

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

(An Autonomous Institute affiliated to JNTUA, Ananthapuramu)

NAAC Accreditation with 'A' Grade, Permanent Affiliation Status from JNTUA

Pasupula Village, Nandikotkur Road, Kurnool – 518002, Andhra Pradesh, India,

www.gpcet.ac.in

CURRICULUM FRAMEWORK

UG - BACHELOR OF TECHNOLOGY

CIVIL ENGINEERING

Under R20 Regulations

B. Tech. - Regular Four-Year Degree Program

(For batches admitted from the Academic Year 2020 - 2021)

(For batches admitted from the Academic Year 2021 - 2022)

(For batches admitted from the Academic Year 2022 - 2023)

&

B. Tech. - Lateral Entry Scheme

(For batches admitted from the Academic Year 2021 - 2022)

(For batches admitted from the Academic Year 2022 - 2023)

(For batches admitted from the Academic Year 2023 - 2024)

G. Pullaiah College of Engineering and Technology

(Autonomous)

(Approved by AICTE | NAAC Accreditation with 'A' Grade | Accredited by NBA (CSE, ECE, CIV & EEE) | Permanently Affiliated to JNTUA)

Nandikotkur Road, Venkayapalli (V), Kurnool - 518452, Andhra Pradesh

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS
GPCET – R20

B.Tech Regular Four Year Degree Programme
(for the batches admitted from the academic year 2020- 2021)
&
B.Tech (Lateral Entry Scheme)
(for the batches admitted from the academic year 2021 - 2022)

Preliminary Definitions and Nomenclature

AICTE: Means All India Council for Technical Education, New Delhi.

Autonomous Institute: Means an institute designated as Autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (**Jawaharlal Nehru Technological University Ananthapur**).

Academic Autonomy: Means freedom to an institute in all aspects of conducting its academic programs, granted by UGC for Promoting Excellence.

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Year: It is the period necessary to complete an actual course of study within a year. It comprises two main semesters i.e., one odd and one even.

Branch: Means specialization in a program like B.Tech degree program in Civil Engineering, B.Tech degree program in Computer Science and Engineering etc.

Board of Studies (BOS): BOS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible for curriculum design and updation in respect of all the programs offered by a department.

Backlog Course: A course is considered to be a backlog course, if the student has obtained a failure grade in that course.

Basic Sciences: The courses offered in the areas of Mathematics, Physics, Chemistry etc., are considered to be foundational in nature.

Commission: Means University Grants Commission (UGC), New Delhi.

Choice Based Credit System: The credit-based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Certificate Course: It is a course that makes a student to have hands-on expertise and skills required for holistic development in a specific area/field.

Compulsory course: Course required to be undertaken for the award of the degree as per the program.

Internal Examination: It is an examination conducted towards sessional assessment.

Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Course: A course is a subject offered by a department for learning in a particular semester.

Course Outcomes: The essential skills that need to be acquired by every student through a course.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student overall the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff, and other resources in the process of study for a degree.

Detention in a Semester: Student who does not obtain minimum prescribed attendance in a Semester shall be detained in that particular Semester. Also a Student can also be detained for lack of required number of credits till II-I/III-I at the end of Second year or Third Year respectively

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal examinations and semester end examinations.

Grade: It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

Institute: Means G.Pullaiah College of Engineering and Technology, Kurnool unless indicated otherwise by the context.

Massive Open Online Courses (MOOC): MOOCs inculcate the habit of self-learning. MOOCs would be additional choices in all the elective group courses.

Minor: Minor are coherent sequences of courses which may be taken in addition to the courses required for the B.Tech degree.

Pre-requisite: A specific course or subject, the knowledge of which is required to complete before student register another course at the next grade level.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: Means, UG degree program: Bachelor of Technology (B.Tech); PG degree program: Master of Technology (M.Tech) / Master of Business Administration (MBA).

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project work: It is a design or research-based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit-based course and is to be planned carefully by the student.

Registration: Process of enrolling into a set of courses in a semester of a program.

Regulations: The regulations, common to all B.Tech programs offered by Institute, are designated as "GPCET Regulations – R20" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 16 to 18 weeks of academic work equivalent to normally90 working days. Odd semester commences usually in July and even semester in December of every year.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at the end of the semester.

Program Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioural.

University: Means Jawaharlal Nehru Technological University Ananthapur (JNTUA), Ananthapuramu.

G. Pullaiah College of Engineering and Technology
(Autonomous)
Academic Regulations
Regulations for Four Year Bachelor of Technology (B.Tech) Degree programme for the batches admitted from the academic year 2020-21
&
For B.Tech Lateral Entry batches admitted from the academic year 2021 -2022

1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B.Tech. degree if he/she fulfils the following academic regulations:

i. Pursues a course of study for not less than four academic years and in not more than eight academic years. However, for the students availing Gap year facility, this period shall be extended by two years at the most and these two years would not be counted in the maximum time permitted for graduation.

ii. Registers for 160 credits and secures all 160 credits.

iii. The student will be eligible to get Under graduate degree with honours or additional minor engineering if he/she completes an additional 20 credits

iv. A student will be permitted to register either for Honours degree or additional minor engineering but not both.

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission stands cancelled.

3. Courses of study

The following courses of study are offered at present as specializations for the B. Tech. course

S.No.	Name of the Branch	Branch Code
1.	Civil Engineering	01
2.	Electrical and Electronics Engineering	02
3.	Mechanical Engineering	03
4.	Electronics and Communication Engineering	04
5.	Computer Science and Engineering	05
6.	Computer Science and Engineering -Artificial Intelligence	31
7.	Computer Science and Engineering -Internet of Things	35

4. Credits:

i. *Credit:* A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture) or two hours of practical work/field work per week.
ii. *Academic Year:* Two consecutive (one odd + one even) semesters constitute one academic year.
iii. *Choice Based Credit System (CBCS):* The CBCS provides choice for students to select from the prescribed courses.

iv. Each course is assigned certain number of credits based on following

	Semester	
	Periods / Week	Credits
Theory	03	03
Tutorial	01	01
Practical	03	1.5
Internship (IV/VI evaluated in V/VII resp.)	-	1.5/3.0
Project work	-	12

5. Course Structure

Every course of the B.Tech program will be placed in one of the 8 categories with minimum credits as listed below.

S.No.	Category	Category Description	Abbreviated Category	Credits
1	Humanities and social science	Humanities and social science including Management courses	HS	10.5
2	Basic Sciences	Basic Science courses	BS	21
3	Engineering Science courses	Engineering Science Courses including workshop, drawing, basics of electrical/mechanical/compute r etc.	ES	24
4	Professional core	Professional core Courses	PC	51
5	Open Electives	Open Elective Courses- from other technical/ emerging and job oriented	OE	12
6	Professional Courses	Professional Elective Courses relevant to chosen specialization/ branch	PE	18
7	Project Work	Project Work, Seminar, Internship in industry elsewhere	PW	16.5
8	Mandatory courses	Environmental Studies, Induction training, Universal human Values, Ethics, Indian Constitution, Essence of Indian Traditional Knowledge (Non-Credit)	MC	0
9	Skill Oriented Courses	Skill Oriented Courses relevant to domain, interdisciplinary, communication skill, industry	SC	10
		Total Credits		160

6. Weightage for course evaluation

6.1 Course Pattern

- The entire course of study is for four academic years. Semester pattern shall be followed in all years.
- A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.
- When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

6.2 Evaluation Process

The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, Internships carried out after IV Semester & VI Semester shall be evaluated for 100 marks each and the Internship along with Project Work carried out in VIII Semester shall be evaluated for 200 marks.

- For theory subjects, the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End-Examination.
- For practical subjects, the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End- Examination.

6.3 Internal Examinations:

i. For theory subjects, during the semester, there shall be two midterm examinations. Each midterm examination consists of objective paper for 10 marks and subjective paper for 30 marks with duration of 1hour 50 minutes (20 minutes for Objective paper and 90 minutes for subjective paper). The marks obtained in subjective paper will be condensed to 20 marks. The remaining 10 marks shall be awarded based on the submission of assignments by the student. A student has to submit two assignments in every subject each for 10 marks.

ii. The objective paper shall consist of 20 objective questions each carrying 0.5 Mark.

iii. Subjective paper shall be set for 30 marks containing3 either or descriptive questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks.
***Note 1: T**he marks obtained in the subjective paper shall be condensed to 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark.

iv. If the student is absent for the internal examination other than the mandatory courses, no re-exam shall be conducted and internal marks for that examination shall be considered zero.

v. First midterm examination shall be conducted for I, II units of syllabus and second midterm examination shall be conducted for III, IV and V units.

vi. Final Internal marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage to the better mid exam and 20% to the other.

6.4 End Examinations:

End examination of theory subjects shall have the following pattern:
There shall be 6 questions and all questions are compulsory. Question 1 shall contain 5 compulsory short answer questions for a total of 10 marks such that each question carries 2 marks. There shall be short answer questions from each unit. In each of the questions from 2 to 6, there shall be either/or type questions of 10 marks each. Student shall answer any one of them. Each of these questions from 2 to 6 shall cover one unit of the syllabus.
End examination of theory subjects consisting of two parts of different subjects, for eg: Electrical & Mechanical Technology, shall have the following pattern:
Question paper shall be in two parts viz., Part A and Part B with equal Weightage. In each part, there shall be 3 either-or type questions each for 10 Marks.

Note: The answers for Part A and Part B shall be written in two separate answer books.

6.5 For practical subjects there shall be a continuous evaluation during the semester for 40 sessional marks and end examination shall be for 60 marks. Day-to-day work in the laboratory shall be evaluated for 40 marks by the concerned laboratory teacher based on the regularity/record/ viva. The end examination shall be conducted by the concerned laboratory faculty and senior expert in the same subject of the department.

For practical subjects there shall be a continuous evaluation during the semester for 30 sessional marks and end examination shall be for 60 marks. Day-to-day work in the laboratory shall be evaluated for 40 marks by the concerned laboratory teacher based on the regularity/record/ viva. The end examination shall be conducted by the concerned laboratory faculty and senior expert inthe same subject of the department.

In a practical subject consisting of two parts (Eg: Electrical & Mechanical Lab), the end examination shall be conducted for 30 marks in each part. Internal examination shall be evaluated as above for 40 marks in each part and final internal marks shall be arrived by considering the average of marks obtained in two parts.

6.6 There shall be mandatory courses with zero credits. There shall be no external examination. However, attendance in the mandatory course shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 40% or more in the internal examinations. In case, the student fails, a re-examination shall be conductedfor failed candidates every six months/semester at a mutually convenient date of college/student satisfying the conditions mentioned in item 1 & 2 of the regulations.

6.7 For the subject having design and/or drawing, such as Engineering Drawing, the distribution shall be 40 marks for internal evaluation and 60 marks for end examination.

Day-to-day work shall be evaluated for 10 marks by the concerned subject faculty based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2 hours each for 40 marks with consideration of 80% weightage to the better mid exam and 20% to the other for the finalization of Internal marks. The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 30 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark. The sum of day-to-day evaluation and the internal test marks will be the final sessional marks for the subject.

In the end examination pattern for Engineering Drawing there shall be 5 questions, either/or type, of 14 marks each. There shall be no objective type questions in the end examination. However, the end examination pattern for other subjects related to design/drawing is mentioned along with the syllabus.

6.8 There shall be five Professional Elective Courses from V Semester to VII and for each elective there shall be choices such that the student shall choose a course from the list of choice courses offered by the department for that particular elective.

6.9 There shall be four Open Electives/ Job Oriented Courses common to all disciplines from V Semester to VII, where in the students shall choose the electives offered by various departments including his/her own department in such a manner that he/she has not studied the same course in any form during the Programme.

The students shall be permitted to pursue up to a maximum of two elective courses under MOOCs (Massive Open Online Courses) offered by NPTEL notified by the Department during the semester. Each of the Courses must be of minimum 12 weeks in duration. The student has to acquire a certificate for the concerned course from the NPTEL during the semester only in order to earn 3 Credits.

6.10 There shall be a mandatory **induction program** for three weeks before the commencement of first semester.

6.11 Minor in a discipline (Minor degree/programme) concept is introduced in the curriculum for all conventional B. Tech programmes in which it offers a major. The main objective of Minor in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.

a. Students who have a CGPA of 8.0 or above (up to II semester) and without any backlog subjects will be permitted to register for Minor discipline programme. A SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor discipline registration active else Minor discipline registration will be cancelled.
b. Students aspiring for a Minor must register at the beginning of IV Semester and must opt for a Minor in a discipline other than the discipline he/she has registered in.
c. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying four theory subjects each for 4 credits and two MOOCs offered by NPTEL (notified by the Department corresponding to the Minor Programme) each for 2 credits and with a minimum duration of 8 weeks.
d. The student has to acquire a certificate for the concerned course from the NPTEL in order to earn 2 Credits.
e. Students are not allowed to register and pursue more than two courses in any semester. Students may complete the Minor before VIII semester.
f. Each department shall enlist a set of subjects from its curriculum which are core for the discipline without any prerequisites. The Evaluation pattern of theory subjects will be similar to the regular programme evaluation.
g. Students are not allowed to pursue minor discipline programme subjects under Self-study. Classes for the courses of the minor shall be conducted beyond the regular hours.
Student may enlist their choices of Minor discipline programmes in order of preference, to which they wish to join. It will not be permissible to alter the choices after the application has been submitted. However, students are allowed to opt for only one Minor discipline programme in the order of preference given by the student.

h. Minimum strength for offering Minor in a discipline is considered One-Fifth (i.e., 20% of the class) of the class size and Maximum size is Four-Fifth of Class size (i.e., 80% of the class).

i. Completion of a Minor discipline programme requires no addition of time to the regular Four year Bachelors' programme. That is, Minor discipline programme should be completed by the end of final year B. Tech. program along with the major discipline.

j. The Concerned Head of the department will arrange separate course/class work and time table of the various Minor programmes. Attendance regulations for these Minor discipline programmes will be as per regular courses.

k. A Student registered for Minor in a discipline shall pass in all subjects that constitute the requirement for the Minor discipline programme. No class/division (i.e., second class, first class and distinction etc.) shall be awarded for Minor discipline programme.

l. In case a student drops or fails to meet the CGPA requirement for Degree with Minor at any point after registration, he/she will be dropped from the list of students eligible for Degree with Minor and the student will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioned the additional courses completed by them.

m. This Minor in a discipline will be mentioned in the degree certificate as Bachelor of Technology in XXX with Minor in YYY. For example, Bachelor of Technology in **Computer Science & Engineering** with Minor in **Electronics & Communication Engineering**. The fact will also be reflected in the transcripts, along with the list of courses for Minor programme with CGPA mentioned separately.

6.12 Honors degree in a discipline:

a. This concept is introduced in the curriculum for all conventional B. Tech. programmes. The main objective of Honors degree in a discipline is to provide additional learning opportunities for academically motivated students and it is an optional feature of the B. Tech. programme.

b. A student shall be permitted to register for Honors program at the beginning of IV Semester provided that the student must have acquired a minimum of 8.0 SGPA up to the end of second semester without any backlogs. SGPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Honors discipline registration active else Honors discipline registration will stand cancelled.

c. In order to earn the Honors degree in his/her discipline, a student has to earn 20 extra credits by studying four advanced specified courses for 16 credits and acquiring the remaining 4 credits through two MOOCs offered by NPTEL which are domain specific in the branch of Engineering concerned, each for 2 credits and with a minimum duration of 8 weeks.

d. The student has to acquire a certificate for the concerned course from the NPTEL in order to earn 3 Credits.

e. The Evaluation pattern of theory subjects shall be similar to the regular programme evaluation.

f. If a student drops or is terminated from the Honors program, the additional credits earned till that time cannot be converted into free or core electives; they will remain extra. These additional courses will find mention in the transcript (but not in the degree certificate). In such cases, the student may choose between the actual grade or a "pass (P)" grade and also choose to omit the mention of the course as for the following:

   i. All the courses done under the dropped Honors will be shown in the transcript. (or)

   ii. None of the courses done under the dropped Honors will be shown in the transcript.

g. In case a student fails to meet the CGPA requirement for Degree with Honors at any point after registration, he/she will be dropped from the list of students eligible for Degree with Honors

and the student will receive regular B.Tech degree only. However, such students will receive a separate grade sheet mentioning the additional courses completed by them.

h. Honors must be completed simultaneously with a major degree program. A student cannot earn Honors after he/she has already earned bachelor's degree.

6.13 National Service Scheme (NSS)/Yoga is compulsory for all the Undergraduate students. The student participationshall be for a minimumperiod of 45 hours during the first year. Gradeswillbe awardedasVery good, Good, Satisfactory in the mark sheet on the basis of participation, attendance, performance and behaviour. If a student gets Unsatisfactorygrade, he/she has to repeat the above activity in the subsequent years along withthe next yearstudents.

6.14 Students shall undergo two summer internships each for a minimum of six weeks duration at the end of second and third years of the programme for 1.5 credits & 3 credits respectively.The organizationin which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising Head of Department and two senior faculty. The student shall submit a detailed technical report along with internship certificate from the Internship organization in order to obtain the prescribed credits. The student shall submit the Internship Project Report along with Certificate of Internship. The evaluation of the first and second summer internships shall be conducted at the end of the V Semester & VII semester respectively.

There shall be internal evaluation for 100 marks and there shall not be external evaluation. The Internal Evaluation shall be made by the departmental committee (Head of the Department and two senior faculty of the department) on the basis of the project report submitted by the student.

Completion of the internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship in the subsequent summer provided that the student doesn't pursue two summer internships in the same summer.

Community Service Project focussing on specific local issues, shall be an alternative to the six weeks of summer Internship, whenever there is any emergency and when students cannot pursue their summer internships. The Community Service Project shall be for 6 weeks in duration which includes preliminary survey for 1 week, community awareness programs for one week, community immersion program in consonance with Government agencies for 3 weeks and a community exit report (a detailed report) for one week. The community service project shall be evaluated for 100 marks by the internal departmental committee comprising Head of the Department and two senior faculty of the department. **However, the first priority shall be given to the internship.**

6.15 There shall also be a mandatory full internship in the final semester (VIII Semester) of the Programme along with the project work. The organization in which the student wishes to carry out the Internship need to be approved by Internal Department Committee comprising Head of the Department and two senior faculty. The faculty of the respective department monitors the student internship program along with project work. At the end of the semester, the candidate shall submit a certificate of internship and a project report. The project report and presentation shall be internally evaluated for 60 marks by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. The Viva-Voce shall be conducted for 140 marks by a committee consisting of HOD, Project Supervisor and an External Examiner.

Completion of internship is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such a case, the student shall repeat the internship along with project work for next six months.

6.16 There shall be five skill-oriented courses offered during III semester to VII semester. Out of the five skill courses, two shall be skill-oriented programs related to the domain and thesetwoshall be completed in second year. Of the remaining three skill courses, one shall necessarily be a soft skill course and the remaining 2 shall be skill-advanced courses either from the same domain or Job oriented skill courses, which can be of inter disciplinary nature.

The student can choose between a skill advanced course being offered by the college or to choose a certificate course being offered by industries/Professional bodies/APSSDC or any other accredited bodies which are duly approved by the Internal Department Committee. Thecreditsassignedto theskill advancedcourseshall be awarded to the studentuponproducingthe Course Completion Certificate from theagencies/professionalbodies.

The Internal Department Committee comprising Head of Department and two senior faculty shall evaluate the grades/ marks awarded for a course by external agencies and convert to the equivalent marks/grades.

7. Attendance Requirements:

- A student shall be eligible to appear for external examination and promoted to next semester, if he/she acquires a minimum attendance of 40% in every subject (Theory/Laboratory) being offered in that semester along with an aggregate attendance of 75% of all the subjects (Theory/Laboratory) offered in that semester.
- Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee. However, a student who has been condoned for shortage of attendance need to acquire a minimum of 40% in each subject (Theory/ Laboratory) being offered in that semester.
- Shortage of Attendance below 65% in aggregate shall in NO case be condoned.
- Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that class and their examination registration shall stand cancelled.
- A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek re-admission for that semester when offered next.
- A stipulated fee shall be payable towards condonation of shortage of attendance to the college.

8. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7

8.1 A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project, if he/she secures notless than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In case of mandatory courses, internships, project work viva – voce, he/she should secure 40% of the total marks.

8.2 A student shall be promoted from II to III year only if he/she fulfils the academic requirement of securing 40% of the credits in the subjects that have been studied up to III Semester from the following examinations.

One regular and two supplementary examinations of I Semester.
One regular and one supplementary examination of II Semester.
One regular examination of III semester.

8.3 A student shall be promoted from III year to IV year only if he/she fulfils the academic requirements of securing 40% of the credits in the subjects that have been studied up to V semester from the following examinations, irrespective of whether the candidate takes the end examination or not asper the normal course of study.

One regular and four supplementary examinations of I Semester.
One regular and three supplementary examinations of II Semester.
One regular and two supplementary examinations of III Semester.
One regular and one supplementary examinations of IV Semester.
One regular examination of V Semester.

And if a student is detained for want of credits for particular academic year by sections 8.2 and above, the student may make up the credits through supplementary examinations and onlyafter securing the required credits he/she shall be permitted to join in the V Semester or VII Semester as the case may be.

8.4 A student shall register and put up minimum attendance in all 160 credits and earn all the 160 credits. Marks obtained in all 160 credits shall be considered for the calculation of aggregate percentage of marks obtained.

Students who fail to earn 160 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

9. Course Pattern:

(i) A student eligible to appear for the end examination in a subject, but absent or has failed in the end examination may appear for that subject at the next supplementary examination when offered.

When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

(ii) **With–holding of Results**:

If any case of indiscipline or malpractice is pending against candidate, the result of the candidate shall be with held and he/she will not be allowed/promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

(iii) Grading

After each subject is evaluated for 100 marks, the marks obtained in each subject will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Table – Conversion into Grades and Grade Points assigned

Range in which the marks in the subject fall	Grade	Grade Points Assigned
≥ 90	S (Superior)	10
80-89	A (Excellent)	9
70-79	B (Very Good)	8
60-69	C (Good)	7
50-59	D (Average)	6
40-49	E (Below Average)	4
< 40	F (Fail)	0
Absent	Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered. Same is the case with a student who obtains 'Ab' in end examination.

For **mandatory** courses "Satisfactory" or "Unsatisfactory" shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

10. Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

(i) The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$\text{SGPA} = \frac{\sum_{i=1}^{n} C_i \times GP_i}{\sum_{i=1}^{n} C_i}$$

where, C_i is the number of credits of the ith subject and GP_i is the grade point scored by the student in the ith course.

(ii) The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$\text{CGPA} = \frac{\sum_{j=1}^{m} SGPA_j \times TC_j}{\sum_{j=1}^{m} TC_j}$$

where "$SGPA_j$" is the SGPA of the jth semester and TC_j is the total number of credits in that semester.

(iii) Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

(iv) While computing the SGPA, the subjects in which the student is awarded Zero grade points will also be included.

(v) *Grade Point:* It is a numerical weight allotted to each letter grade on a 10-point scale.

(vi) *Letter Grade:* It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

11. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. degree, he/she shall be placed in one of the following four classes.

Class Awarded	**CGPA Secured**
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 4.0 < 5.5

12. Gap Year:

Gap year concept of Student Entrepreneur in Residence shall be introduced and outstanding students who wish to pursue entrepreneurship are allowed to take a break of one year at any time after II year to pursue entrepreneurship full time. This period may be extended to two years at the most and these two years would not be counted for the time for the maximum time for graduation. An evaluation committee shall be constituted by the College to evaluate the proposal submitted by the student and the committee shall decide whether or not to permit the student(s) to avail the Gap Year.

13. Transitory Regulations:

Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfilment of academic regulations. Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, and they will be in the academic regulations into which they get readmitted.

Candidates who were permitted with Gap Year shall be eligible for rejoining into the succeeding year of their B. Tech from the date of commencement of class work, and they will be in the academic regulations into which the candidate is presently re-joining.

14. Minimum Instruction Days:
The minimum instruction days including exams for each semester shall be 90 days.

15. Medium of Instruction
The Medium of Instruction is **English** for all courses, laboratories, internal and external examinations and project reports.

16. Rules of Discipline

(i) Use of mobile phones with camera, in the campus is strictly prohibited.

(ii) Students shall behave and conduct themselves in a dignified and courteous manner in the campus/Hostels.

(iii) Students shall not bring outsiders to the institution or hostels.

(iv) Students shall not steal, deface, damage or cause any loss to the institution property.

(v) Students shall not collect money either by request or coercion from others within the campus or hostels.

(vi) Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, code or data without appropriate acknowledgement or permission of the original source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by oneself shall also be considered as cases of plagiarism.

(vii) Use of vehicles by the students inside the campus is prohibited.

(viii) Any conduct which leads to lowering of the esteem of the organization is prohibited.

(ix) Any material to be uploaded to social media sites need to be approved by Head of the Department concerned/Dean/Principal.

(x) Any student exhibiting prohibited behaviour shall be suspended from the institute. The period of suspension and punishment shall be clearly communicated to the student. The student shall lose the attendance for the suspended period

(xi) Dress Code

Boys : All the boy students should wear formal dresses. Wearing T-shirts and other informal dresses in the campus is strictly prohibited.

Girls : All the girls students shall wear saree/chudidhar with dupatta

17. Punishments for Malpractice cases – Guidelines

The examinations committee may take the following guidelines into consideration while dealing with the suspected cases of malpractice reported by the invigilators/squad members etc; during end examinations. The punishment may be more severe or less severe depending on the merits of the individual cases.

S.No.	Nature of Malpractice/Improper conduct	Punishment
1	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cellphones, pager, palm computers or any other form of material concerned with or related to the course of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the course of the examination).	Expulsion from the examination hall and cancellation of the performance in that course only.
2	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or	Cancellation of the performance in that course.

	writes to the examiner requesting him to award pass marks.	
3	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that semester/year examinations.
4	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the students involved. In case of an outsider, he will be handed over to the police and a case shall be registered against him.
5	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
6	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
7	Smuggles in the Answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeit of seat.
8	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses of that semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case shall be registered against them.

	engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
9	Leaves the exam hall taking away answer script or intentionally tears up the script or any part there of inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The candidate is also debarred for two consecutive semesters from classwork and all end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
10	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The student is also debarred and forfeits the seat.
11	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in S.No7 to S.No 9.	For Student of the college: Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case shall be registered against them.
12	Impersonates any other student in connection with the examination	The student who has impersonated shall be expelled from examination hall. The student is debarred from writing the remaining exams, and rusticated from the college for one academic year during which period the student will not be permitted to write any exam. If the imposter is an outsider, he will be handed over to the police and a case shall be registered against him. The performance of the original student who has been impersonated, shall be cancelled in all the courses of the examination including practicals and project work of

		that semester/year. The student is rusticated from the college for two consecutive years during which period the student will not be permitted to write any exam. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
13	If any malpractice is detected which is not covered in the above S.No 1 to S.No 12 items, it shall be reported to the college academic council for further action and award suitable punishment.	
14	Malpractice cases identified during sessional examinations will be reported to the examination committee nominated by Academic council to award suitable punishment.	

ACADEMIC REGULATIONS FOR B. TECH.(R20)
(LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2021-2022 and onwards)

1. Award of B.Tech. Degree

A student admitted in Lateral Entry Scheme (LES) will be declared eligible for the award of the B.Tech degree if he fulfils the following academic regulations:

(a) Pursues a course of study for not less than three academic years and in not more than six academic years.
(b) Registers for 121 credits and secures all *121* credits from III semester to VIII semester of Regular B. Tech. program.
(c) Students, who fail to fulfil the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.
(d) The regulations **3** to 7 are to be adopted as that of B. Tech. (Regular).

2. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.7.

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. For the Seminar & Comprehensive viva-voce he should secure 40% in the internal evaluation.

ii. A student shall be promoted from third year to fourth year only if he/she fulfils the academic requirements of *40%* credits obtained till III-I from the following examinations, irrespective of whether the candidate takes the end examination or not as per the normal course of study.

One regular and Two supplementary examinations of III semester.
One regular and one supplementary examinations of IV semester.
One regular examination of V semester.

And in case a student is already detained for want of credits for particular academic year, the student may make up the credits through supplementary exams of the above exams before the commencement of VII semester class work of next year.

3. Course Pattern

- The entire course of study is three academic years on semester pattern.
- A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.
- When a student is detained due to lack of credits/shortage of attendance he may be re-admitted when the semester is offered after fulfilment of academic regulations, he shall be in the academic regulations into which he is readmitted.

4. The regulations **9** to **10** are to be adopted as that of B. Tech. (Regular).

5. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree, he/she shall be placed in one of the following four classes:

Class Awarded	**CGPA Secured**	From the Aggregate Marks secured for 121 Credits (i.e II Year to IV Year)
First Class with Distinction	≥ 7.5	
First Class	≥ 6.5 < 7.5	
Second Class	≥ 5.5 < 6.5	
Pass Class	≥ 4.0 < 5.5	

6. The regulations **11** to **17** are to be adopted as that of B. Tech. (Regular). All other regulations as applicable for B. Tech. Four-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

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(An Autonomous Institution affiliated to JNTU, Ananthapuramu)

DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

0 SEMESTER (I YEAR)									
S.No	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P		Internal	External	Total
20SIP01	Physical Activities - Sports, Yoga and Meditation, Plantation	MC	0	0	6	0	-	-	-
20SIP02	Career Counselling/Lectures by eminent people	MC	2	0	2	0	-	-	-
20SIP03	Orientation to all branches - career options, tools, etc.	MC	3	0	0	0	-	-	-
20SIP04	Orientation on admitted Branch - corresponding labs, tools and platforms	EC	1	0	4	0	-	-	-
20SIP05	Proficiency Modules & Productivity Tools	ES	2	1	2	0	-	- http://www.gpcet.ac.in/	-
20SIP06	Assessment on basic aptitude and mathematical skills	MC	1	0	4	0	-	-	-
20SIP07	Remedial Training in Foundation Courses	MC	2	1	2	0	-	-	-
20SIP08	Universal Human Values, painting, sculpture, pottery, music, dance	MC	1	0	2	0	-	-	-
20SIP09	Communication Skills - focus on Listening, Speaking, Reading, Writing skills, debates, enacting a play.	BS	2	1	2	0	-	-	-
		TOTAL	14	3	24	0			-

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PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

I SEMESTER (I YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30002	Mathematics-I	BS	3	0	0	3	40	60	100
A30003	Engineering Physics	BS	3	0	0	3	40	60	100
A30501	Computer Programming	ES	3	0	0	3	40	60	100
A30001	Communicative English	HS	3	0	0	3	40	60	100
A30301	Engineering Graphics and Computer aided Drafting	ES	1	0	4	3	40	60	100
A30006	Communicative English Lab	HS	0	0	3	1.5	40	60	100
A30007	Engineering Physics Lab	BS	0	0	3	1.5	40	60	100
A30502	Computer Programming Lab	ES	0	0	3	1.5	40	60	100
	TOTAL		13	00	13	19.5	320	480	800

II SEMESTER (I YEAR)									
S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30010	Mathematics-II	BS	3	0	0	3	40	60	100
A30012	Engineering chemistry	BS	3	0	0	3	40	60	100
A30505	C and Data Structures	ES	3	0	0	3	40	60	100
A30303	Engineering Mechanics	ES	3	0	0	3	40	60	100
A30302	Engineering Workshop	ES	1	0	4	3	40	60	100
A30013	Engineering Chemistry Lab	BS	0	0	3	1.5	40	60	100
A30506	C and Data Structures Lab	ES	0	0	3	1.5	40	60	100
A30304	Applied Mechanics Lab	ES	0	0	3	1.5	40	60	100
A30032	Universal Human Values	MC	2	0	0	0	100*	-	100*
	TOTAL		15	00	13	19.5	320	480	800

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B. TECH – CIVIL ENGINEERING

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30014	Transform Techniques and Numerical Methods	BS	3	0	0	3	40	60	100
A30101	Strength of Materials-I	PC	3	0	0	3	40	60	100
A30102	Surveying	PC	3	0	0	3	40	60	100
A30701	Managerial Economics and Financial Analysis	HS	3	0	0	3	40	60	100
A30103	Fluid Mechanics	PC	3	0	0	3	40	60	100
A30104	Strength of Materials Lab	PC	0	0	3	1.5	40	60	100
A30105	Surveying Lab	PC	0	0	3	1.5	40	60	100
A30106	Fluid Mechanics Lab	PC	0	0	3	1.5	40	60	100
A30107	Building Construction and Planning	SC	1	0	2	2	40	60	100
A30035	**Universal Human Values**	MC	3	0	0	3	40	60	100
	TOTAL		**19**	**0**	**11**	**24.5**	**400**	**600**	**1000**

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30011	Probability and Statistics	ES	3	0	0	3	40	60	100
A30108	Hydraulics and Hydraulic Machinery	BS/PC	3	0	0	3	40	60	100
A30109	Strength of Materials-II	PC	3	0	0	3	40	60	100
A30110	Structural Analysis	PC	3	0	0	3	40	60	100
A30111	Water Resources Engineering	PC	3	0	0	3	40	60	100
A30112	CAD Lab-I	PC	0	0	3	1.5	40	60	100
A30113	Engineering Geology Lab	PC	0	0	3	1.5	40	60	100
A30114	Hydraulic Machinery Lab	PC	0	0	3	1.5	40	60	100
A30115	Basics of RS and GIS	SC	1	0	2	2	40	60	100
	TOTAL		**16**	**00**	**11**	**21.5**	**360**	**540**	**900**
Internship 2 Months (Mandatory) during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

* The marks for Mandatory Courses are not considered for calculating SGPA

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V SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30116	Design & Drawing of Reinforced Concrete Structures	PC	3	0	0	3	40	60	100
A30117	Geotechnical Engineering	PC	3	0	0	3	40	60	100
A30118	Environmental Engineering	PC	3	0	0	3	40	60	100
	Open Elective-1	OE	3	0	0	3	40	60	100
	Professional Elective-1	PE	3	0	0	3	40	60	100
A30119	Soil Mechanics Lab	PC	0	0	3	1.5	40	60	100
A30120	Environmental Engineering Lab	PC	0	0	3	1.5	40	60	100
A30121	Construction Planning and Project Management	SC	1	0	2	2	40	60	100
A30034	Gender sensitization	MC	2	0	0	0	100*	0	100*
	Internship 2 Months (Mandatory) during summer vacation (to be evaluated during V Semester)	PW	0	0	0	1.5	100	0	100
TOTAL			**18**	**0**	**8**	**21.5**	**420**	**480**	**900**
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	**40**	**60**	100

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B. TECH – CIVIL ENGINEERING

VI SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30122	Concrete Technology	PC	3	0	0	3	40	60	100
A30123	Design of Steel Structures	PC	3	0	0	3	40	60	100
A30124	Transportation Engineering	PC	3	0	0	3	40	60	100
	Professional Elective-2	PE	3	0	0	3	40	60	100
	Open Elective-2	OE	3	0	0	3	40	60	100
A30125	Concrete Technology Lab	PC	0	0	3	1.5	40	60	100
A30126	Transportation Engineering Lab	PC	0	0	3	1.5	40	60	100
A30127	CAD Lab-II	PC	0	0	3	1.5	40	60	100
A30128	Estimation Costing and Valuation	SC	1	0	2	2	40	60	100
A30033	Indian Constitution and Multiculturalism	MC	2	0	0	0	100*	0	100*
TOTAL			18	00	10	21.5	360	630	1000
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									

* The marks for Mandatory Courses are not considered for calculating SGPA

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VII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	Professional Elective-3	PE	3	0	0	3	40	60	100
	Professional Elective-4	PE	3	0	0	3	40	60	100
	Professional Elective-5	PE	3	0	0	3	40	60	100
	Open Elective-3	OE	3	0	0	3	40	60	100
	Open Elective-4	OE	3	0	0	3	40	60	100
A30022	**Professional Ethics**	HS	3	0	0	3	40	60	100
A30131	**ETABS LAB**	SC	1	0	2	2	40	60	100
A30132	**Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester**	PW	0	0	0	3	100	0	100
TOTAL			**19**	**00**	**2**	**23**	**380**	**420**	**800**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

***There is a provision for the Universities/Institutions to implement AICTE mandatory course "Universal Human Values 2: Understanding Harmony" under Humanities and social science Elective in seventh semester for 3 credits.**

VIII SEMESTER (IV YEAR)									
Course Code	Title of the Course	gory	Periods per Week			Cre dits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	Externa l	Total
A30134	Project (Major Project) Project work, seminar and internship in industry (Internship along with Project Work)	PW	0	0	0	12	60	140	200
Internship (6 Months)									
	TOTAL		**0**	**0**	**0**	**12**	**60**	**140**	**200**

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PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

Professional Electives

Professional Elective – 1	
Course Code	**Title of the Course**
A30151	Advanced Structural Analysis
A30152	Green Buildings
A30153	Watershed Management
A30154	Disaster Management and Mitigation
A30171	Engineering Geology
Professional Elective – 2	
Course Code	**Title of the Course**
A30155	Ground Improvement Techniques
A30156	Earthquake Engineering
A30157	Engineering Hydrology
A30158	Air Pollution and Control
Professional Elective – 3	
Course Code	**Title of the Course**
A30159	Bridge Engineering
A30160	Pavement Analysis and Design
A30161	Hydropower Engineering
A30162	Cost Effective Housing Techniques
A30173	Ground Improvement
Professional Elective – 4	
Course Code	**Title of the Course**
A30163	Pre-stressed Concrete
A30164	Urban Transportation and Planning
A30165	Rehabilitation and Retrofitting of Structures
A30166	Industrial Waste Management
A30175	Geometric Design of Highways
Professional Elective – 5	
A30167	Traffic Engineering
A30168	Environmental Impact Assessment and Management
A30169	Foundation Engineering
A30170	Design and Drawing of Irrigation Structures
A30178	Municipal Solid Waste Management

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Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A33147	Machine Learning Essentials	3-0-0	3	CAI
A33148	Software Testing	3-0-0	3	CAI
A33149	Knowledge Representation and Reasoning	3-0-0	3	CAI
A33150	Agile Methodologies	3-0-0	3	CAI
A33545	Fundamentals of Computer Networks	3-0-0	3	CSO
A33546	Internet of Things Fundamentals	3-0-0	3	CSO
A33547	Sensor Networks	3-0-0	3	CSO
A33548	Cloud Computing	3-0-0	3	CSO
A30181	Basic Civil Engineering	3-0-0	3	CE
A30182	Building Planning and Construction	3-0-0	3	CE
A30183	Disaster Management	3-0-0	3	CE
A30184	Water Resources Conservation	3-0-0	3	CE
A30281	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A30282	Renewable Energy Sources	3-0-0	3	EEE
A30283	Electrical Measuring Instruments	3-0-0	3	EEE
A30284	Control Systems Engineering	3-0-0	3	EEE
A30381	Optimization Techniques	3-0-0	3	ME
A30382	Mechanical Technology	3-0-0	3	ME
A30383	Introduction to Automobile Systems	3-0-0	3	ME
A30481	Basic Electronics	3-0-0	3	ECE
A30482	Introduction to Communication Systems	3-0-0	3	ECE
A30483	Fundamentals of IOT	3-0-0	3	ECE
A30484	Introduction to Embedded Systems	3-0-0	3	ECE
A30485	CISCO Networking	3-0-0	3	ECE
A30474	Introduction to internet of things	3-0-0	3	ECE
A30581	Basic Data Structures	3-0-0	3	CSE
A30582	Fundamentals of DBMS	3-0-0	3	CSE
A30583	Basics of Software Engineering	3-0-0	3	CSE
A30584	Python for Everyone	3-0-0	3	CSE
A30585	Computer Organization and Operating Systems	3-0-0	3	CSE
A30586	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A30587	Fundamentals of Web Technologies	3-0-0	3	CSE
A30588	Introduction to Java Programming	3-0-0	3	CSE
A30579	The Joy of Computing using Phyton	3-0-0	3	CSE
A30081	Research Methodology	3-0-0	3	H&S
A30082	Intellectual Property Rights	3-0-0	3	H&S
A30083	National Service Scheme	3-0-0	3	H&S
A30084	Yoga	3-0-0	3	H&S
A30085	Design Thinking	3-0-0	3	H&S
A30086	Management Science	3-0-0	3	H&S
A30087	Entrepreneurship Development	3-0-0	3	H&S
A30094	Entrepreneurship	3-0-0	3	H&S

Mandatory Courses

Course Code	Title of the Course
A30031	Environmental Science
A30032	Human Values and Professional Ethics
A30033	Indian Constitution and Multiculturalism
A30034	Gender Sensitization

COURSE STRUCTURE

I - SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

I SEMESTER (I YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30002	Mathematics-I	BS	3	0	0	3	40	60	100
A30003	Engineering Physics	BS	3	0	0	3	40	60	100
A30501	Computer Programming	ES	3	0	0	3	40	60	100
A30001	Communicative English	HS	3	0	0	3	40	60	100
A30301	Engineering Graphics and Computer aided Drafting	ES	1	0	4	3	40	60	100
A30006	Communicative English Lab	HS	0	0	3	1.5	40	60	100
A30007	Engineering Physics Lab	BS	0	0	3	1.5	40	60	100
A30502	Computer Programming Lab	ES	0	0	3	1.5	40	60	100
		TOTAL	13	00	13	19.5	320	480	800

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A40002 – MATHEMATICS – I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Solution of system of linear equations, Eigen values and Eigen vectors, Quadratic forms, Functions of single variable, Roll's theorem, legranges mean value theorem, Cauchy mean value theorem, multivariable calculus, jacobian, maxima &minima. Evaluate the double and Triple integrals and its applications, Special functions. The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program

Course Pre/co requisites

- Linear Algebra
- Differentiation
- Integration

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A40002.1 Develop the use of matrix algebra techniques that is needed by engineers for practical Applications.

A30002.2 Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem.

A30002.3 Utilize mean value theorems to real life problems.

A30002.4 Familiarize with functions of several variables which is useful in optimization.

A30002.5 Apply important tools of calculus in higher dimensions and will become familiar with 2-dimensional coordinate systems.

A30002.6 Analyze 3- dimensional coordinate systems and utilization of special functions.

3. Course Syllabus

UNIT-I: Matrix Operations and Solving Systems Of Linear Equations

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Clayey-Hamilton theorem (without proof), finding inverse and power of a matrix by Clayey-Hamilton theorem, Diagonalisation of a matrix.

UNIT-II: Quadratic forms

Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof).

UNIT-III: Multivariable Calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers with three variables only**.**

UNIT-IV: Double Integrals

Double integrals, change of order of integration change of variable from Cartesian to polar coordinates, double integration in polar coordinates, areas enclosed by plane curves**.**

UNIT-V:TripleIntegrals and Special Functions

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

4. Books and Materials

Text Books:

1. Erwin Kreyszig, *Advanced Engineering Mathematics,* 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, *Higher Engineering Mathematics*, 44/e, Khanna publishers, 2017.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, 3/e, Alpha Science International Ltd., 2002.
2.George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus,* 13/e, Pearson Publishers, 2013.
3. Glyn James, *Advanced Modern Engineering Mathematics*, 4/e, Pearson publishers, 2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30003 – ENGINEERING PHYSICS
(Common to CE &ME)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering. To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of engineering physics has been thoroughly revised keeping in view of the basic needs of all engineering branches by including the topics like mechanics, acoustics, material properties, lasers and fiber optics ,superconductors are introduced, The applications of nanomaterials relevant to engineering branches are to be familiarized.

Course Pre/co-requisites

Bridge Course

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30003.1 Apply mechanics for solving engineering problems

A30003.2 Apply the principles of acoustics for noise cancellation and in designing buildings

A30003.3 Analyse the applications of ultrasonics in various engineering fields

A30003.4 Explain the principles of physics in dielectrics and magnetic materials

A30003.5 Interpret the concepts of lasers and optical fibers in various applications

A30004.6 Elucidate the applications of superconductors and nanomaterilas

3. Course Syllabus

UNIT I **8 hrs**

Mechanics – Basic laws of vectors and scalars, conservative forces F = - grad V and angular momentum, Newton's laws in inertial and linear accelerating non-inertial frames of reference, rotating frame of reference with constant angular velocity, Centrifugal and Coriolis forces, Effect of Coriolis force due to Earth's rotation, qualitative explanation of Foucault's pendulum-rigid body, angular momentum, moment of inertia, Moment of Inertia of a fly wheel and circular Disc.

UNIT II

ACOUSTICS AND ULTRASONICS **10 hrs**

Acoustics: Classification of Sound, decibel, Weber–Fechner law – Sabine's formula, derivation using growth and decay method – Absorption coefficient and its determination – factors affecting acoustics of buildings and their remedies.

Ultrasonics: Introduction-magnetostriction effect and piezo electric effect-Production of ultrasonics by magnetostriction and piezoelectric methods, acoustic grating-Determination of velocity of

ultrasonics by using acoustic diffraction- Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications, Sonogram.

UNIT III

DIELECTRIC AND MAGNETIC MATERIALS **8 hrs**

Dielectric Materials: Introduction to Dielectrics - Types of polarizations-Electronic and ionic polarizations with mathematical Derivations-orientation polarization(quantitative) -Frequency dependence of polarization-Lorentz(internal) field-Claussius -Mosotti equation-Applications of Dielectrics.

Magnetic Materials: Introduction to Magnetics--Classification of Magnetic materials-Weiss theory of ferromagnetism (qualitative)-Hysteresis-soft and hard magnetic materials-Ferrites and garnets and its applications.

UNIT IV

LASERS AND FIBEROPTICS **8 hrs**

LASERS: Introduction - Characteristics of Laser - Spontaneous and Stimulated emission of radiation - Einstein's coefficients - Population inversion - Pumping Mechanisms - He-Ne laser, Nd- YAG laser - Semiconductor laser - Applications of lasers

Fiber Optics: Introduction-Total Internal Reflection-Construction of optical fibers, Critical angle of propagation-Acceptance Angle-Numerical Aperture-Classification of optical fibers- Fiber optic Communication system – Applications of optical fibers.

UNIT V

SUPERCONDUCTORS AND NANO MATERIALS **8 hrs**

Superconductors: Superconductors-Properties- Meissner effect-BCS Theory- AC & DC Josephson Effect -Types of Superconductors-High $T_c$superconductors-Applications.

Nanomaterials: Introduction-significance of nanoscale-Basic Principles of Nano materials –Properties of nanomaterials: Optical, Electrical, Thermal, Mechanical and Magnetic properties -Synthesis of nanomaterials: Top-down and bottom-up approach methods-Ball milling-chemical vapour deposition method-Applications of Nano materials.

4. Books and Materials

Text Book(s):

1. Gaur R.K. and Gupta S.L., "*Engineering Physics*"-Dhanpat Rai publishers, 2012.
2. M.N.Avadhanulu&P.G.Kshirsagar"*A Text book of Engineering Physics*"-S.Chand Publications,2017
3. T.MadhuMohan,T.VijayaKrishna,B.K.Pandey,Manoj.K.Harbola,S.Chaturvedi, "*Engineering Physics*", Cengage,2019.

Reference Book(s)

1. M K Varma "*Introduction to Mechanics*"-Universities Press-2015.
2. D.K. Bhattacharya and A. Bhaskaran, "*Engineering Physics*"- Oxford Publications-2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30501 – PYTHON PROGRAMMING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course covers the basic programming and demonstrates fundamental programming techniques. This course helps the students gaining the knowledge to write python language applications, mathematical and engineering problems.Helps to undertake future courses that assume this programming language as a background in computer programming**.**

Course Pre/Co-requisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30501.1 Comprehend the fundamental concepts of computer hardware and problem solving Abilities.

A30501.2 Knowledge on the basic concepts of algorithms, flow charts and python programming.

A30501.3 Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.

A30501.4 Interpret the importance of functions in programming

A30501.5 Analyze and modularize the problem and its solution by using functions.

A30501.6 Ability to relate the concepts of strings, files and pre-processors to the real world Applications.

3. Course Syllabus

Introduction to Computers and Problem Solving Strategies -Introduction, Defining a Computer, History of Computers, Characteristics of Computers, Classification of Computers, Applications of Computers, Components and Functions of a Computer System, Concept of Hardware and Software, Central Processing Unit(CPU),I/O Devices, Computer Memory, Classification of Computer Software, Problem Solving Strategies, Program Design Tools.

Basics of Python Programming – Introduction to computer and python programming, History of python, Basics of python programming, python character set, tokens, data types, output function, multiple assignments, formatting numbers and strings.

Operators and Expressions -Arithmetic Operators, Comparison Operators, Assignment and In- place or Shortcut Operators, Unary Operators, Bitwise Operators, Shift Operators, Logical Operators, Membership Operators, Identity Operators, Operator Precedence and Associatively, Expressions in Python.

Decision statements -Boolean type, Boolean operators, numbers, strings with Boolean operators, decision making statements, conditional expressions.

Loop control statements -while loop, range function, for loop, nested loops, break and continue statements.

Data Structures -Sequence, Lists, Tuples, Sets, Dictionaries. Functional Programming -filter(), map(), reduce() , Python Strings.

Functions -Basics of functions, syntax, use of a function, local and global scope of a variable, return statement, recursive functions, lambda functions, parameters and arguments in functions.

Modules -The from…import statement, Name of Module, Making your own Modules, dir() function, The Python Module, Modules and Namespaces, Packages in Python, Standard Library modules, Globals(), Locals() and Reload(), Function Redefinition.

Exceptions -Introduction, Handling Exceptions, Multiple Except Blocks, else Clause, Raising Exceptions, finally Block, Re-raising Exception.

File Handling -Introduction, Need of file handling, text input and output files, seek function, binary files. Extracting data from a file and performing some basic operations on it.

4. Books and Materials

Text Book(s)

1. Programming and problem solving with python by Ashok NamdevKamthane,Amit Ashok Kamthane., McGraw-Hill Education.
2. Python programming using problem solving approach by ReemaThareja, Oxford.

Reference Book(s)

1. Martin C.Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3. Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly, 2016.

OR

4. http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30001 – COMMUNICATIVE ENGLISH

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Course Pre/co-requisites:

The course has no specific pre/co-requisites

Course Outcomes(COs)

After the completion of the course, the student will be able to:

A30001.1 Remember the concepts which the student has learnt previously and identifying their connection

A30001.2 Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English

A30001.3 Apply grammatical structures to formulate sentences and correct word forms

A30001.4 Analyze discourse markers to speak clearly on a specific topic in informal discussions

A30001.5 Evaluate reading/listening texts and to write summaries based on global Comprehension of these texts.

A30001.6 Create a coherent paragraph interpreting a figure/graph/chart/table

Course Syllabus

UNIT – I

Listening: Listening for comprehension.
Speaking: Introducing oneself and describing people, places and objects.
Reading: Skimming and scanning pieces of information.
Writing: Summary writing.
Grammar and Vocabulary: Sentences and Clauses. Preposition, Parts of speech. One word substitutes.
Text: On the Conduct of Life: William Hazlitt. If: Rudyard Kipling

UNIT –II

Listening: Listening for purpose.
Speaking: Short structured talks on specific topics.
Reading: Identifying and recognizing verbal techniques to link the ideas in a paragraph.
Writing: Mechanics of writing. (Punctuation)
Grammar and Vocabulary: Articles. Parts of speech. Synonyms.
Text: The Brook: Alfred Tennyson
Self-Improvement- How I Became a Public Speaker: George Bernard shaw

UNIT –III

Listening: Listening for global comprehension.
Speaking: Discussing and reporting on specific topics.
Reading: Reading for comprehension
Writing: Paragraph writing.
Grammar and Vocabulary: Noun-Pronoun Agreement. Subject-Verb Agreement. Antonyms.
Text: The Death Trap: Saki
Time Management: On Saving Time: Seneca

UNIT –IV

Listening: Predicting conversation/transactional dialogues
Speaking: Role Plays
Reading: Interpreting the graphic elements in the text.
Writing: Information Transfer. Letter writing (formal and Informal). Essay Writing
Grammar and Vocabulary: Misplaced Modifiers. Degrees of Comparisions.
Text: ChinduYellamma
Innovation: Muhammad Yunus

UNIT – V

Listening: Listening comprehension.
Speaking: Formal Oral Presentations.
Reading: Reading for comprehension
Writing: Summary writing. Technical Report writing.
Grammar and Vocabulary: Spotting the errors. Idioms and Phrases.
Text: Politics and the English Language: George Orwell
The Dancer with a White Parasol: Ranjana Dave

4. Books and Materials

Text Book:
Language and Life:A Skills Approach, Orient BlackSwan, Hyderabad. 2018.

Reference Books:

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30301-ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	4	14	0	56	3	40	60	100

3. Course Description

Course Overview

This course teaches the practices for accuracy and clarity in presenting the technical information in the form of drawings and the utility of drafting & modelling packages in orthographic and isometric drawings. It enables the student to understand and develop engineering imagination essential for successful design and familiarize how industry communicates technical information.

Course Pre/co-requisites

The course has no specific prerequisite and co-requisites

4. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30301.1 Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
A30301.2 Apply orthographic projection concepts to draw projections of points, lines, planes and solids.
A30301.3 Apply development concepts to draw development of surfaces of simple solids.
A30301.4 Apply isometric projection concepts to draw isometric projections of right regular solids
A30301.5 Apply orthographic projection concepts to convert isometric view to orthographic views.
A30301.6 Make use of AutoCAD Software to draw 2D diagrams of various objects

3. Course Syllabus

PART -A

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance – Drawing Instruments and their Use – Conventions in Drawing – Lettering – BIS Conventions.

Curves used in Engineering Practice:

a) Conic Sections- Ellipse, Parabola & Hyperbola – General method only.

b) Rectangular Hyperbola – General method only.

c) Cycloid, Epicycloids and Hypocycloid

UNIT II

Projection of Points: Principles of Orthographic Projection, Conventions, First and Third Angle Projections, Projections of Points.

UNIT III

Projection of Lines: Projection of Lines in simple positions, inclined to one or both planes, Finding True lengths.

Projections of Planes: Projections of regular Plane surfaces in simple position, inclined to one plane.

UNIT IV

Projections of Solids: Projections of Regular Solids in simple position, axis inclined to one of the planes.

Developments of Solids: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid and Cone.

UNIT V

Isometric and Orthographic Projections: Principles of Isometric Projection –Isometric Scale – Isometric Views– Isometric Views of Lines, Plane Figures, Simple Solids(Cube, Prism, Cone & Cylinder).Conversion of Isometric view to Orthographic Views.

PART –B (PRACTICEONLY)

Introduction to Computer Aided Drafting:

Introduction to AutoCAD Software, setting of units and drawing limits, producing drawings by using Absolute, Relative and Polar coordinate input entry methods, drawing simple figures, applying dimensions to objects and Editing options

4. Books and Materials

Text Book(s):

K.L. Narayana and P. Kannaih ,*Engineering Drawing*, Scitech Publications, 2nd edition,2011.

Reference Book(s)

1. N.D. Bhatt, *Engineering Drawing,* Charotar Publishing House,53rd Edition2016.
2. K. Venugopal,*Engineering Drawing and Graphics,* New age International Publishers,5th edition, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30006 – COMMUNICATIVE ENGLISH LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

A well equipped and well maintained language lab is maintained in the college to hone the communication skills of students. The students are trained in developing their communication skills through this system. **The** language lab lessons engaged in this college facilitates classroom engagement and interaction via computer based exercises and activities to maximize language immersion. It focuses on acquiring and developing the four main language skills of a student, namely; listening, speaking, reading and writing along with adequate grammar and vocabulary building exercises as well.

Course Objectives:

1. Students will be exposed to a variety of self-instructional, learner friendly modes of language learning
2. Students will cultivate the habit of reading passages from the computer monitor. Thus Providing them with the required facility of ace computer based competitive exams like GRE, TOEFL, and GMAT etc.
3. Students will learn better pronunciation through stress, intonation and rhythm
4. Students will be trained to use language effectively to face interviews, group discussions, Public speaking
5. Students will be initiated into greater use of the computer in resume preparation, Report writing, format making etc

Course Pre/co requisites

A30001-Communicative English

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30006.1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
A30006.2	Apply communication skills through various language learning activities
A30006.3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
A30006.4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
A30006.5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
A30006.6	Improve upon speaking skills over telephone, role plays and public speaking

3. Course Syllabus

List of topics to be covered:

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons
4. JAM
5. Small talks on general topics (Hypothetical situations)
6. Debates
7. Situational dialogues –Greeting and Introduction
8. Reading passages (TOEFL, IELTS)- Summarizing and Note making.
9. Vocabulary Building
10. Asking for Information and Giving Directions
11. Information Transfer
12. Non-verbal Communication –Dumb Charades
13. Oral Presentations
14. Précis Writing and Paraphrasing
15. Spotting errors

4. Books and Materials

Text Books:

1. *Language and Life:A Skills Approach.* Orient BlackSwan: Hyderabad. 2018.
2. Rizvi, M. Ashraf. Effective Technical Communication. Noida:McGraw-Hill Education. 2009.

Reference Books:

1. Dhanavel, S P. English for Communication Skills for Students of Science and Engineers. New Delhi: Mittal Books India. 2009.
2. Lewis, Norman. Word Power made Easy. Haryana:Penguin Random House India. 2009.
3. Mohan, Krishna and N P Krishna. *Speaking English Effectively.* India: MacMillan.2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30007 – ENGINEERING PHYSICS LABORATORY (COMMON TO CE & ME)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course imparts practical and conceptual knowledge of Engineering Physics applicable to the domain of civil and mechanical engineering. The laboratory work of the course is aimed to ensure that the student comprehends the concepts of Engineering Physics through demonstrable and executable experiments. This course will enable the student to determine the rigidity modulus of wire, moment of inertia of fly wheel, ultrasonic velocity in liquid, Poisson's ratio of aluminum and rubber, spring constant , numerical aperture and acceptance angle of an optical fiber, wavelength of laser source, hair size, verification of Hooke's law and three laws of a stretched string, study the magnetic field along the axis of a current carrying coil, B-H Curve and strain measurement by using strain gauge.

Course Pre/co-requisites:

A30003-Engineering Physics

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30007.1	Estimate the mechanical properties of materials
A30007.2	Determine moment of inertia of a flywheel
A30007.3	Measure the velocity of ultrasonics in liquid by applying the basic concepts of ultrasonics
A30007.4	Determine the wavelength of laser, particle size, numerical aperture and acceptance angle by applying the principles of lasers and optical fibres
A30007.5	Measure the elastic constants, Poisson's ratio of the material
A30007.6	Measure the strain of the metal bar by using strain gauge.

3. Course Syllabus

(Any 12 of the following)

1. Parallelogram law of co-planar forces
2. Rigidity modulus of material of a wire-dynamic method (torsional pendulum)
3. Moment of inertia by Flywheel
4. Determination of ultrasonic velocity in liquid (Acoustic grating)
5. Determination of dielectric constant by charging and discharging method.
6. Magnetic field along the axis of a circular coil carrying current
7. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
8. Determination of Numerical Aperture and acceptance angle of an optical fibre

9. LASER: Determination of wavelength of laser source by using diffraction grating

10. LASER: Determination of Particle size (hair) by using laser source

11. Study of Strain Measurement by using Strain Gauge.

12. Sonometer: Verification of the three laws of stretched strings

13. Poisson's Ratio of aluminum and rubber

14. Determination of the elastic constants of the material of a flat spiral spring

15. Determination of the spring constant of the material of a flat spiral spring

4. Laboratory Equipment/Software/Tools Required

1. Torsion Pendulum
2. Fly Wheel
3. Laser Source
4. B-H Curve kit
5. Strain Gauge
6. Acoustic Grating
7. Optical Fiber Kit
8. Optical Fiber sensor
9 .Stewart-Gee's Apparatus
10. Poisson's Ratio Apparatus

5. Books and Materials

Text Book(s):

S.Balasubramanian,M.N.Srinivasan "A *Text book of Practical Physics*"- S. Chand Publishers, 2017.

Reference Book(s)

https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=802&cnt=1.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30502 – PYTHON PROGRAMMING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This lab helps the students gaining the knowledge to write python language applications, mathematical and engineering problems. Helps the students to apply python programming libraries in solving the computational problems.

Course Pre/Co-requisites

A30501-Python Programming

.Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30502.1 Design solutions to mathematical problems & Organize the data for solving the Problem.

A30502.2 Understand and implement modular approach using python

A30502.3 Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc.

A30502.4 Understands about files and its applications.

A30502.5 Develop real-world applications, files and exception handling provided by python

A30502.6 Select appropriate programming construct for solving the problem

2. Course Syllabus

Experiment-1 a) Running instructions in Interactive interpreter and a Python Script.
b) Write a program to compute distance between two points taking input from the user

Experiment-2 a) Write a Program for checking whether the given number is a even number or not.
b) Using a for loop, write a program that prints out the decimal equivalents of 1/2, 1/3, 1/4, . . ,1/10

Experiment-3 a) Write a program using a while loop that asks the user for a number, and prints a countdown from that number to zero.
b) By considering the terms in the Fibonacci sequence whose values do not exceed four million, find the sum of the even-valued terms.

Experiment-4 a) Write a Python program to check if a number is a perfect number.
b) Write a Python program to check if a number is a strong number.

Experiment-5 a) Write a program to count the number of characters in the string and store them in a

dictionary data structure.
b) Python program to split a string based on a delimiter and join the string using another delimiter.

Experiment-6 a) Python Program to Convert Decimal to Binary, Octal and Hexadecimal without using built in methods.
b) Write a function nearly equal to test whether two strings are nearly equal. Two strings a and b are nearly equal when a can be generated by a single mutation on b.

Experiment-7 a) Write a function dups to find all duplicates in the list.
b) Write a function cumulative product to compute cumulative product of a list of numbers.

Experiment-8 a) Write a function reverse to reverse a list. Without using the reverse function.
b) Write function to compute gcd, lcm of two numbers using recursion.

Experiment-9 a) Write a program to perform addition of two square matrices.
b) Write a program to perform multiplication of two square matrices.

Experiment-10 a) Write a program to print each line of a file in reverse order.
b) Write a program to compute the number of characters, words and lines in a file.

3. Laboratory Equipment/Software/Tools Required

Open source scripting language (Spyder, pyscripter and etc), Python IDLE, Anaconda

4. Books and Materials

Text Book(s)

1. Allen B. Downey, "Think Python: How to Think like a Computer Scientist", 2nd edition, O'Reilly, 2016.
   Or
   http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
2. Algorithmic Problem Solving with Python, John B. Schneider ,Shira Lynn Broschat, Jess Dahmen.
3. Think in Python, Allen Downey, Green Tea Press, Needham, Massachusetts.

Reference Book(s)

1) Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016.
2) DainelY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019.

COURSE STRUCTURE

II - SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

II SEMESTER (I YEAR)									
S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30010	Mathematics-II	BS	3	0	0	3	40	60	100
A30012	Engineering chemistry	BS	3	0	0	3	40	60	100
A30505	C and Data Structures	ES	3	0	0	3	40	60	100
A30303	Engineering Mechanics	ES	3	0	0	3	40	60	100
A30302	Engineering Workshop	ES	1	0	4	3	40	60	100
A30013	Engineering Chemistry Lab	BS	0	0	3	1.5	40	60	100
A30506	C and Data Structures Lab	ES	0	0	3	1.5	40	60	100
A30304	Applied Mechanics Lab	ES	0	0	3	1.5	40	60	100
A30032	Universal Human Values	MC	2	0	0	0	100*	-	100*
	TOTAL		15	00	13	19.5	320	480	800

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30010 – MATHEMATICS – II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Linear Differential Equations of Higher Order, Equations Reducible to Linear Differential Equations and Applications, Partial Differential Equations – First order, Multi variable Calculus (Vector differentiation & Integration). Mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Pre/co requisites

- Calculus
- Vectors

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30010.1	Apply the mathematical principles to solve second and higher order differential equations.
A30010.2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
A30010.3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
A30010.4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs.
A30010.5	Analyze the vector calculus involving divergence, curl and their properties alongwith vector identities.
A30010.6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

3. Course Syllabus

UNIT-I: Differential Equations of First and Higher Order

Formation of differential equations,solutions to First order differential equations(Exact &Reducible to Exact),Higher order linear differential equations , complete solution, operator D, Solution of homogeneous &Non-Homogeneous linear differential equations, method of variation of parameters.

UNIT-II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

UNIT-III: Partial Differential Equations – First order

Formation of PDE by the elimination of arbitrary constants and arbitrary functions. solutions of first order linear and non-linear Partial differential equations (f(p,q) = 0,f(z,p,q) = 0,f(x,p) = F(y,q) ,Z = px +qy+f(x,y) ,f(x,y,z,p,q) = 0(Charpit's method)). Solutions of homogeneous higher order linear partial differential equations with constant coefficients.

UNIT-IV: Vector differentiation

Scalar and vector point functions, vector differential operator(DEL) Gradient,Directional derivatives,normal to surface, Divergence,Solenoidal vector and Curl, Irrational vector,vector identities.

UNIT-V: Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).Problems related to Green's, Stokes,Divergence theorems.

4. Books and Materials

Textbooks:

1. Erwin Kreyszig, *Advanced Engineering Mathematics,* 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, *Higher Engineering Mathematics*, 44/e, Khanna publishers, 2017.

References:

1. R. K. Jain and S. R. K. Iyengar, *Advanced Engineering Mathematics*, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, *Thomas Calculus,* 13/e, Pearson Publishers, 2013.
3. Glyn James, *Advanced Modern Engineering Mathematics*, 4/e, Pearson publishers, 2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30012 – ENGINEERING CHEMISTRY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course acquaints the students with different softening methods and develops the study of electrochemical cells, types of batteries and their applications, Interactions between them, emphasizing their properties and indicating some applications. It deals with more advanced topics, familiarises engineering material, their properties and applications which provides the student to impart knowledge on corrosion and its significance, to explain nano and Smart materials and their uses.

Course Pre/Co requisites

Bridge Course

2. Course Outcomes (COs)

After the completion of the course, the student will be able to

A30012.1 To illustrate the molecular orbital energy levels for different molecular species and Apply Schrodinger wave equation and particle in a box.

A30012.2 To differentiate between pH metry, Potentiometric and conductometric titrations.

A30012.3 Explain the preparation properties and applications of polymers and describe the mechanism of conduction in conducting polymers.

A30012.4 Understand the principles of different analytical instruments and explain their applications.

A30012.5 Explain the concept of nano clusters nano wires and characterize the applications of SEM & TEM.

A30012.6 Explain of different types of colloids, their preparations, properties and applications

3. Course Syllabus

Unit – 1 : Structure and Bonding Models: Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2 , applications to hydrogen, Particle in a box model , molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O_2 and CO, etc. calculation of bond order, crystal field theory – salient features – energy level diagrams for transition metal ions – splitting in octahedral and tetrahedral environments- Applications of CFT (magnetic properties and colour).

Unit- 2: Electrochemistry and Applications: Electrodes – concepts, reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode) electrochemical cell, Nernst equation, cell potential calculations, numerical problems. Photovoltaic cell &photo galvanic cells – working and applications. Primary cells – Zinc-air battery, alkali metal sulphide batteries, Secondary cells – lead acid and lithium batteries. Fuel cells - Hydrogen-oxygen & Methanol fuel cells – working and applications.

Unit - 3: PolymerChemistry: Introduction to polymers, Basic Concepts, Chain growth and Step growth polymerization, copolymerization (stereo specific polymerization) with specific examples. Mechanisms of polymer formation. Plastomers: Thermoplastics and Thermosetting, Preparation, properties and applications of – Bakelite, Nylons. Elastomers: Buna-S, Buna-N–preparation, properties and applications. Conducting polymers – polyacetylene, polyaniline – mechanism of conduction and applications.

Unit – 4: Instrumental MethodsandApplications: Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. Principle and applications of pH metry, potentiometer, Conductometry, UV-spectroscopy, IR Spectroscopy. Chromatography- Basic principle- TLC- Separation of organic mixtures

Unit – 5: Nano materials and Colloidal chemistry:

Nano materials : Introduction to nano materials: Nano particles, nano clusters, (CNT's) and nano wires. Chemical synthesis of nano materials- Sol gel method. Characterization: principle and application of scanning electron microscope (SEM) and Transmission Electron Microscope (TEM).

Colloidal chemistry: Introduction to colloidal chemistry - colloidal, Micelle formation, synthesis of colloids (any two methods with examples), properties and applications.

4. Books and Materials

Text Books:

1. Jain and Jain*, Engineering Chemistry,* 16/e, Dhanpat Rai,2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' *Physical Chemistry,* Oxford University Press,2010.
3. K N Jayaveera, G V Subba Reddy and C Rama Chandraiah*, Engineering Chemistry* Mc Graw Hill Education (India) Pvt Ltd, New Delhi 2016
4. B.K Sharma *Engineering Chemistry,* Krishna Prakashan, Meerut.

Reference Books:

1. J. D. Lee*, Concise Inorganic Chemistry,* 5/e, Oxford University Press,2008.
2. Skoog and West*, Principles of Instrumental Analysis,* 6/e,Thomson,2007.
3. Ben L. Feringa and Wesley R. Browne*, Molecular Switches,* 2/e, Wiley-VCH,2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30505-C AND DATA STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The aim of this course is to provide insight in C programming concepts and organizing many data types logically in a way data can easily be accessed, modified, and configured. It covers the concepts of C Data types, Control Statements, Arrays, Functions, Structures, files, along with data structure concepts such as Stacks, Queues, Linked Lists, with standard algorithms for searching and sorting. It improves the problem-solving ability of a learner to a great extent.

Course Pre/co requisites

- Computer Programming
- Mathematics

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30505.1 Apply fundamental programming concepts of C for solving general purpose problems.

A30505.2 Implement functions for organized software development.

A30505.3 Apply various operations on linear data structures.

A30505.4 Design techniques for efficient searching and sorting of a given application.

A30505.5 Develop programs on stacks and Queues for real time applications

A30505.6 Analyze Linear and nonlinear programming for efficiency.

3. Course Syllabus

Unit-I

Data Types, Operators and Control Statements- Data Types and Sizes, Variables, Constants, Operators, Type Conversions, Precedence and Order of Evaluation, Control statements.

Unit-II

Arrays-Indexing**,** Array Initialization,One Dimensional Array, Two-Dimensional Array**,** Variable Length Arrays, Functions.

Unit-III

Structures, Unions, Storage Class Specifiers, Bit Fields, Enumerations, typedef, Pointers, Files- read, append and write operations.

Unit-IV

Sorting Techniques- Selection Sort, Bubble Sort, Quick Sort, **Searching Techniques** -Sequential Search, Binary Search, Hashed List Searches.

Unit-V

Linked lists- Definition, Single linked list, Circular linked list, Double linked list, Circular Double linked list, Application of linked lists. **Stacks**- Definition, Representation of Stack, Stack Operations, **Queues**- Definition, Representations of Queues, Queue Operations

4. Books and Materials

Text Book(s)

1. Herbert Schildt. *The Complete Reference C*. Fourth Edition, McGraw-HillEducation, 2008.
2. DebasisSamanta. *Classic Data Structures*. Second Edition, PHI,2009.

Reference Book(s)

1. Horowitz, Sahni, Anderson Freed. Fundamentals of Data Structures in C.2nd Edition, Universities Press.
2. Ron S.Gottfried, Programming with C, 3rd Edition, TMH, 2011.
3. G A VijayalakshmiPai. *Data Structures and Algorithms*. TMH, 2008.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30303- ENGINEERING MECHANICS

(Common to CE & ME)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Engineering Mechanics is the branch of science for analyzing force systems that acts upon the bodies at either at rest or in motion. The knowledge of mechanics helps us in designing the various parts of machine elements. The course content is designed in such a way that the balancing of various mechanical systems could be achieved by the calculations of center of gravity and moment of inertia. The effects of friction and the consequences of frictional forces on the mating parts will be analyzed to design various systems with negligible effort loss.

Course Pre/co-requisites

A30303-Engineering Physics

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30303.1	Analyze the basic concepts of rigid bodies subjected to different types of loads and supports.
A30303.2	Analyze the motion of the bodies considering friction and external loads.
A30303.3	Determine centroids, centre of gravity, moment of inertia of simple and composite figures.
A30303.4	Analyze the motion of particle without considering forces and considering forces, develop equations for different motions.
A30303.5	Apply Newton's laws and conservation laws to elastic collisions and motion of rigid bodies.
A30303.6	Analyze the perfect frames using different methods and concepts of Mechanical vibrations.

3. Course Syllabus

UNIT I

Introduction to Engineering Mechanics – Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams –Types of Supports – Support reactions for beams with different types of loads.

UNIT II

Friction: Friction covering, types of friction, limiting friction, laws of Friction, static and dynamic friction, motion of bodies, ladder friction, wedge friction.

UNIT III

Centroid and Center of Gravity: Centroids of simple figures, centroids of composite sections. Centre of gravity and its implications, centre of gravity of composite sections.

Moment of Inertia: Area & Mass moment of Inertia – radius of gyration, parallel axis– perpendicular axis theorem – simple Problems.

UNIT IV

Kinematics: Equations of motion for rigid bodies, constant and variable acceleration, rectilinear and curvilinear motion, motion under gravity -projectile motion, problems on kinematics

Kinetics: Principles of dynamics - Newton's Laws of motion, D'Alembert's principle in rectilinear translation, principle of work and energy, problems on kinetics.

UNIT V

Analysis of Perfect Frames: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

Mechanical Vibrations: Definitions, concepts-simple harmonic motion-Free vibrations-Simple, compound and torsional pendulum- simple problems

4. Books and Materials

Text Book(s):

1. S S Bhavikatti, *Engineering Mechanics*, 4th edition, New Age International, 2008.

2. S. Timoshenko, D. H. Young and J. V. Rao, *Engineering Mechanics*, Tata McGraw-Hill Company, 2013

Reference Book(s)

1. R. K. Bansal, *Engineering Mechanics*, Lakshmi Publications, 2007.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30302 – ENGINEERING WORKSHOP

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	3	40	60	100

1. Course Description

Course Overview

This course introduces students to the basic concepts related to Engineering workshop and also imparts the knowledge about usage of the tools. This course familiarizes students with woodworking, wel din g, sheet metal operations, fitting and electrical house wiring skills. This knowledge enables the students to fabricate, manufacture or work with materials.

Course Pre/co-requisites

This course has no Pre/co-requisites

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30302.1 Apply wood working skills to make products.

A30302.2 Perform metal cutting operations in the fitting section to make models.

A30302.3 Perform simple welding operations to join to metal pieces.

A30302.4 Apply sheet metal working skills to make required models.

A30302.5 Evaluate the performance analysis of various pumps and turbines.

A30302.6 Perform general maintenance works on own at house/ work place.

3. Course Syllabus

1. **FittingTrade–**Making ofaL-fitfromthegivenM.SFlatmaterialpiece.
2. **FittingTrade–**Making ofaSquare jointfromthegivenM.SFlatmaterialpiece.
3. **CarpentryTrade–**Making of acrosslapjointasperspecification.
4. **CarpentryTrade-**Tomakeadovetailjointasperspecification.
5. **TinSmithy**–Making ofanopenscoopwiththegivensheetmetal
6. **TinSmithy**–Making ofasquare tinwiththegivensheetmetal
7. **Foundry:**Preparation ofasandmouldusingasinglepiecepattern
8. **Welding**: Preparation of a single V butt joint
9. **Welding**: Preparation of single lap joint
10. **House Wiring:** One bulb connected by oneone-way switch

11. **House Wiring:** One bulb connected by twoTwo- way switches
12. **House Wiring:** Staircasewiring
13. **House Wiring:**Tubelightwiring
15. **House Wiring:** Go-DownWiring

4. Laboratory Equipment/Software/Tools Required

1. Fitting bench wise
2. Hack saw frame
3. Carpentry benchwise
4. Jack plane
5. Snip tool
6. Nose player
7. Cope & Drag
8. Sprue
9. Welding machine
10. House wiring set up

5. Books and Materials

Text Book(s)

P.N. Rao, *Manufacturing Technology*, Volume-I, Tata McGraw Hill, 4th edition, 2013.

Reference Book(s)

1. Schmid and Kalpakjin, *Manufacturing Technology*, Pearson education, 7thedition, 2014.

2. P. N. Rao, *Manufacturing Technology*, *Foundry forming and welding*, Volume-I, McGraw Hill education, 5th edition, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30013 – ENGINEERING CHEMISTRY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

- This course introduces the basic concepts of practical understanding of the redox reactions which is the foundation for engineering discipline.
- The emphasis of this course is laid on the basics of the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineers these to suit diverse applications which includes the hygiene accepts of water would be in a position to design methods to Produce Portable water using modern technology.

Course Pre/co requisites:

A30012- Engineering Chemistry

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30013.1	Determine the cell constant and conductance of solutions
A30013.2	Prepare advanced polymer materials.
A30013.3	Determine the physical properties like surface tension, adsorption and viscosity
A30013.4	Estimate the Iron and Calcium in cement
A30013.5	Calculate the hardness of water and calculation of dissolved oxygen percentages
A30013.6	Determination of percentage of Iron in Cement sample by colorimetry

Course Syllabus

1. Determination of Hardness of a groundwater and tap water sample.
2. Determination of dissolved oxygen in the given samples by using Winkler's method
3. Estimation of active chlorine content in Bleaching powder.
4. Determination of cell constant and conductance of solutions
5. Potentiometry - determination of redox potentials and EMFs
6. Determination of Strength of an acid in Pb-Acid battery
7. Preparation of a polymer (Bakelite)
8. Determination of viscosity of the solutions using Viscometer-I-
9. Determination of viscosity of the solutions using Viscometer-II
10. Estimation of Calcium in Portland Cement
11. Determination of percentage of Iron in Cement sample by colorimetry
12. Preparation of nanomaterials by precipitation method.

3. Laboratory Requirements

1. Conductivity meter
2. Potentiometer
3. Viscometer-I
4. Viscometer-II
5. Colorimeter

4. Books and Materials **Reference Book(s):**

1. Mendham J, Denney RC, Barnes JD, Thosmas M and Sivasankar B Vogel's *Quantitative Chemical Analysis* 6/e, Pearson publishers (2000).

2. N.K Bhasin and Sudha Rani *Laboratory Manual on Engineering Chemistry* 3/e, Dhanpat Rai Publishing Company (2007).

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30506-C AND DATA STRUCTURES LABORATORY

(COMMON TO CIVIL AND MECHANICAL)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course provides practical experience in using C language and Data structures. This course covers C fundamentals, Structures, Unions, Files, Searching and sorting techniques, Stacks, Queue and Linked list concepts. It improves the problem-solving ability of a learner to a great extent.

Course Pre/co requisites

- Computer Programming
- C and Data Structures

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30506.1 Develop fundamental programs in C for solving general purpose problems.

A30506.2 Implement functions for reusability and easy maintenance

A30506.3 Apply various operations on linear data structures.

A30506.4 Design techniques for efficient searching and sorting of a given application.

A30506.5 Develop programs on stacks and Queues for real time applications.

A30506.6 Apply Linear and nonlinear programming for efficiency.

3. Course Syllabus

1. Write a C program to find the roots of a Quadratic equation**.**
2. Write a C program to check whether the number is prime or not.
3. Write a C program to generate multiplication tables from 11 to 20.
4. Write a C program to find the maximum of a set of numbers.
5. Write a C program to generate Pascal Triangle.
6. Write a C program to read two matrices and print their sum and product in the matrix form.
7. Write a C program to accept a line of characters and print the number of Vowels, Consonants, blank spaces, digits and special characters.
8. Write a C program to merge two files.
9. Write C programs using recursion for finding GCD and LCM of two numbers.
10. Write a C program to exchange two numbers using pointers.
11. Write a program to perform Linear Search on the elements of a given array.
12. Write a program to perform Binary Search on the elements of a given array.

13. Write a C program to sort a list of elements using the bubble sort algorithm.
14. Write a C program to sort a list of elements using the merge sort algorithm.
15. Write a C program to sort a list of elements using the quick sort algorithm.
16. Write a C Program to Implement a Stack using an Array.
17. Write a C Program to Implement a Queue using an Array.
18. Write a program in C to create and display Singly Linked List.
19. Write a program in C to create and display a doubly linked list.
20. Write a program in C to create and display a circular linked list.

4. Laboratory Equipment/Software/Tools Required

C Compiler, GCC, Dev C++, Turbo C Editor

5. Books and Materials

Text Book(s)

1. Herbert Schildt. *The Complete Reference C*. Fourth Edition, McGraw-HillEduction, 2008.
2. DebasisSamanta. *Classic Data Structures*. Second Edition, PHI,2009.

Reference Book(s)

1. Horowitz, Sahni, Anderson Freed. Fundamentals of Data Structures in C.2nd Edition, Universities Press.
2. Ron S.Gottfried, Programming with C, 3rd Edition, TMH, 2011.
3. G A VijayalakshmiPai. *Data Structures and Algorithms*. TMH, 2008.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30304 APPLIED MECHANICS LABORATORY
(Common to CE & ME)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

2. Course Description

Course Overview

This course imparts intensive and extensive practical knowledge on the concepts of Engineering Mechanics in the field of mechanical engineering. This course provides the knowledge in deflection of various beams, efficiencies, velocity ratio and mechanical advantage of single and double gear crab. This lab is aimed at making the student understand the concepts of Engineering Mechanics through demonstrable experiments. The student should be able to develop practical capabilities, so that they can apply the knowledge gained in this course to solve complex engineering problems.

Course Pre/Co-requisites:

A30303- Engineering Mechanics
A30003- Engineering Physics

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30304.1	Acquire knowledge of static and dynamic behaviour of the bodies.
A30304.2	Verify the Principle of moments using the bell crank lever apparatus.
A30302.3	Determine velocity ratio, mechanical advantage and efficiency of single and double gear crab
A30304.4	Determine the velocity ratio of the machine and to interpret the law of machine
A30304.5	Analyze the coefficient of static friction between two surfaces
A30304.6	Apply laws of mechanics to determine efficiency of simple machines with consideration of friction

3. Course Syllabus

1. To conduct Bending Test on Simply Supported Beam
2. To find experimentally the reactions at the supports of a simply supported beam and verify the same with analytical values
3. To verify the Principle of moments using the Bell Crank lever apparatus.
4. To determine the coefficient of Static Friction between two surfaces
5. To conduct Bending Test on Cantilever Beam.
6. To estimate the acceleration due to gravity using a compound pendulum
7. To understand the gear arrangement and establish the law of machine
8. To compare the efficiency of Single and Double Gear Crab
9. To establish law of machine
10. To understand the velocity ratio of the machine and to interpret the law of machine

4. Laboratory Equipment/Software/Tools Required

1. Bell crank lever
2. Friction Plane
3. Single and Double Gear Crab
4. Compound Pendulum
5. Simply Supported and Cantilever beam

5. Books and Materials

Text Book(s):

1. S S Bhavikatti, *Engineering Mechanics*, 4th edition, New Age International, 2008.

2. S. Timoshenko, D. H. Young and J. V. Rao, *Engineering Mechanics*, Tata McGraw-Hill Company, 2013

Reference Book(s)

1. R. K. Bansal, *Engineering Mechanics*, Lakshmi Publications,2007.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30032-UNIVERSAL HUMAN VALUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	3	100		100

1. Course Description

Course Overview:

This course is aimed at giving inputs that will help to ensure the right understanding and right feelings in the students in their life and profession, enabling them to lead an ethical life. In this course, the students learn the process of self-exploration, the difference between the Self and the Body, the naturally acceptable feelings in relationships in a family, the comprehensive human goal in the society, the mutual fulfillment in the nature and the co-existence in existence. As a natural outcome of such inputs, they are able to evaluate an ethical life and profession ahead.

Course Pre/Co-requisites:

The course has no specific pre/co-requisites

Course Outcomes(COs)

After the completion of the course, the student will be able to:

A30032.1 Understand the significance of value inputs in a classroom and start applying them in their life and profession

A30032.2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.

A30032.3 Understand the value of harmonious relationship based on trust and respect in their life and profession

A30032.4 Understand the role of a human being in ensuring harmony in society and nature.

A30032.5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

A30032.6 Analyze the value of maintaining ethical values in critical situations

Course Syllabus

UNIT – I

Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance'and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT –II

Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and
enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I',
Understanding the harmony of I with the Body: Sanyam and Swasthya; correctappraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya

UNIT –III

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship, Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

UNIT –IV

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

UNIT – V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics:

a) Ability to utilize the professional competence for augmenting universal human order,b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models

Case studies of typical holistic technologies, management models and production, systems, Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b) At the level of society: as mutually enriching institutions and organizations

4. Books and Materials

Text Book:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Reference Books:

1. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.

2. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.

3. A N Tripathy, 2003, Human Values, New Age International Publishers.

4. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.

5. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books

COURSE STRUCTURE

III - SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30014	Transform Techniques and Numerical Methods	BS	3	0	0	3	40	60	100
A30101	Strength of Materials-I	PC	3	0	0	3	40	60	100
A30102	Surveying	PC	3	0	0	3	40	60	100
A30701	Managerial Economicsand Financial Analysis	HS	3	0	0	3	40	60	100
A30103	Fluid Mechanics	PC	3	0	0	3	40	60	100
A30104	Strength of Materials Lab	PC	0	0	3	1.5	40	60	100
A30105	Surveying Lab	PC	0	0	3	1.5	40	60	100
A30106	Fluid Mechanics Lab	PC	0	0	3	1.5	40	60	100
A30107	Building Construction and Planning	SC	1	0	2	2	40	60	100
A30035	Universal Human Values	MC	3	0	0	3	40	60	100
	TOTAL		19	0	11	24.5	400	600	1000

* The marks for Mandatory Courses are not considered for calculating SGPA

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30014 –TRANSFORM TECHNIQUES AND NUMERICAL METHODS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Theory of transforms (Laplace transforms, Fourier transforms) and Fourier series, solutions of algebraic & transcendental equations, Interpolation, curve fitting, Numerical solutions of differentiation, Integration, solutions of ODE of first order. The mathematical skills developed through this course form a necessary base to analyze and design problems encountered in their Engineering specialization.

Course Pre/corequisites

A30002 – Mathematics – I
A30010 – Mathematics – II

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30014.1 Apply Laplace transforms to solve ordinary differential equations.

A30014.2 Build Fourier series and Fourier transforms of a given function.

A30014.3 Apply numerical methods to solve algebraic and transcendental equations.

A30014.4 Derive interpolating polynomials using interpolation formulae

A30014.5 Solve differential and integral equations numerically

3. Course Syllabus

UNIT I

Laplace transforms and Inverse Laplace transforms: Laplace transform of standard functions, Inverse transform – First shifting, Theorem, transforms of derivatives and integrals – Unit step function – Second, shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function, Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT II

Fourier series &Fourier transforms: Fourier series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic Continuation – Half-range Fourier sine and cosine expansions- Parseval's formula-Complex form of Fourier series, Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT III

Solutions of Algebraic and transcendental equations & Interpolation: Introduction-The Bisection method-The Method of False Position-Iteration Method Newton-Raphson Method,

Interpolation, and finite differences, other difference operators and relations between them, Differences of a polynomial, Missing terms, Newton's interpolation formulae, Interpolation with unequal intervals: Lagrange's interpolation formula.

UNIT IV

Numerical Differentiation, Integration and Curve fitting: Numerical differentiation: Derivatives using Newton's interpolation formulae, Numerical integration: Trapezoidal rule, Simpson's one-third rule, Simpson's three-eighth rule, Method of least squares**,** Fitting a straight line, second degree parabola and other curves of the form $y = ae^{bx}$, $y = ab^{x}$, $y = ax^{b}$ by the method of least squares.

UNIT V

Numerical Solution of Ordinary Differential Equations of First Order: Taylor's series method, Picard's method, Euler's and modified Euler's Method, Runge-Kutta methods, Predictor and Corrector methods: Milne's method, Adams-Bash forth-Moulton method, Numerical solution of Laplace equations using finite difference approximation.

4. Books and Materials

Text Book(s)

1. B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 43rd Edition, New Delhi, 2014
2. E.Rukmanghadachari, E Keshava Reddy, *Engineering Mathematics*, Pearson publications

Reference Book(s)

1. B.V. Ramana, Higher Engineering Mathematics, 23rd Reprint, Tata Mc-Graw Hill Education Private Limited, New Delhi, 2015.
2. S.S. Sastry, *Introductory methods of numerical analysis,* PHI learning private limited

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30101 – STRENGTH OF MATERIALS–I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with an introductory study on stresses and strains on deformable bodies. It provides knowledge on analysis of bars of uniform and varying sections subjected to various loading conditions. The course covers the concepts of flexural stresses, shear stresses and deflections in beams. It also enables the student to find out shear force and bending moments with different loading and end conditions to solve the complex engineering problems.

Course Pre/corequisites

A30303 – Engineering Mechanics

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30101.1 Interpret simple stresses and strains to find out various properties of materials

A30101.2 Develop bending moment and shear force diagrams of beams subjected to different loading conditions

A30101.3 Compute flexural and shear stresses across various sections to plot the stress distribution envelops

A30101.4 Apply various theorems such as Mohr's, Double integration, Conjugate beam etc., to find slope and deflections of beams

A30101.5 Analyze the direct and bending stresses on various structural elements for stability conditions

3. Course Syllabus

UNIT I

Simple stresses and strains: Concept of stress and strain, St. Venant's principle, elasticity and plasticity, Hooke's law, stress – strain diagram for mild steel, working stress, factor of safety, lateral strain, Poisson's ratio, volumetric strain, pure shear, complementary shear, elastic modulus, elastic constants and relationship between them, bars of varying section, composite bars and temperature stresses

UNIT II

Shear force and bending moment: Types of beams, concept of shear force and bending moment, S.F and B.M diagrams for various beams with different loading conditions, point of contra flexure, relation between S.F., B.M and rate of loading at a section of a beam, draw load diagram from SFD & BMD

UNIT III

Flexural stresses and shear stresses: Theory of simple bending, assumptions, derivation of bending equation, section modulus, determination of flexural/bending stresses of rectangular and circular sections (solid and hollow), I,T, angle and channel sections

Derivation of formula for shear stress distribution, Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle and channel sections

UNIT IV

Deflection of beams: Slope, deflection and radius of curvature, differential equation for the elastic line of a beam, Double integration and Macaulay's methods, determination of slope and deflection for cantilever and simply supported beams subjected to point loads, Uniformly distributed, varying load and couple, Mohr's theorems, Moment area method – application to simple cases, determination of slope and deflection for cantilever and simply supported beams using conjugate beam method

UNIT V

Direct and bending stresses: Stresses under the combined action of direct loading and bending moment, core of a section, determination of stresses in the case of chimneys, retaining walls and dams, conditions for stability, stresses due to direct loading and bending moment about both axes.

4. Books and Materials

Text Book(s)

1. R.K.Bansal, *Strength of Materials*, Lakshmi Publications House Pvt Ltd.6th edition2019

Reference Book(s)

1. R.K Rajput, *Strength of Materials,* S.Chand & Company Ltd 6th edition 2015.
2. B.C Punmia, Ashok Kumar Jain, N Arun Kumar, *Mechanics of Material,* Laxmi Publications,10th edition 2001
3. R. Subramanian, *Strength of Materials,* Oxford University Press 3rd edition 2016

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30102 – SURVEYING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course develops knowledge on the basic and conventional Geomatics concepts like elementary data collection, measurement of length, direction, elevations, angles, etc. It is essential for all civil engineering projects such as highways, bridges, railways, water supply, building constructions, etc. It deals with knowledge of limits of accuracy by making measurements with the surveying equipment's employed in practice such as chain, compass, and levelling instruments as these measurements provide true concept of the theory of errors.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30102.1 Compute linear measurement and angles using compasses, chain to prepare plans and maps

A30102.2 Determine elevations of station points along the irregular intervals to prepare contour maps and to calculate the volume of earth work

A30102.3 Measure horizontal angles by Theodolite for a traverse to find areas and elevations

A30102.4 Apply surveying principles for setting out simple curves by using different methods and compare fixed and movable hair method in tachometric surveying

A30102.5 Make use of advanced surveying instruments to solve Construction problems

3. Course Syllabus

UNIT I

Introduction and Basic Concepts: Introduction, objectives, classification and principles of surveying, scales, shrinkage of map, surveying accessories, measurement of distances and directions linear distances direct methods- chains- tapes, ranging, tape corrections, indirect methods.

Prismatic Compass- Bearings, included angles, local attraction, magnetic declination, and dip

Plane table surveying-Introduction, accessories, setting up of plane table, techniques, testing, adjustments, advantages and disadvantages

UNIT II

Levelling: Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and determination of levels, hi method, rise and fall method, effect of curvature of earth and refraction.

Contouring- Characteristics and uses of contours, direct & indirect methods of contour surveying, interpolation and sketching of contours.

Computation of Areas and Volumes - Areas, determination of areas consisting of irregular boundary and regular boundary, volumes, computation of areas for level section and two-level sections, volume of borrow pits, capacity of reservoirs.

UNIT III

Theodolite Surveying: Methods types of theodolites, fundamental lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical angle, trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing traverse computations and adjustments, omitted measurements.

UNIT IV

Tachometric Surveying: Fundamental principles of tachometry, stadia and tangential methods tachometry,

Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.

UNIT V

Construction surveys: Methods introduction-staking out buildings-pipelines and sewers-highways culverts, bridge surveys, determining the length of a bridge-locating centres of piers-surface surveys and underground surveys-levelling in tunnels.

Total station Surveying: Basic principles, applications, comparison with conventional surveying. Electro-magnetic wave theory, electromagnetic distance measuring system, principle of working and EDM instruments

4. Books and Materials

Text Book(s)

1. B.C. Punmia, *Surveying,* Laxmi Publications Pvt. Ltd., New Delhi, 4th edition 2016
2. K.R. Arora, *Surveying,* Standard Book House, New Delhi, 3rd edition 2017

Reference Book(s)

1. S.K. Duggal, *Surveying Vol I& II*, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2nd edition 2005
2. C Venkatramaiah, *Text book of surveying*, Universities press,2nd edition2018

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30701 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is designed in such a way that it gives an overview of concepts of managerial economics financial analysis. Managerial economics enables students to understand micro environment in which markets operate how price determination is done under different kinds of competitions. Financial analysis gives clear idea about concepts and conversions accounting procedures along with introducing students to fundamentals of ratio analysis and interpretation of financial statements.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30701.1 Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization

A30701.2 Analyze the demand, production, cost and break even to know inter relationship among variables and their impact

A30701.3 Classify the market structure to decide the fixation of suitable price

A30701.4 Apply capital budgeting techniques to select best investment opportunity

A30701.5 Analyze and prepare financial statements to assess financial health of business

3. Course Syllabus

UNIT I

Managerial Economics: Definition, Nature and Scope of Managerial Economics, Relation with other disciplines –Demand Analysis: Types, Determinants, Laws, GST-Implications.
Elasticity of Demand: Types, Measurement and Significance, methods of demand Forecasting.

UNIT II

Production function: Isoquants and Iso-costs, MRTS, Least Cost Combination of Inputs. Laws of Production
Cost & Break-Even Analysis: Cost concepts, Break-even Analysis (BEA)-Determination.

UNIT III

Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition, oligopoly.
Pricing: Objectives, Policies, Methods, Cross Subsidization

UNIT IV

Capital: significance, Types, Components, Factors, Methods and sources of raising finance.

Capital Budgeting: Nature and scope, features, Methods - Payback Method, Accounting Rate of Return (ARR), Net Present Value, Profitability Index, Internal rate of return.

UNIT V

Accounting Principles: Concepts, Conventions, Double Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts with simple adjustments.

Financial Analysis through Ratios: Importance, types- Liquidity Ratios, Activity Ratios, Turnover Ratios and Profitability ratios.

4. Books and Materials

Text Book(s)

1. A.R. Aryasri, *Managerial Economics and Financial Analysis*, TMH, India, 2011.

Reference Book(s)

1. Varshney & Maheswari, *Managerial Economics*, Sultan Chand, 2003.
2. Ambrish Gupta, *Financial Accounting for Management: An Analytical Perspective*, 4th Edition, Pearson Education, New Delhi, 2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30103– FLUIDS MECHANICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with basic properties of fluids and physical laws that govern the flow of fluids. This course also provides knowledge on principles of buoyancy, stability of a floating body and application of mass, momentum and energy equations in fluid flow. It also deals with analysis of pipe flow and various flow measuring devices to find discharge and velocity of flowing fluids. This course enables to use these concepts to develop the problem-solving skills essential for good engineering practice of fluid mechanics in practical applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30103.1 Make use of conservation laws of mass, momentum and energy to find properties of fluids

A30103.2 Compute the force of buoyancy on submerged and floating bodies to locate metacentre

A30103.3 Apply Euler's and Bernoulli's equation to find the characteristics of fluid in motion

A30103.4 Identify various flow measuring devices to find the coefficient of discharge

A30103.5 Evaluate minor and major energy losses to solve complex pipe network systems

3. Course Syllabus

UNIT I

Introduction: Specific gravity, viscosity, surface tension and capillarity, vapour pressure, Newtonian and non-Newtonian fluids, Pascal's and hydrostatic law, pressure measurement, hydrostatic forces on surfaces

UNIT II

Buoyancy: Force and centre of buoyancy, stability of submerged bodies and floating bodies, metacentre and meta-centric height

UNIT III

Dynamics of Fluid: Fluid flows, Streak line, equations for acceleration, continuity equation, velocity potential and stream function, flow net, vortex flow, forces acting on a fluid in motion, Euler's equation of motion, Bernoulli's equation, energy correction factor, momentum principle, force exerted on a pipe bend.

UNIT IV

Flow measurements in mouth pieces: Venturi-meter, orifice meter, nozzle, Pitot tube, classification of mouthpieces, flow through external and internal cylindrical mouthpiece

Flow over notches & weirs: Classification of notches and weirs, flow through rectangular, triangular and trapezoidal notches and weirs, velocity of approach, Cipolletti weir and broad crested weir.

UNIT V

Analysis of pipe flow: Energy losses in pipelines, Darcy-Weisbach equation, concept of equivalent length, hydraulic power transmission through a pipes, siphon, pipes in series, parallel & branched pipes, laminar and turbulent flow in pipes, Reynolds's experiment, Poiseuille equation, Prandtl's theory, velocity distribution and friction factor for pipe flow.

4. Books and Materials

Text Book(s)

1. R K Rajput, *A Text Book of Fluid Mechanics and Hydraulics Machines,* S. Chand & company Ltd, New Delhi 6th Edition 2013

Reference Book(s)

1. R K Bansal, *A text of Fluid mechanics and hydraulic machines*, Laxmi Publications (P) Ltd., New Delhi 10th Edition 2018.
2. S K Som & G Biswas, Introduction to Fluid Mechanics & Fluid Machines, Tata McGraw Hill publishers Pvt Ltd 2nd Edition 2008.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30104 – STRENGTH OF MATERIALS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course is intended to find the mechanical properties of materials used in construction by conducting different tests. It deals with the basic principles in the area of strength, mechanics of materials and structural analysis through a series of experiments. This course enables the students to find the properties of the materials such as impact strength, tensile strength, compressive strength, hardness and ductility.

Course Pre/corequisites

A30101-Strength of Materials-I

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30104.1	Experiment with different types of materials to find the mechanical properties
A30104.2	Determine the Brinell and Rockwell hardness number to find the hardness of given specimen
A30104.3	Analyze elastic constants of spring and beam to design structural members
A30104.4	Determine toughness of materials using Charpy and Izod test
A30104.5	Prove Maxwell's reciprocal theorem for its validity on beams

3. Course Syllabus

1. Determine the Tensile strength of Ductile Materials.
2. Determine the modulus of elasticity and flexural rigidity of simply supported beam material.
3. Determine deflection of the cantilever beam.
4. Determine hardness of the given specimen by Brinell's hardness test.
5. Determine hardness of the given specimen by Rockwell hardness test.
6. Determine deflection of the given spring specimen by spring test.
7. Determine compressive strength of wood and concrete.
8. Determine energy absorbed and toughness of specimen by conducting Charpy Impact test.
9. Determine energy absorbed and toughness of specimen by conducting Izod Impact test.
10. Conduct deflection test on Continuous beam.
11. Verification of Maxwell's Reciprocal theorem on beams.
12. Determine the modulus rigidity of the given mild steel specimen by conducting Torsion test.

4. Laboratory Equipment/Software/Tools Required

1. Universal Testing Machine
2. Impact machine
3. Torsion testing machine

4. Spring testing machine
5. Compression testing machine
6. Hardness testing machine

5. Books and Materials

Text Book(s)

1. R.K Rajput, *Strength of Materials*, S.Chand& Company Ltd, 6th edition, 2018.

Reference Book(s)

1. R.K.Bansal, *Strength of Materials*, Lakshmi Publications House Pvt. Ltd., 6th edition, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30105 – SURVEYING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course imparts practical knowledge required to perform field work independently. It enables the student to gain knowledge on working of survey instruments like compass, cross staff, plane table, dumpy level used for field measurements. The duty of the surveyor is to collect, represent, manage natural and man-made features on the earth surface.

Course Pre/corequisites

A30102 – Surveying

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30105.1 Make use of conventional surveying instruments in plotting of a layout

A30105.2 Determine horizontal and vertical angles by Theodolite for a given traverse

A30105.3 Compute the difference in elevations using various levelling Instruments

A30105.4 Utilize Rankine's and two Theodolite methods to plot curves

A30105.5 Experiment with total station to find fundamental measurements accurately in the field

3. Course Syllabus

1. Setting up of right angles using cross staff
2. Plotting two-point problem using plane table survey
3. Perform fly levelling: height of the instrument method and rise and fall method
4. Perform longitudinal sectioning by using dumpy level
5. Perform cross-sectioning by using dumpy level
6. Theodolite Survey: Measurement of horizontal and Vertical angles
7. Finding the distance between two inaccessible points using theodolite
8. Tachometric survey: Heights and distance problems using tachometric principles.
9. One exercise on curve setting.
10. Determination of area using total station.
11. Determination of remote height using total station.
12. Developing a contour map

4. Laboratory Equipment/Software/Tools Required

1. Chains, tapes, ranging rods, cross staff, arrows
2. Prismatic and surveyor compass and Tripods, Optical square
3. Plane tables, Alidade, Plumbing fork, trough compasses.

4. Dumpy level, levelling staves and tripods
5. Theodolites
6. Total Station

5. Books and Materials

Text Book(s)

1. B.C. Punmia, *Surveying,* Laxmi Publications Pvt. Ltd., New Delhi, 4th edition, 2016.

Reference Book(s)

1. K.R. Arora, *Surveying,* Standard Book House, New Delhi,3rd edition, 2017

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30106 – FLUID MECHANICS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course is designed to examine the properties of fluids. It imparts practical exposure on the performance evaluation methods of various flow measuring equipment's in fluid machines.

Course Pre/corequisites

A3103 – Mechanics of Fluids

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A3106.1 Calibrate flow measuring devices to check the rate of flow

A3106.2 Prove the validity of Bernoulli equation when applied to fluid flow patterns

A3106.3 Conduct experiments on flow measuring devices to find coefficient of discharge

A3106.4 Gain knowledge to calculate and design engineering applications involving fluid

3. Course Syllabus

1. Perform the Calibration of Venturi meter
2. Perform the Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Determination of Friction Factor of Pipe / Minor Losses
6. Determination of Coefficient of loss of head in a sudden contraction
7. Verification of Bernoulli's equation.
8. Verification of Reynolds Experiment

4. Laboratory Equipment/Software/Tools Required

1. Venturi Meter
2. Orifice Meter
3. Orifice Meter with constant Head
4. Orifice Meter with external mouth variable heads
5. Closed Circuit Notches with different shapes

6. Bernoulli's set up

7. Sudden Contraction setup and Friction Pipe setup

8. Stop Watches

5. Books and Materials

Text Book(s)

1. R K Rajput, A Text Book of Fluid Mechanics and Hydraulics Machines, S. Chand & company Ltd, New Delhi 6th Edition 2013

Reference Book(s)

1. P. N. Modi & Seth, Hydraulics and Fluid Mechanic, Standard Book House- New Delhi, 9thEdition 2009
2. R K Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 10th Edition 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30107– BUILDING CONSTRUCTION AND PLANNING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	14	0	28	2	40	60	100

1. Course Description

Course Overview

Building drawing is a means of communication between owner architect, engineer and contractor. The course deals with the concepts of building Bye laws, rules and regulation for planning as per local competent authority. The course also covers the various types of materials employed in the building construction. The knowledge of this course is useful for building construction, estimating and costing, surveying, projects etc.

Course Pre/corequisites

A30301 Engineering Graphics and Computer aided Drafting

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30107.1 Identify suitable materials to be used for construction works

A30107.2 Apply Building Bye-Laws and Regulations with respect to classification of buildings based on occupancy

A30107.3 Plan Residential and Public Buildings as per the requirements

A30107.4 Draw the conventional signs of doors, windows, ventilators and various materials

A30107.5 Generate plan, elevation, section of single storey and Multi-storey buildings as per the given requirements

3. Course Syllabus

UNITI

Introduction: Traditional and organic building materials, stone, modern building materials, bricks, cement, glass, plastics, sustainable building materials, insulating materials, structural components, foundations, various bonds, brick and block walls, cavity walls, damp proof course, doors, windows and stairs, internal construction, construction joints, paints & fire protection works

UNIT II

Principles of Building Planning: Introduction – Selection of site – Aspect, Prospect, furniture requirements, roominess, grouping, circulation, privacy, sanitation, elegance, economy, flexibility and practical considerations

Building Bye–Laws and Regulations: Introduction – Objectives of building bye–laws – Principles underlying building bye laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) –

Classification of buildings – Open space requirements – Built up area limitations – Height of the buildings – Wall thickness – Lighting and ventilation requirements,

UNIT III

Planning of Residential Buildings: Introduction – Minimum standards for various parts of the buildings – Requirements of different rooms and their grouping – Veranda – Drawing room– Bed room – Kitchen – Dining room – Store room – Bath room – Water closet – Staircase – Garage

Planning of Public Buildings: Introduction – Educational buildings – Hospitals and dispensaries – Office buildings – Banks – Industrial buildings – Hotels and motels – Buildings for recreation

UNIT IV

Drawing Exercises-1: 1a) Conventional signs used in building drawing 2b) Doors, windows and ventilator 2) Single storied residential building with RCC Roof (Copying Exercise) 3) Drawing plan, elevation and section of a single storied residential building for the given line sketch and specifications 4) Multi–storied residential building with RCC roof

UNIT V

Drawing Exercises-2: Drawing Planning and drawing of plan, elevation and section of a single storied residential building with RCC roof for the given site and accommodation details

4. Books and Materials

Text Book(s)

1. N.Kumara Swamy & A.Kameswara Rao, *Building Planning & Drawing*, Charotar Publishers, Anand, 2012
2. B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, *Building Construction*, Laxmi Publications Pvt Ltd., 2nd Edition, 2005

Reference Book(s)

1. Gurucharan Singh and Jagdish Singh, *Building Planning Designing and scheduling*, Standard publishers Distributors, 2009
2. Bureau of Indian Standards [2005], National Building Code of India, New Delhi.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

A30035-UNIVERSAL HUMAN VALUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course is aimed at giving inputs that will help to ensure the right understanding and right feelings in the students in their life and profession, enabling them to lead an ethical life. In this course, the students learn the process of self-exploration, the difference between the Self and the Body, the naturally acceptable feelings in relationships in a family, the comprehensive human goal in the society, the mutual fulfillment in the nature and the co-existence in existence. As a natural outcome of such inputs, they are able to evaluate an ethical life and profession ahead.

Course Pre/Co-requisites:

The course has no specific pre/co-requisites

Course Outcomes(COs)

After the completion of the course, the student will be able to:

A30032.1 Understand the significance of value inputs in a classroom and start applying them in their life and profession

A30032.2 Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.

A30032.3 Understand the value of harmonious relationship based on trust and respect in their life and profession

A30032.4 Understand the role of a human being in ensuring harmony in society and nature.

A30032.5 Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

A30032.6 Analyze the value of maintaining ethical values in critical situations

Course Syllabus

UNIT – I

Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self Exploration–what is it? - its content and process; 'Natural Acceptance'and Experiential Validation- as the mechanism for self exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels

UNIT –II

Understanding Harmony in the Human Being - Harmony in Myself

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and
enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I',
Understanding the harmony of I with the Body: Sanyam and Swasthya; correctappraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya

UNIT –III

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*;Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship, Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!

UNIT –IV

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence

Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence

UNIT – V

Implications of the above Holistic Understanding of Harmony on Professional Ethics

Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics:

a) Ability to utilize the professional competence for augmenting universal human order,b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models

Case studies of typical holistic technologies, management models and production, systems, Strategy for transition from the present state to Universal Human Order:

a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b) At the level of society: as mutually enriching institutions and organizations

4. Books and Materials

Text Book:

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.

Reference Books:

1. A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.

2. P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.

3. A N Tripathy, 2003, Human Values, New Age International Publishers.

4. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.

5. B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books

COURSE STRUCTURE

IV - SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30011	Probability and Statistics	ES	3	0	0	3	40	60	100
A30108	Hydraulics and Hydraulic Machinery	BS/PC	3	0	0	3	40	60	100
A30109	Strength of Materials-II	PC	3	0	0	3	40	60	100
A30110	Structural Analysis	PC	3	0	0	3	40	60	100
A30111	Water Resources Engineering	PC	3	0	0	3	40	60	100
A30112	CAD Lab-I	PC	0	0	3	1.5	40	60	100
A30113	Engineering Geology Lab	PC	0	0	3	1.5	40	60	100
A30114	Hydraulic Machinery Lab	PC	0	0	3	1.5	40	60	100
A30115	Basics of RS and GIS	SC	1	0	2	2	40	60	100
TOTAL			16	00	11	21.5	360	540	900
Internship 2 Months (Mandatory) during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

* The marks for Mandatory Courses are not considered for calculating SGPA

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30011 – PROBABILITY AND STATISTICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course offers more advanced topics of mathematics required to analyze the problems in engineering. Topics to be covered in this course include: Descriptive statistics and methods for data science, Probability, Probability distributions, Estimation and Testing of hypothesis, large sample tests, and Small sample tests. The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Pre/co requisites

This course has no pre/co-requisites.

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30011.1 Adopt correlation methods and principle of least squares, regression analysis

A03011.2 Apply discrete and continuous probability distributions

A30011.3 Classify the concepts of data science and its importance

A30011.4 Interpret the association of characteristics & through correlation & regression tools

A30011.5 Design the components of a classical hypothesis test

A30011.6 Infer the statistical inferential methods based on small and large sampling tests

3. Course Syllabus

UNIT-I

Descriptive statistics Introduction, Measures of Variability (dispersion) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, principle of least squares, method of least squares, regression lines, regression coefficients and their properties.

UNIT-II

Probability: Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

UNIT-III

Probability distributions: Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties**.**

UNIT-IV

Estimation and Testing of hypothesis, large sample tests: Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test.

Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems.

UNIT-V

Small sample tests: Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

4. Books and Materials

Textbooks:

1. Miller and Freunds, *Probability and Statistics for Engineers,* 7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, *Fundamentals of Mathematical Statistics,* 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, *A First Course in Probability,* Pearson Education India, 2002.
2. W. Feller, *an Introduction to Probability Theory and its Applications*, 1/e, Wiley, 1968.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30108 – HYDRAULICS AND HYDRAULIC MACHINERY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is an extension of fluid mechanics which deals with basic principles of fluids. It offers basic knowledge on fluid statics, dynamics and hydraulic machines. The objective of this course is to enable the student to understand laws of fluid mechanics and evaluate pressure, velocity and acceleration fields for various fluid flows and performance parameters for hydraulic machinery.

Course Pre/corequisites

A30103 – Fluid Mechanics

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30108.1 Apply Chezy's and Manning's equation to find geometric properties of channels

A30108.2 Analyze specific energy and flow conditions to find critical depth in various channels

A30108.3 Determine the characteristics of hydraulic jump in channels using momentum and specific energy equations

A30108.4 Evaluate force exerted by the jet of water on stationary and moving plates to understand the working principles of turbine

A30108.5 Assess the characteristics of hydraulic turbines and pumps to find the efficiency

3. Course Syllabus

UNIT I

Uniform and non-uniform flow in open channels: Most economical flow in channels, geometric properties of rectangular, triangular, trapezoidal and circular channels, Chezy's equation, Manning's equation-problems.

UNIT II

Specific energy and Critical flow: Specific energy, critical depth, conditions for critical flow in rectangular, trapezoidal and triangular channels- theory & problems.

Hydraulic jump: Hydraulic jump in a rectangular, trapezoidal and triangular channels- theory and problems, applications of hydraulic jump, types of hydraulic jump

UNIT III

Impact of jets: Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes, velocity triangles at inlet and outlet, expressions for work done and efficiency-angular momentum principle, torque and head transferred in roto-dynamic machines.

UNIT IV

Pelton wheel and turbines: Pelton wheel parts, velocity triangles, work done and efficiency, working principles, Francis turbine, Kaplan turbine– head and efficiencies of hydraulic turbines, radial flow reaction turbines, discharge, speed ratio, flow ratio, draft tube- types, efficiency, introduction to cavitations in turbines, specific speed.

UNIT V

Centrifugal pumps: Components, working of a centrifugal pump, work done by impeller, head and efficiencies, minimum starting speed, velocity triangles and related problems, multistage centrifugal pumps in series and parallel, specific speed – problems

4. Books and Materials

Text Book(s)

1. R K Rajput, *A Text Book of Fluid Mechanics and Hydraulics Machines,* S. Chand & company Ltd, New Delhi 6th Edition 2013

Reference Book(s)

1. P N Modi & Seth, *Hydraulics and Hydraulic Machines*, Standard Book House Publishers, 18th Edition, 2011
2. R K Bansal, *A text of Fluid mechanics and hydraulic machines*, Laxmi Publications (P) Ltd., New Delhi 10th Edition 2018.
3. N Narayan Pillai, *Principles of Fluid Mechanics and Fluid Machines*, Universities Press (India), Hyderabad, 2nd Edition, 2009

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30109 – STRENGTH OF MATERIALS – II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is continuation of strength of materials – I. It imparts knowledge about the principal stresses and strains on the inclined sections of structural members. This course also deals with failure phenomenon of the structural members. The course is intended to introduce the basic principles for the design of power transmission of shafts, springs, columns and struts, thin and thick cylinders.

Course Pre/corequisites

A30303 – Engineering Mechanics
A30101 – Strength of Materials-I

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30109.1	Assess an inclined section to find principal stresses and strains using analytical and graphical methods
A30109.2	Design different types of shafts and springs subjected to torsion
A30109.3	Analyze failure of columns and struts for various end conditions by calculating the crushing load
A30109.4	Apply various theories of failure on the structural members for safe design
A30109.5	Design thin and thick cylinders subjected to fluid pressure

3. Course Syllabus

UNIT I

Principal stresses and strains: Introduction to stresses on an inclined section of a bar under axial loading, compound, normal and tangential stresses on an inclined plane for biaxial condition, two perpendicular normal stresses accompanied by a state of simple shear, Mohr's circle of stresses.

UNIT II

Torsion of circular shafts: Theory of pure torsion, derivation of basic torsion equation, polar section modulus, power transmitted by shafts, design of different types of shafts.

UNIT III

Columns and struts: Types of columns, axially loaded compression members, Euler's assumptions, theorem, derivation and limitations for long columns for various end conditions, equivalent length of a column, slenderness ratio, and long columns subjected to eccentric loading, other formulas for crushing load of columns.

UNIT IV

Thin cylinders and springs: Thin seamless cylindrical shells, derivation of formula for longitudinal and circumferential stresses, hoop, longitudinal and volumetric strains, changes in dimensions, thin spherical shells, types of springs, deflection of close and open coiled helical springs under axial pull and axial couple, springs in series and parallel.

UNIT V

Thick cylinders and theories of failures: Introduction, Lame's theory and derivation for thick cylinders, distribution of hoop and radial stresses across thickness, design of thick and compound cylinders necessary difference of radii for shrinkage, various theories of failures.

4. Books and Materials

Text Book(s)

1. R K Rajput, *Strength of Materials*, S Chand & Company Ltd, 6th edition, 2018.

Reference Book(s)

1. R K Bansal, *Strength of Materials*, Lakshmi Publications House Pvt. Ltd., 6th edition, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30110–STRUCTURAL ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with the analysis of indeterminate structures, fixed and continuous beams. Course enables the student to find out end moments of continuous beams with and without settlements by slope deflection and moment distribution methods. It provides knowledge on essential parameters such as slope, deflection, shear force and bending moment to design the structural components.

Course Pre/corequisites

A30303 – Engineering Mechanics

A30101 – Strength of Materials-I

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30110.1 Interpret various energy theorems to find deflections in beams

A30110.2 Analyze the statically indeterminate members for various loading conditions

A30110.3 Develop shear force and bending moment diagrams for fixed and continuous beams

A30110.4 Apply Clapeyron's three moment theorem to find end and intermediate moments

A30110.5 Analyze indeterminate beams with and without support settlements using slope-deflection and moment distribution methods

3. Course Syllabus

UNIT I

Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem-Deflections of simple beams and pin jointed trusses. Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with up to two degrees of internal and external indeterminacies

UNIT II

Fixed Beams: Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads, Shear force and Bending moment diagrams, Deflection of fixed beams effects of sinking and rotation of support.

UNIT III

Continuous Beams: Clapeyron's three moment theorem, application and problems, Shear force and Bending moment diagrams, effects of sinking and rotation of support

UNIT IV

Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports

UNIT V

Moment Distribution Method: Introduction to moment distribution method, application to continuous beams with and without settlement of supports

4. Books and Materials

Text Book(s)

1. S. Ramamrutham and R. Narayan, *Theory of Structures,* Dhanpat Rai & Co. (p) Ltd.9th Edition, 2014

Reference Book(s)

1. Vazirani and Ratwani, *Structural Analysis Vol-I &II*,Khanna Publishers, 2nd Edition, 2004
2. Pundit and Gupta, *Structural Analysis Vol I &II*, Tata McGraw Hill Publishers,2nd Edition, 2008

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30111 – WATER RESOURCES ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides a platform to develop solutions for flood control, water distribution, waste water collection, irrigation drainage, river navigation and groundwater hydrology. The course enables the student to provide consultancy services to industry for design, development, testing and monitoring work in the broad field of water resources & hydraulic engineering. Water resources engineers deal with the control and utilization of water by society.

Course Pre/corequisites

A30103 – Fluids Mechanics
A30109 – Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30111.1 Interpret rainfall data using different methods

A30111.2 Apply various methods to estimate surface and ground water hydrology components

A30111.3 Build the knowledge to connect hydrology with respect to field requirement

A30111.4 Design irrigation channels using silt theories

A30111.5 Classify various hydraulic structures involved in cross drainage works

3. Course Syllabus

UNIT I

Introduction To Hydrology: Engineering hydrology and its applications, Hydrologic cycle, precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

Descriptive Hydrology: Evaporation- factors affecting - measurement of evaporation, Infiltration- factors affecting - measurement of infiltration, infiltration indices, Run off-Factors affecting run-off, Computation of run-off, Design Flood, Estimation of maximum rate of run-off, separation of baseflow.

UNIT II

Hydrograph Analysis: Hydrograph, Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration, S-hydrograph.

Ground Water: Introduction, Aquifer, Aquiclude, Aquifuge, aquifer parameters porosity, Specific yield, Specific retention, Divisions of sub–surface water, Water table, Types of aquifers, storage Coefficient, coefficient of permeability and transmissibility, well hydraulics- Darcy's law, Steady radial flow to a well –Dupuit's theory for confined and unconfined aquifers, Tube well, Open well, Yield of an open well–Constant level pumping test, Recuperation test.

UNIT III

Irrigation: Introduction; Necessity and Importance of Irrigation, advantages and ill effects of Irrigation types of Irrigation, methods of application of Irrigation water, quality for Irrigation water, Duty and delta, duty at various places, relation between duty and delta, factors affecting duty, methods of improving duty.

Water Requirement of Crops: Types of soils, Indian agricultural soils, preparation of land for Irrigation, soil fertility, Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture tension, soil moisture stress, various soil moisture constants, Limiting soil moisture conditions, Depth and frequency of irrigation, Gross command area, Culturable command area, Culturable cultivated and uncultivated area, Kor depth and Kor period, crop seasons and crop rotation, Irrigation efficiencies, Determination of irrigation requirements of crops, Assessment of Irrigation water, Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT IV

Channels – Silt Theories: Classification; Canal alignment; Inundation canals, Cross–section of an irrigation channel, Balancing depth, Borrow pit, Spoil bank, Land width, Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design, Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory

Water Logging And Canal Lining: Water logging; Effects of water logging, Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT V

Diversion Head Works: Types of diversion head works; Diversion and Storage head works, weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on permeable foundations; Blighs creep theory, Khoslas theory; Determination of uplift pressure, impervious floors using Blighs and Khoslas theory; Exit gradient.

Canal outlets: Introduction; types of outlet; flexibility, proportionality, setting ,hyper proportional outlet, sub-proportional outlet, sensitivity, efficiency of an outlet, drowning ratio, modular limit; pipe outlet; Kennedy's gauge outlet; Gibb's module; canal escape.

4. Books and Materials

Text Book(s)

1. B C Punmia Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi16th edition, 2009.
2. S. K. Garg, Irrigation Engineering and Hydraulic Structures by, Khanna Publishers, Delhi. 35th edition, 2018.

Reference Book(s)

1. Jayarami Reddy, *Engineering Hydrology,* Laxmi publications Pvt. Ltd, 4th edition, 2005.
2. P.N. Modi, *Irrigation & Water Power Engineering*, Standard Book House, 7th edition, 2008.
3. K.Subramanya Engineering Hydrology , The Tata McGraw Hill Company,Delhi3rd Edition2008

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30112 – COMPUTER AIDED DRAWING LAB-I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course introduces AutoCAD software to draw civil engineering structures. AutoCAD is a software application for 2D and 3D computer aided design and drafting. It can be used for simple projects or complex designs like drawing the architecture of a building. This course makes the students to apply computer aided tool in civil engineering domains like building drawings, surveying and mechanics. This course is designed to aid the students in acquiring skills that would help them in detailed engineering drawing.

Course Pre/corequisites

A30301-Engineering Graphics

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30112.1 Make use of different tools in AutoCAD to draw regular and irregular shapes

A30112.2 Modify existing drawings as per client requirements using necessary commands

A30112.3 Develop a plan, section and elevation of various structures to implement on site

A30112.4 Apply computer aided drawings to find sectional properties of structural components

A30113.5 Create 3D drawings from 2D plan of various buildings for architectural purposes

3. Course Syllabus

1. Drawing different shapes with coordinate systems.
2. Drawing of regular shapes in editor mode
3. Exercise on draw tools
4. Exercise on modify tools
5. Exercise on other tools (Layers, dimensions, texting etc.)
6. Draw building components like doors, and windows.
7. Draw plan of building with dimensioning
8. Draw elevation and section of the single storied building
9. Draw a plan of a residential building using layers.
10. Develop a 3-D plan of the building from a given 2-D plan
11. Draw section of the staircases.
12. Auto CAD applications in surveying and mechanics.

4. Laboratory Equipment/Software/Tools Required

1. Computer installed with OS
2. AUTO CAD software

5. Books and Materials

Text Book(s)

1. N. Kumara Swamy, A. Kameswara Swamy, *Building Planning and Drawing,* Charotar Publications, 6th edition, 2012.

Reference Book(s)

1. Shannon R Kyle, *AutoCAD Workbook for Architects and Engineers*, Blackwell Publishers, 1st Edition, 2008

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30113 – ENGINEERING GEOLOGY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

The objective of this course is to provide comprehensive study and identification of different types of natural materials like rocks and minerals. The knowledge acquired on geological concepts and approaches will help the students to engage themselves in civil engineering projects. Geologists study the nature of land to determine whether it is stable enough to support the proposed project. The deformation and failure of rock mass subjected to engineering load is essentially controlled by its internal structure, so the study of rock masses should be considered to understand its behaviour.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30113.1 Identify various minerals and rocks by their origin and properties

A30113.2 Apply geological features influencing rock masses and discontinuities

A30113.3 Measure strike and dip of the bedding planes

A30113.4 Interpret geological maps to represent the distribution of rocks and minerals

3. Course Syllabus

1. Study of physical properties and identification of minerals
2. Megascopic description and identification of rocks
3. Interpretation and drawing of sections for geological maps
4. Numerical Problems related to Structural Geology

4. Laboratory Equipment/Software/Tools Required

1. Different types of rocks and minerals
2. Geological maps
3. Geological models

5. Books and Materials

Text Book(s)

1. Chennakesavulu N, *Text book of Engineering Geology*, MacMillan Ltd., New Delhi, 2nd edition, 2009.

Reference Book(s)

1. P C Varghese. *Engineering Geology for Civil Engineers,* PHI Learning Private Limited, New Delhi, 2nd edition, 2012.
2. Parbin Singh, *Engineering and General Geology*, Katson Publications, 4th edition, 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30114 – HYDRAULIC MACHINERY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course is designed to examine the properties of fluids. It imparts practical exposure on the performance evaluation methods of various flow measuring equipment's, hydraulic turbines and pumps. The course enables the students to understand the functions and working principles of hydraulic machineries.

Course Pre/corequisites

A30103 – Fluids Mechanics
A30109 – Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30114.1 Calibrate flow measuring devices to check the rate of flow

A30114.2 Prove the validity of Bernoulli equation when applied to fluid flow patterns

A30114.3 Conduct experiments on flow measuring devices to find coefficient of discharge

A30114.4 Measure the impact forces produced by jet of water striking on flat and curved surfaces

A30114.5 Test basic performance parameters of hydraulic turbines and pumps

3. Course Syllabus

1. Perform the Calibration of Venturi meter
2. Perform the Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction
7. Verification of Bernoulli's equation.
8. Find the Impact force of jet on vanes.
9. Performance test on Pelton wheel turbine.
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.

4. Laboratory Equipment/Software/Tools Required

1. Venturi Meter

2. Orifice Meter
3. Orifice Meter with constant Head
4. Orifice Meter with external mouth variable heads
5. Closed Circuit Notches with different shapes
6. Bernoulli's set up
7. Jet vanes with different shapes
8. Closed circuit Pelton wheel Turbines
9. Francis Turbines
10. Centrifugal pump
11. Sudden Contraction setup and Friction Pipe setup
12. Stop Watches

5. Books and Materials

Text Book(s)

1. R K Rajput, *A Text Book of Fluid Mechanics and Hydraulics Machines,* S. Chand & company Ltd, New Delhi 6th Edition 2013

Reference Book(s)

1. P N Modi & Seth, *Hydraulics and Fluid Mechanic*, Standard Book House- New Delhi, 9thEdition 2009
2. R K Bansal, *A text of Fluid mechanics and hydraulic machines*, Laxmi Publications (P) Ltd., New Delhi 10th Edition 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30115 – BASIC REMOTE SENSING AND GIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	14	0	28	2	40	60	100

1. Course Description

Course Overview

This course gives comprehensive new dimensions in the study and understanding of Photogrammetric techniques, and applications on water resources. Geographic information system (GIS) is a computer-based tool for mapping and analyzing features and events on earth. Remote sensing (RS) is the science of collecting data regarding an object or a phenomenon without any physical contact with the object.

Course Pre/corequisites

A30102 – Surveying

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30115.1 Distinguish the characteristics of satellites, platforms & sensors used in acquisition of remote sensing data.

A30115.2 Apply the concepts of Electro Magnetic energy spectrum and spectral signature curves in the practical problems

A30115.3 Apply GIS in land use, disaster management, ITS and resource information system

A30115.4 Interpret data for water resource applications

A30115.5 Apply remote sensing and GIS in various civil engineering applications

3. Course Syllabus

UNIT I

Introduction to photogrammetry: Principles& types of aerial photograph, geometry of vertical aerial photograph, scale & height measurement on single vertical aerial photograph, height measurement based on relief displacement, fundamentals of stereoscopy, fiducially points.

UNIT II

Remote sensing: Basic concepts and foundation of remote sensing – elements involved in remote sensing, remote sensing terminology and units, energy resources, energy interactions with earth surface features and atmosphere sensors and satellite visual interpretation techniques, basic elements, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT III

Geographic information system: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, a theoretical framework for GIS.

Types of data representation: Data collection and input overview, data input and output. Key board entry and coordinate geometry procedure, manual digitizing and scanning, raster GIS, vector GIS.

UNIT IV

GIS spatial analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage vector data storage, attribute data storage.

UNIT V

Water resources applications: Land use/land cover in water resources, surface water mapping and inventory, rainfall, runoff relations and runoff potential indices of watersheds, flood and drought impact assessment and monitoring, reservoir sedimentation, fluvial geomorphology, water resources management and monitoring, ground water targeting, identification of sites for artificial recharge structures, drainage morphometry

4. Books and Materials

Text Book(s)

1. B. Bhatta, *Remote Sensing and GIS*, Oxford University Press, New Delhi, 2nd edition, 2016.
2. Gorge Joseph, *Fundamentals of remote sensing*, Universities press, Hyderabad, 3rd edition, 2018.

Reference Book(s)

1. S. Kumar, *Basics of remote sensing &GIS*, Laxmi Publications, 2nd edition, 2016.
2. Satheesh Gopi, *Total Station GIS and Remote Sensing*, Pearson Publication, 2nd edition, 2017.
M. Anji Reddy, *Remote sensing and GIS*

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
(AUTONOMOUS)

COURSE STRUCTURE

V – SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

V SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30116	Design & Drawing of Reinforced Concrete Structures	PC	3	0	0	3	40	60	100
A30117	Geotechnical Engineering	PC	3	0	0	3	40	60	100
A30118	Environmental Engineering	PC	3	0	0	3	40	60	100
A30474	Introduction to internet of things	OE-1	3	0	0	3	40	60	100
A30151 A30152 A30153 A30154 A30171	Advanced Structural Analysis Green Buildings Watershed Management Disaster Management and Mitigation Engineering Geology	PE-1	3	0	0	3	40	60	100
A30119	Soil Mechanics Lab	PC	0	0	3	1.5	40	60	100
A30120	Environmental Engineering Lab	PC	0	0	3	1.5	40	60	100
A30121	Construction Planning and Project Management	SC	1	0	2	2	40	60	100
A30034	Gender sensitization	MC	2	0	0	0	100*	0	100*
	Internship 2 Months (Mandatory) during summer vacation (to be evaluated during V Semester)	PW	0	0	0	1.5	100	0	100
TOTAL			**18**	**0**	**8**	**21.5**	**420**	**480**	**900**
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	**40**	**60**	100

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30116 – DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is an initial design course for civil engineers to provide the knowledge on building components. This course deals with design concepts of reinforced concrete elements like beams, columns, slabs, footings and stair cases. The designs will be carried out as per the provisions of Indian Standard Code IS 456:2000. This course provides the required capabilities to solve complex engineering problems in civil engineering.

Course Pre/corequisite

A2101 – Strength of Materials-I
A2104 – Building Material and Construction

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30116.1	Make use of Indian Standard code provisions in designing reinforced concrete structures
A30116.2	Apply limit state design for serviceability, deflection and cracking
A30116.3	Justify the various modes of failure in reinforced concrete members
A30116.4	Design various reinforced concrete members to meet different loading conditions
A30116.5	Develop the reinforcement detailing drawings of concrete members to implement on site

3. Course Syllabus

UNIT I

Concepts of RCC design: Introduction to working stress method, limit state method, material stress-strain curves, safety factors, characteristic values, stress block parameters, IS: 456 2000.

Beams: Limit state analysis and design of singly reinforced, doubly reinforced, Flanged beams

UNIT II

Shear torsion and bond: Limit state analysis and design of section for shear and torsion, concept of bond, anchorage and development length, IS-code provisions. Design examples in simply supported and continuous beams, limit state design for serviceability, deflection, cracking

UNIT III

Design of slabs: Design of one-way slab, two- way slabs, continuous slab using IS coefficients, cantilever and canopy slab

UNIT IV

Design of columns: Short column- axial loads, uni-axial and biaxial bending IS code provisions

UNIT V

Design of footings & stair cases: Design of footings - isolated, square, rectangular, types of stair case, design of stair case, dog legged and open well.

4. Books and Materials

Text Book(s)

1. K Subramanian, *Design of Reinforced Concrete Structures,* Oxford University Press India, 1st edition, 2014.

Reference Book(s)

1. N. Krishna Raju and R.N. Pranesh, *Reinforced concrete design,* New Age International Publishers, New Delhi, 3rd edition, 2003.
2. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Limit State Design of Reinforced Concrete,* Laxmi Publications Pvt. Ltd,2nd edition, 2007

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30117 – GEOTECHNICAL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course deals with the basic concepts of soil mechanics. It also provides the knowledge of index and engineering properties of the soil. The course extends to the study of the shear strength of cohesion less and cohesive soils. This course covers methods of soil exploration and principles of soil mechanics which enable the students to design the foundations and earth retaining structures safely and economically. It also gives in-depth knowledge about analysis of piles.

Course Pre/corequisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30117.1	Evaluate the index and engineering properties of the soil
A30117.2	Determine the stress distributions in the founded soil
A30117.3	Analyze the compressibility of soils to obtain the coefficients
A30117.4	Calculate the bearing capacity of soils and foundation settlements
A30117.5	Estimate load carrying capacity of pile and pile

3. Course Syllabus

UNIT I

Introduction: Soil formation – Mass- volume relationship –Relative density.

Index Properties of Soil: In situ density, Grain size analysis –consistency limits and indices – I.S. Classification of soils

Permeability: flow of water through soils – Darcy's law- Permeability – Factors affecting permeability

UNIT II

Stress distribution in soils: Boussinesq's for point loads – Newmark's influence chart.

Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment.

UNIT III

Consolidation: Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation normally consolidated soil, over consolidated soil and under consolidated soil

Shear strength of soils: Importance of shear strength, Mohr-coulomb failure theories, types of laboratory tests for strength parameters

UNIT IV

Soil exploration: Need, Methods of soil exploration, Boring and Sampling methods, Field tests –

Penetration Tests – Plate load test, Pressure meter

Earth pressure theories: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory

UNIT V

Shallow foundations: Types, choice of foundation, Location of depth, Safe Bearing Capacity – Terzaghi's theory.

Deep foundations: Types of piles, Load carrying capacity of piles based on static pile formulae, Dynamic pile formulae, Pile load tests

4. Books and Materials

Text Book(s)

1. K.R. Arora, *Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, Ltd., New Delhi. 7th edition, 2014.
2. C. Venkataramiah, Geotechnical Engineering New Age International Pvt. Ltd, 4th edition 2002.

Reference Book(s)

1. T W Lambe and Whitman, Soil Mechanics, Mc-Graw Hill Publishing Company, New York. 2nd edition, 2011.
2. Manoj Dutta & Gulati S. K, *Geotechnical Engineering*, Tata McGraw Hill Publishers New Delhi. 5th edition, 2008.
3. B.C. Punmia, Ashok Kumar Jain. *Soil Mechanics and Foundation,* Laxmi Publications, 16th edition, 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30118 – ENVIRONMENTAL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of Environmental Engineering is to ensure that societal development and the use of water, land and air resources are sustainable. Students will attain the cognition of the technical aspects for the activities such as water supply and sewerage, management of surface water and groundwater quality, remediation of contaminated sites and solid waste management.

Course Pre/corequisite

A2004 – Engineering Chemistry

A2005 – Environmental Studies

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30118.1 Distinguish the physical, chemical and biological properties of the water samples

A30118.2 Interpret various treatments for drinking water, waste water and solid waste

A30118.3 Design treatment plants by forecasting population for drinking water, waste water and solid waste

A30118.4 Select appropriate distribution layout for municipal water supply

A30118.5 Measure and propose control measures for noise and air pollution in the environment

3. Course Syllabus

UNIT I

Water Quality, Demand And Supply: Protected water supply, population forecasts, design period, water demand, types of demand, factors affecting fluctuations, fire demand, storage capacity, water quality and testing, Impurities in water, water borne diseases, Drinking water standards. Comparison from quality and quantity and other considerations.

Sources of Water Supply:

Intakes, infiltration galleries, confined and unconfined aquifers, distribution systems, requirements, methods and layouts

UNIT II

Water Treatment and Distribution: Layout and general outline of water treatment units, sedimentation, uniform settling velocity, principles, design factors, surface loading, jar test, optimum dosage of coagulant, coagulation, flocculation, clarifier design, coagulants, and feeding arrangements. filtration, theory, working of slow and rapid gravity filters ,multimedia filters, design of filters, troubles in operation comparison of filters

Disinfection, types of disinfection, theory of chlorination chlorine demand and other disinfection treatment methods.

Distribution Systems: Types of layouts of distribution systems, design of distribution systems, Hardy Cross and equivalent pipe method service reservoirs, joints, valves such as sluice valves, air valves, scour valves and check valves water meters, laying and testing of pipe lines, pump house.

UNIT III

Sewage Treatment and Disposal: Conservancy and water carriage systems, sewage and storm water estimation, type of concentration, storm water over flows combined flow, characteristics of sewage, cycles of decay, decomposition of sewage, examination of sewage, B.O.D. and C.O.D. equations.

Design of sewers: shapes and materials, sewer appurtenances manhole, inverted siphon, catch basins, flushing tanks, ejectors, pumps and pump houses, house drainage, components requirements, sanitary fittings, traps, one pipe and two pipe systems of plumbing, ultimate disposal of sewage, sewage farming, dilution.

UNIT IV

Wastewater Treatment:

Lay out and general outline of various units in a waste water treatment plant, primary treatment Design of screens, grit chambers, skimming tanks-sedimentation tanks-principles and Design of biological treatment, trickling filters, standard and high rate, Construction and Design of oxidation ponds.

Sludge treatment: sludge digestion, factors effecting, design of digestion tank, sludge disposal by drying, septic tanks and Imhoff tanks, working principles and design, soak pits.

UNIT V

Solid waste management: Characteristics, generation, collection and transportation of solid wastes, engineered systems for solid waste management (reuse/ recycle energy recovery, treatment and disposal).

Noise pollution: Impacts of noise, permissible limits of noise pollution, measurement of noise and control of noise pollution

4. Books and Materials

Text Book(s)

1. S.K. Garg, Water Supply Engineering, Khanna Publications, 33rd edition, 2010.
2. G.S. Birdi, Water Supply and Sanitary Engineering, Dhanpat Rai & Sons Publishers,9th edition2010.

Reference Book(s)

1. B.C. Punmia, Ashok Jain & Arun Jain, Waste Water Engineering, Vol. II, Laxmi Publications Pvt.Ltd, New Delhi,2nd edition 2015.
2. Peavy, Environmental Engineering, TMH Publishers, 1st edition, 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30119 – SOIL MECHANICS LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This course enables the students to determine the various soil conditions, the physical and index properties of the soil by both the field and laboratory test methods. It helps to understand the behavior of the soil under different loading conditions for the safe design of structures.

Course Pre/corequisites

A30119 – Geotechnical Engineering

2.Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30119.1 Determine the index properties of the soil

A30119.2 Evaluate the engineering properties of the soil

A30119.3 Assess the sub grade strength of roads and pavements

A30119.4 Measure the co efficient of permeability for cohesive and non-cohesive soils

A30119.5 Estimate the shear strength under controlled drainage conditions

3. Course Syllabus

1. Determination of particle size distribution of soil by Sieve Analysis method
2. Determination of critical water contents of fine-grained soils
3. Determination of field density by core cutter method
4. Determination of field density by sand replacement method
5. Determination of permeability of soil by constant head method
6. Determination of permeability of soil by variable head method
7. Determination of optimum moisture content and maximum dry density of a soil
8. Determination of unconfined compressive strength of a soil sample
9. Determination of shear strength by Direct shear test.
10. Determination of shear strength by Vane shear test
11. Determination of C.B.R. of undisturbed and remolded /compacted soil specimens

4. Laboratory Equipment/Software/Tools Required

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus-core cutter and sand replacement methods

4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 5.15mm, and 0.075mm.
5. Hydrometer
6. Permeability apparatus
7. I.S light and heavy compaction tests.
8. Apparatus for CBR test
9. Sampling tubes and sample extractors.

5. Books and Materials

Text Book(s)

1. K.R. Arora, *Soil Mechanics and Foundation Engineering,* Standard Publishers and Distributors, Delhi Ltd., New Delhi2nd edition 2009.

Reference Book(s)

1. B.C. Punmia, Ashok Kumar Jain, *Soil Mechanics and Foundations,* Laxmi Publishers,17th edition 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30120 – ENVIRONMENTAL ENGINEERING LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

The laboratory provides knowledge of estimating various parameters like pH, chlorides, sulphates, and nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand is also included. The estimation status of industrial effluents will also be taught in this laboratory by estimating biological oxygen demand (BOD) and chemical oxygen demand (COD) of effluent.

Course Pre/corequisites

A2010 – Engineering Chemistry Laboratory

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30120.1 Discuss the importance of water and its quality analysis

A30120.2 Analyze various physico-chemical parameters of water in case of quality requirements

A30120.3 Assess complete water quality for domestic supplies

A30034.4 Suggest various types of treatment methods required to purify raw water with different contaminants

A30120.5 Analyze biological parameters of water in case of quality requirements

3. Course Syllabus

List of Experiments:

To determine the characteristics of the following parameters of given water / waste water sample

1. Various forms of Acidity
2. Various forms of Alkalinity
3. Various forms of Hardness
4. Various forms of Solids
5. Chlorides
6. Sulphates
7. Dissolved Oxygen
8. Turbidity
9. Conductivity
10. pH
11. Optimum dose of coagulant
12. Chlorine demand and Break point Chlorination
13. Determination of biological oxygen demand (B.O.D)

4. Laboratory Equipment/Software/Tools Required

1. pH meter
2. Turbidity meter
3. Conductivity meter
4. Hot air oven
5. Muffle furnace
6. Dissolved Oxygen meter
7. U – V visible spectrophotometer
8. Reflux Apparatus
9. Jar Test Apparatus
10. Biological oxygen demand (BOD) incubator
11. Chemical oxygen demand (COD) extraction apparatus

5. Books and Materials

5. Text Book(s)

1. Sawyer and Mc. Carty, Chemistry for Environmental Engineering, McGraw Hill Education,5th edition 2002.

Reference Book(s)

1. G.Kotaiah and N. Kumara Swamy, Environmental Engineering Lab Manual, Charotar Publishers, Anand, 1stedition 1994.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30121 – CONSTRUCTION PLANNING AND PROJECT MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course comprises fundamentals of construction, planning, management and techniques which can be used to perform and complete the construction works in time. The course covers planning of construction facilities and introduces various advanced construction techniques currently used in the industry.

Course Pre/co requisites

A30121– Building Materials and Construction

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30121.1 Build knowledge on roles and responsibilities of a project manager

A30121.2 Plan the construction facilities to expedite project activities

A30121.3 Develop schedule of activities to complete the construction project on time

A30121.4 Analyse and implement safety practices in construction industry

A30121.5 Create tender and contract document for a construction project

3. Course Syllabus

UNIT-I

Project Management: Introduction – Project planning – Scheduling – Controlling – Role of decision in project management– Techniques for analysing alternatives Operation research – Methods of planning and programming problems

UNIT-II

Bar Charts and Milestone Charts: Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT network problems.

UNIT-III

Elements of Network: Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network –Common partial situations in network – Numbering the events – Cycles, Problems

UNIT-IV

CPM: Network Analysis: Earliest expected time – Formulation for TE - Latest allowable occurrence time –Formulation for TL - Combined tabular computations for TE and TL. Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems.

UNIT-V

PERT: Network Analysis CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for TE and TL - Start and finish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

4. Books and Materials

Text Book(s)

1. Kumar neeraj Jha, *Construction project management*, Pearson publications, New Delhi, 2nd Edition, 2015.
2. B.C.Punmia, K.K.Khandelwal, *Project Planning and Control with PERT and CPM*, Lakshmi Publications, New Delhi, 4th Edition, 2017.

Reference Book(s)

1. Subir K. Sarkar, SubhajitSaraswati, *Construction Technology*, Oxford Higher Education, Univ. Press, New Delhi,1st Edition, 2008.
2. Bennett, F. Lawrence, *The management of construction: a project life cycle approach*, Rutledge, 2nd Edition, 2007.
3. Oberlender, Garold D., *Project management for engineering and construction*. Vol. 2. New York: McGraw-Hill, 1993.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30034 – GENDER SENSITIZATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100	0	100

1. Course Description

Course Overview

The main objective of this course is to develop students' sensibility with regard to issues of gender in contemporary India and to provide a critical perspective on the socialization of men and women. It also introduces students to information about some key biological aspects of genders to expose the students to debates on the politics and economics of work. This course helps the students to reflect critically on gender violence.

Course Pre/corequisites

This course has no pre requisites

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30034.1 Develop a better understanding of important issues related to gender in contemporary India

A30034.2 Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender

A30034.3 Acquire insight into the gendered division of labour and its relation to politics and economics

A30034.4 Equip to work and live together as equals

A30034.5 Develop a sense of appreciation of women in all walks of life

3. Course Syllabus

UNIT I

UNDERSTANDING GENDER: Gender: Why should we study it Socialization: Making Women, Making Men Introduction, preparing for Woman hood, growing up Male, First lessons in Caste, Different Masculinities

UNIT II

GENDER AND BIOLOGY: Missing Women: Sex Selection and its consequences Declining Sex Ratio, Demographic Consequences Gender Spectrum: Beyond the Binary Two or Many? Struggles with Discrimination, Additional Reading: Our Bodies, Our Health.

UNIT III

GENDER AND LABOUR: Housework: The Invisible Labour "My Mother Doesn't Work". "Share the Load", Women's Work: Its Politics and Economics Fact and Fiction, Unrecognized and Unaccounted work

UNIT IV

ISSUES OF VIOLENCE: Sexual Harassment: Say No! Sexual Harassment, not Eve-Teasing-Coping with Everyday Harassment Domestic Violence: Speaking Out Is Home a Safe Place? -When Women Unite [Film], Rebuilding Lives Thinking about Sexual Violence Blaming the Victim-"I Fought for my Life….."

UNIT V

GENDER STUDIES: Knowledge: Through the Lens of Gender Point of View, Gender and the Structure of Knowledge. Who's History? Questions for Historians and Others Reclaiming a Past, Writing other Histories.

4. Books and Materials

Text Book(s)

1. A. Suneeta, Uma Bhrugubanda, *Towards a world of equals: A Bilingual Textbook on gender*

Reference Book(s)

1. Sen, Amartya. "More than one Million Women are Missing." New York Review of Books 37,20 (20 December1990). print
2. TripiLahiri, By the Numbers: Where Indian Women Work, Women's Studies Journal(14November2012)<http://blogs.wsj.com/Indiareal time/2012/11/14/by-the-numbers where-Indian-Women-work/>

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30151 – ADVANCED STRUCTURAL ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course covers various methods for the analysis of statically determinate and indeterminate structures. It deals with prediction of performance of a given structure under the action of prescribed loads. This course will enable the student to apply different methods of analysis in computing the structural parameters in elements like beams and columns.

Course Pre/corequisites

A1111 – Structural Analysis – I

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30151.1 Interpret structural actions in statically determinate and indeterminate structures

A30151.2 Analyze three hinged arches, continuous beams and portal frames using displacement method of analysis

A30151.3 Apply flexibility and stiffness method of analysis for two span continuous beams subjected to sinking of supports

A30151.4 Determine support reactions, shear forces and bending moments in beams and frames subjected to vertical and lateral loads

A30151.5 Assess the collapse mechanism and energy absorption capacity of fixed and continuous beams

3. Course Syllabus

UNIT I

Arches: Three hinged arches, elastic theory of arches, Eddy's theorem, determination of horizontal thrust, bending moment, normal thrust, radial shear and rib shortening

UNIT II

Slope deflection and moment distribution method: Analysis of single bay, single storey portal frame including side sway, stiffness and carryover factors and distribution factors

UNIT III

Rotation contribution method: Analysis of continuous beams including settlement of supports and single bay, single storey portal frames with side sway

UNIT IV

Flexibility and Stiffness method: Application to two span continuous beams including support settlement

UNIT V

Plastic analysis: Shape factor, plastic modulus, moment curvature relationship, ultimate moment, plastic hinge – lower and upper bound theorems, ultimate strength of fixed and continuous beams

4. Books and Materials

Text Book(s)

1. S Ramamrutham and R Narayan, *Theory of Structures*, Dhanpat Rai Publishers, 9th edition, 2014.
2. Hemant Patil, Yogesh Patil and Jignesh Patil, Structural Analysis – I, Synergy Knowledge ware publications, Mumbai

Reference Book(s)

1. R C Hibbeler, *Structural Analysis*, Pearson Education Publishers, 9th edition, 2017.
2. Pundit and Gupta, *Structural Analysis,* Tata Mc-Graw Hill Publishers, 2nd edition, 2015.
3. D S Prakasarao, *Structural Analysis*, University Press, Hyderabad

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30152 – GREEN BUILDINGS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objectives of this course are to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials. The student will learn the concepts of embodied, operational and life cycle energy, minimizing energy consumption by optimal design and use of Building Integrated Photo-voltaic (BIPV) techniques.

Course Pre/corequisites

A1104 – Building Materials and Construction

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30152.1 Describe the importance and necessity of green building

A30152.2 Assess a building on the norms available for green building

A30152.3 Suggest materials and technologies to improve energy efficiency of building

A30152.4 Develop buildings which use minimal natural resources during construction and maintenance

A30152.5 Distinguish conventional and eco-friendly method of construction

3. Course Syllabus

UNIT I

Introduction of green building: History, concept and need of green building, assessment methods

Principles and elements of design of green building: Sustainability concept and reality, climate responsive process of design, climatic zones, design criteria of green buildings

UNIT II

Thermal comfort inside the building: Factors affecting, indices, cooling and heating requirement, heat transmission through building sections, simple calculation for U value and insulation thickness day lighting ventilation

UNIT III

Water conservation: 3 R's for water conservation, rain water harvesting, low flow fixtures, grey water recycling material conservation, concept of embodied energy

UNIT IV

Bureau of energy efficiency: Functions, policies, guidelines, energy conservation building code, study of existing green buildings introduction to energy efficiency software's, carbon calculators, energy codes ECBC requirement, concepts of OTTV etc, green Performance rating, requirements of LEED, GRIHA etc.

UNIT V

Present and future of Green building: Introduction to the wide range of resources, tools, and trends that reflect the latest approaches to green building, application of bio-mimicry, net-zero buildings, and building in high risk zones

4. Books and Materials

Text Book(s)

1. Arvind Krishnana, Simos Yannas, Nick Baker, S V Szokolay, *Climate responsive architecture (A design hand book for energy efficient buildings),* McGraw Hill Education, 7th reprint, 2013.
2. J M Fowler, *Energy and the Environment*, McGraw Hill, New York, 2nd edition, 1984.

Reference Book(s)

1. K S Jagadeesh, B V Venkata Rama Reddy & K S. Nanjunda Rao, *Alternative Building Materials and Technologies,* New Age International Publishers,1st edition 2015.
2. Bureau of energy efficiency, *Energy Conservation building code (ECBC),* 1st edition, 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30153–WATERSHED MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Watershed is the basic scientific unit for planning and management of water resources. Watershed Management is an integration of technologies within the natural boundaries of drainage area for optimum development of land, water and plant resources to meet the basic needs of the people in a sustained manner. The main objective of watershed development and management program is proper use of all available resources of a watershed for optimum production with minimum hazards to natural resources.

Course Pre/corequisites

1158 - Air Pollution and Control

A1154- Disaster Management and Mitigation

A1116 – Water Resources Engineering – I

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30153.1 Understand the concepts of watershed management and its effect on land, water and ecosystem resources

A30153.2 Suggest technical measures for soil erosion control both due to water and wind

A30153.3 Assess the current status of the watershed at field, by taking up accurate investigation measures and conduct survey

A30153.4 Suggest drought control measures, water conservation structures, including design

A30153.5 Formulate and solve deterministic optimization models for design and operation of water resources systems

A30153.6 – Develop control and mitigation techniques for watershed problems

3. Course Syllabus

UNIT I

INTRODUCTION AND BASIC CONCEPTS: Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed, introduction to watershed management, different stakeholders and their relative importance, watershed management policies and decision making, Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, Soil erosion and conservation

Watershed Management Practices in Arid and Semiarid Regions, Case studies, short term and long term strategic planning.

UNIT II

INTEGRATED WATERSHED MANAGEMENT WATERSHED MODELING: Introduction to integrated approach, Integrated water resources management, conjunctive use of water resources, rainwater harvesting; roof catchment system. Standard modeling approaches and classifications, system concept for watershed modeling, overall description of different hydrologic processes, modeling of rainfall-runoff process, subsurface flow sand groundwater flow

UNIT III

SOCIAL ASPECTS OF WATERSHED MANAGEMENT: Community participation, Private sector participation, Institutional issues, Socio-economy, Integrated development, Water legislation and implementations, Case studies. Use of modern techniques in watershed management, Applications of Geographical Information System and Remote Sensing in Watershed Management, Role of Decision Support System in Watershed Management.

UNIT IV

MANAGEMENT OF WATER QUALITY: Water quality and pollution, types and Sources of pollution, water quality modeling, environmental guidelines for water quality. Storm Water and Flood Management: Storm water management, design of drainage system, flood routing through channels and reservoir, flood control and reservoir operation, case studies on flood damage.

UNIT V

DROUGHT MANAGEMENT: Drought assessment and classification, drought analysis techniques, drought mitigation planning. Water Conservation and Recycling, Perspective on recycle and reuse, Waste water reclamation.

4. Books and Materials

Text Book(s):

1. Watershed Management by Murty, J.V.S; New Age Intl., New Delhi 1998

Reference Book(s):

1. Watershed Management in India by Murthy, J.V.S., Wiley Eastern, New Delhi, 1994.
2. Watershed Development in India by Purandare, A.P., Jaiswal A.K, NIRD, Hyderabad, 1995.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30154 – DISASTER MANAGEMENT AND MITIGATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides knowledge on environmental hazards and disasters. The objective of the course is to provide information on different types of endogenous and exogenous hazards/disasters. This course will enable the student to apply different management and mitigation measures to minimize the effects of hazards and disasters.

Course Pre/corequisites

A1005 – Environmental Studies

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30154.1 Classify different kind of hazards/disasters and their effects on environment

A30154.2 Analyze the causes of hazards/disasters which effects human life

A30154.3 Apply disaster management strategies through engineering applications

A30154.4 Apply emerging approaches in disaster management to reduce effect of disasters

3. Course Syllabus

UNIT I

Environmental Hazards & Disasters: Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental, Disasters and Environmental stress. Concept of Environmental Hazards, Environmental, stress & Environmental Disasters. Different approaches & relation with human Ecology, Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT II

Types of Environmental hazards & Disasters: Types of Environmental hazards & Disasters: Natural hazards and Disasters, Man induced hazards & Disasters, Natural Hazards- Planetary Hazards/ Disasters, Extra Planetary Hazards/ disasters, Planetary Hazards- Endogenous Hazards – Exogenous Hazards.

UNIT III

Endogenous Hazards: Endogenous Hazards, Volcanic Eruption, Earthquakes, Landslides, Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes, Hazardous effects of volcanic eruptions, Environmental impacts of volcanic eruptions, Earthquake Hazards/ disasters, Causes of Earthquakes, Distribution of earthquakes, Hazardous effects of earthquakes, Earthquake Hazards in India, Human adjustment, perception & mitigation of earthquake.

UNIT IV

Exogenous hazards/ disasters: Exogenous hazards/ disasters, Infrequent events, Cumulative atmospheric hazards/disasters Infrequent events: Cyclones, Lightning, Hailstorms Cyclones: Tropical cyclones & Local storms, Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: - Floods- Droughts- Cold waves- Heat waves. Floods: - Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation). Droughts: - Impacts of droughts- Drought hazards in India, Drought control measures, Extra Planetary Hazards/ Disasters, Man induced Hazards /Disasters, Physical hazards/ Disasters-Soil Erosion

UNIT V

Soil Erosion & Emerging approaches in Disaster Management: Mechanics & forms of Soil Erosion, Factors & causes of Soil Erosion, Conservation measures of Soil Erosion. Chemical hazards/ disasters, Release of toxic chemicals, nuclear explosion, Sedimentation processes. Sedimentation processes: - Global Sedimentation problems, Regional Sedimentation problems, Sedimentation & Environmental problems, Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters: - Population Explosion. Three Stages- 1. Pre- disaster stage (preparedness), 2. Emergency Stage, 3. Post Disaster Stage-Rehabilitation.

4. Books and Materials

Text Book(s)

1. Rajib Shah, *Disaster Management*, Universities Press, India, 2nd Edition, 2003
2. Tushar Bhattacharya, Disaster Science and Management, TMH Publications, 1st Edition, 2012

Reference Book(s)

1. Donald Hyndman & David Hyndman, *Natural Hazards & Disasters*, Cengage Learning, 4th Edition, 2013
2. R.B. Singh (Ed), *Disaster Management*, Rawat Publication, New Delhi, 1st Edition, 2006
3. Kates, B.I & White, *The Environment as Hazards*, G.F, Oxford Publishers, New York, 1978

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30171 – ENGINEERING GEOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

To enable the students, understand what minerals and rocks are and their formation and identification. To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.To enable the student, realize its importance and applications of Engineering Geology in Civil Engineering constructions.Concepts of Groundwater and its geophysical methods.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30171.1 Understand the significance of geological agents on Earth surface and its significance in Civil Engineering.

A30171.2 Identify and understand the properties of Minerals and Rocks.

A30171.3 Understand the concepts of Groundwater and its geophysical methods.

A30171.4 Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.

A30171.5 Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels

3. Course Syllabus

4. Books and Materials

UNIT I

Physical Geology: Advances in Engineering Geology, Significance and kinds ofgeo-ground, Geomorphology of river valley, Geomorphology of mountainous regions, Geomorphology of landforms, Weathering, Weathering Indices, Weathering Indices, Erosion and Deposition

UNIT II

Physical Properties: Engineering geological properties of rocks - Concept of geological strata - Geo-mechanical classification of rock strata - Geological construction materials, Deleterious rocks - Cement-aggregates reactions - Engineering Geology of dams - Forces acting on dams

UNIT III

Subsurface Exploration: Tunnels and methods of tunnelling - Treatment and anchoring of geological strata, Treatment and anchoring of geological strata - Effect of geological structures such as folds, faults, beddings, foliations - Line actions on stability of dams foundation and tunnels - Rock-load/ground pressure - Factors affecting ground pressure - Method for determination of ground pressure and support system.

UNIT IV

Investigations and Hazard Assessment: Introduction to Engineering geological investigations - Engineering geological investigations for roads and highways, bridges, building foundations - Engineering Geological Natural hazards and mitigations - Landslide, earthquakes induced seismicity - Geomorphology of sea and sea shore, Shoreline engineering geology - Geological Hazards of Shoreline - Mitigation of Shoreline

UNIT V

Geothermal Energy: Introduction to Geothermal Energy - Engineering geological aspects of geothermal energy - Natural Gases: Coalbed Methane gas hydrate, Shale gas, Carbon Capture Usage and Storage (CCUS)

4.Books and reference

1. Rahm, P.H (1985). Engineering Geology. An Environmental Approach, Elsevier, XI, pp.1-589.
2. Lama, R.D., and Vutukari, S. (1978). Mechanical Properties of Rocks. Trans Tech Pub. II.pp.28-314.
3. Jaeger J.G. and Cook, N.W.G. (1984). Fundamentals of Rock Mechanics. 2nd ed, John Wiley and Sons., pp. 5-380.

Reference Book(s)

1. Bell, F.G. (2007). Engineering Geology, pp.1-551, Gangopadhyay, S. (2013). Engineering Geology, Oxford University Press, pp.1-549
2. Yuguang Ye, Y., Changling Liu, C (2013). Natural Gas Hydrates Experimental Techniques and Their Applications, Springer Series Publ, pp1-402.
3. Witike, W. (2014). Rock Mechanics Based on an Anisotropic Jointed Rock Model (AJRM), Willey Pbl, pp. 1380.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30474 - INTRODUCTION TO INTERNET OF THINGS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30474.1 Analyze IoT applications using IoT design principles, protocols and levels.

A30474.2 Distinguish sensors and actuators in terms of their functions and applications.

A30474.3 Interface I/O devices, Sensors using Arduino uno.

A30474.4 Apply Python concepts for programming of Raspberry Pi.

A30474.5 Develop IoT applications using Raspberry Pi and Arduino uno.

3. Course Syllabus

Unit I

Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I, Communication Protocols: Part III, Part IV, Part V

UNIT-II

Sensor Networks: Part I, Part II, Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications, Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II

Unit III

Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT

UNIT-IV

Data Handling and Analytics, Cloud Computing, Sensor-Cloud, Fog Computing, Smart Cities and Smart Homes

UNIT-V

Connected Vehicles, Smart Grid, Industrial IOT, Industrial IOT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

4. Books and Materials

Text Book(s)

1. S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.
2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
3. Jeeva Jose, *Internet of Things,* 1st edition, Khanna Book Publishing, 2019.
4. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain, *Internet of Things with Raspberry Pi and Arduino,* 1st edition, CRC Press, 2019.

Reference Book(s)

1. Vijay Madisetti, Arshdeep Bahga, *Internet of Things – A hands on Approach*, 1st Edition, University press, 2014.
2. Adrian McEwen, Hakim Cassimally, *Designing the Internet of Things*, 1st edition, John Wiley and sons 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
(AUTONOMOUS)

COURSE STRUCTURE

VI – SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

VI SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30122	Concrete Technology	PC	3	0	0	3	40	60	100
A30123	Design of Steel Structures	PC	3	0	0	3	40	60	100
A30124	Transportation Engineering	PC	3	0	0	3	40	60	100
	Professional Elective-2	PE	3	0	0	3	40	60	100
	Open Elective-2	OE	3	0	0	3	40	60	100
A30125	Concrete Technology Lab	PC	0	0	3	1.5	40	60	100
A30126	Transportation Engineering Lab	PC	0	0	3	1.5	40	60	100
A30127	CAD Lab-II	PC	0	0	3	1.5	40	60	100
A30128	Estimation Costing and Valuation	SC	1	0	2	2	40	60	100
A30033	Indian Constitution and Multiculturalism	MC	2	0	0	0	100*	0	100*
TOTAL			18	00	10	21.5	360	630	1000
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									

* The marks for Mandatory Courses are not considered for calculating SGPA

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30122 – CONCRETE TECHNOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with ingredients of concrete, techniques to enhance the strength and durability of concrete. The course covers the mix design of concrete and behavior of fresh and hardened concrete. Students will also acquire knowledge on various types of special concretes like light weight concrete, fiber reinforced concrete, self-compacting concrete etc.

Course Pre/corequisites

A1104 – Building Materials and Construction

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30122.1 Evaluate the properties and the quality of the concrete materials

A30122.2 Measure the fresh and hardened properties of concrete

A30122.3 Classify various special concretes based on their performance

A30122.4 Assess the effects of physical properties of concrete

A30122.5 Design concrete mixes for various field applications

3. Course Syllabus

UNIT I

Cement: Cement-chemical composition-hydration process-Bogue's Compound-Tests on properties of

cement-Types of cement - I.S. Specifications.

Aggregates- classification of aggregate – tests on properties of aggregates - characteristics of aggregate - I.S. Specifications. Water-quality of water - characteristics of water - I.S. Specifications.

Admixtures – classification of chemical admixtures – properties and limitations – classification of mineral admixtures – properties and limitations - I.S. Specifications. Chemical composition-Hydration of cement- Physical properties

UNIT II

Fresh concrete: Mixing of concrete-workability-factors influencing workability- measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) & SCC (V-Funnel, L-Box, U- Box, Slump Flow and J–Ring).

Hardened concrete: Water/Cement Ratio (Abram's Law)-Gel Space Ratio-tests on hardened concrete-Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non-Destructive Tests (Rebound Hammer-UPV - Radiological methods)

UNIT III

Special concretes: Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete -

No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete-Self Compacting Concrete.

UNIT IV

Elasticity, creep & shrinkage: methods of curing-effects of improper curing-self curing-Modulus of Elasticity-Poisson's Ratio-Dynamic Modulus of Elasticity- Shrinkage and various types -Factors Affecting Shrinkage-Moisture Movement-Creep of Concrete-Factors Influencing Creep.

UNIT V

Mix design: Factors in the choice of mix proportions- Durability of concrete- Proportioning of concrete mix by normal and pump able concretes by various methods of mix design. - Road Note. No. 4 and IS Code Method- ACI method

4. Books and Materials

Text Book(s)

1. M.S. Shetty, *Concrete Technology*, S. Chand & Co. 7th edition, 2018.
2. A.M Neville, *Properties of Concrete*, low priced Edition- 4th edition, 2012.

Reference Book(s)

1. J. Prasad, C.G.K. Nair, "Non-Destructive Test and Evaluation of Materials", Tata McGraw Hill Publishers, New Delhi, 2nd edition, 2011.
2. M.L. Ghambhir, *Concrete Technology*, Tata McGraw Hill publishers, 5th edition, 2017.
3. A.R. Santa Kumar, *Concrete Technology*, Oxford University Press, 2nd edition, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30123 – DESIGN OF STEEL STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is an initial design course for civil engineers to provide the knowledge on elementary design of structural members for designing industrial steel structures. It provides relevant material properties of different types of steel. The designs will be carried out as per the provisions of Indian Standard Code IS: 800-2007. This course provides the required capabilities to solve complex engineering problems in civil engineering.

Course Pre/corequisite

A1101 – Design of RC structures

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30123.1 Estimate strength of welds and bolts to find the efficiency of various connections

A30123.2 Design and detail tension and compression members under different conditions adopting IS Code

A30123.3 Analyze and design flexural members as per code provisions

A30123.4 Design built-up compression members and slab bases with necessary connections

A30123.5 Apply IS code of practice to design various components of welded steel plate girder

3. Course Syllabus

UNIT I

CONNECTIONS: Bolted connections, Bolt value, Welded connections, Advantages and disadvantages of welding, Strength of welds, Butt and fillet welds, Permissible stresses, IS Code requirements, design of fillet weld subjected to in plane and out of plane.

UNIT II

TENSION MEMBERS AND COMPRESSION MEMBERS: Design of Tension members, Design Strength of members, design of compression members, Buckling class, slenderness ratio/ strength design

UNIT III

BEAMS: Allowable stresses, design of simple and compound beams, IS Code-provision, Beam to beam connection, shear, buckling, check for deflection and bearing, laterally unsupported beams.

UNIT IV

DESIGN OF BUILT-UP COLUMNS AND COLUMN BASES: Built-up columns with lacing and/or battening system, design of eccentrically loaded columns, splicing of columns, design of column bases, slab base and gusseted base

UNIT V

PLATE GIRDER: Design of welded plate girder, IS code provisions, design of stiffeners, splicing and connections.

4. Books and Materials

Text Book(s)

1. K Subramanian, *Design of Steel Structures,* Oxford University Press India, 1st edition, 2014.

Reference Book(s)

1. N. Krishna Raju, *Structural Design and Drawing,* New Age International Publishers, New Delhi, 3rd edition, 2016.
2. S K Duggal, *Design of Steel Structures,* Tata McGraw-Hill Publications Pvt. Ltd, 2nd edition, 2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30124 - TRANSPORTATION ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Transportation plays a major role in the development of the human civilization. It includes the solution to transportation problems which are analytically based, economically sound, socially credible, environmentally sensitive, practically acceptable and sustainable. Alternatively, the transportation solution should be safe, rapid, comfortable, convenient, and eco-friendly for general public and material. This subject also deals with various geometric elements of highways and their design, fundamentals of traffic engineering and pavement structure design by various methods.

Course Pre/corequisite

A2102-Surveying

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30124.1	Develop a strong analytical and practical knowledge of highway planning
A30124.2	Apply theories of transportation engineering to design pavements
A30124.3	Classify various highway geometrical design elements
A30124.4	Apply traffic regulations for intersection design
A30124.5	Design flexible and rigid pavements as per IRC guidelines

3. Course Syllabus

UNIT I

Highway development and planning: Highway development in India, necessity for highway planning, different road development plans- classification of roads- road network patterns, highway alignment- factors affecting alignment- engineering surveys – drawings and reports

UNIT II

Highway geometric design: Importance of geometric design- design controls and criteria- highway cross section elements, sight distance elements, stopping sight distance, overtaking sight distance and intermediate sight distance, design of horizontal alignment, design of super elevation and extra widening, design of transition curves-design of vertical alignment-gradients, vertical curves

UNIT III

Traffic engineering: Basic parameters of traffic, volume, speed and density, definitions and their inter relation, highway capacity and level of service concept, factors affecting capacity and level of service, traffic volume studies- data collection and presentation-speed studies, data collection and presentation, parking studies and parking characteristics- road accidents, causes and preventive assures, accident data recording, condition diagram and collision diagrams

Traffic regulation and management: Road traffic signs, types and specifications, road markings-need for road markings-types of road markings- specifications - design of traffic signals, Webster method, saturation flow, phasing and timing.

UNIT IV

Intersection design: Conflicts at intersections, channelization, traffic islands and design criteria-types of at-grade intersections, types of grade separated intersections, rotary intersection, concept of rotary and design criteria- advantages and disadvantages of rotary intersection

UNIT V

Pavement design: Types of pavements, difference between flexible and rigid pavements pavement components, sub grade, sub base, base and wearing course, functions of pavement components, design factors, flexible pavement design methods, GI method, CBR method, (as per IRC 37-2002),design of rigid pavements, critical load positions - Westergaard's stress equations computing radius of relative stiffness and equivalent radius of resisting section, stresses in rigid pavements, design of expansion and contraction joints in cc pavements. Design of dowel bars and tie bars

4. Books and Materials

Text Book(s)

1. S.K. Khanna & C.E.G. Justo, *Highway Engineering*, Nemchand & Bros, 10th edition, 2020.
2. L.R. Kadiyali, *Highway Engineering Design*, Khanna Publications, 1st edition, 2019.

Reference Book(s)

1. L R. Kadiyali &Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications,6th edition, 2018.
2. L.R. Kadiyali, *Traffic Engineering and Transportation planning,* Khanna Publications, 4th edition, 2016.
3. R Srinivasa Kumar, *Textbook of Highway Engineering*, Orient Blackswan, 2nd edition 2011

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30125 – CONCRETE TECHNOLOGY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	28	1	40	60	100

1. Course Description

Course Overview

The concrete laboratory intends to train the students in the field of testing the ingredients of concrete and to study the behavior of fresh concrete, its workability and strength in hardened state, which are used in the design of structural components.

Course Pre/corequisites

A1104 – Building Materials and Construction
A1124 – Concrete Technology

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30125.1 Evaluate various properties of cement and aggregate

A30125.2 Determine compressive strength of concrete by using non-destructive tests

A30125.3 Design concrete mix as per the site conditions and specifications of materials available

A30125.4 Assess the mechanical properties of concrete

3. Course Syllabus

1. Determination of normal consistency and fineness of cement
2. Finding out Initial setting time and final setting time of cement
3. Determination of specific gravity and soundness of cement
4. Determination of workability test of concrete by compaction factor, slump and vee-bee time
5. Determination of Young's modulus and compressive strength of concrete
6. Determination of specific gravity and water absorption of coarse aggregate
7. Determination of water absorption in fine aggregate
8. Testing the strength and durability of existing concrete structures
9. Designing the Concrete mix for the given site conditions

4. Laboratory Equipment/Software/Tools Required

1. Compressive testing machine
2. Aggregate impact testing machine
3. Pyconometers
4. Los angles abrasion test machine
5. Vicat's apparatus
6. Specific gravity bottle

7. Lechatlier's apparatus
8. Slump and compaction factor setups
9. Rebound hammer pulse velocity machine

5. Books and Materials

Text Book(s)

1. M.S. Shetty, *Concrete Technology*, S. Chand & Co. 7th edition 2018.

Reference Book(s)

1. M.L. Ghambhir, *Concrete Technology*, Tata McGraw Hill publishers, 5th edition, 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30126- TRANSPORTATION ENGINEERING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Transportation engineering laboratory provides a platform for the learner to determine the properties of coarse aggregates and grade of bitumen. Students can conduct Surveys, spot speed studies, volume counts, and conflict studies for preparing road improvement plans to enhance road safety.

Course Pre/co requisites

A2124 Concrete Technology
A2126 Geotechnical Engineering

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30126.1-Identify basic engineering properties of various materials
A30126.2- Determine the grade and properties of bitumen
A30126.3-Conduct traffic studies for estimating traffic flow characteristics
A30126.4-Design traffic signals using Webster method
A30126.5-Evaluate longitudinal and cross-section details of roads

3. Course Syllabus

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test.
5. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

III. TRAFFIC FIELD STUDIES

1. Traffic Volume Studies at Mid-block and Data Analysis
2. Traffic Volume Studies at Intersection and Data Analysis
3. Speed Studies and Data Analysis

4. Laboratory Equipment/Software/Tools Required

1. Aggregate Impact testing machine
2. Apparatus for aggregate crushing test
3. Pyconometer
4. Bitumen penetration test setup
5. Ring and Ball Test Apparatus

5. Books and Materials

Text Book(s)

1. S.K. Khanna and C.E.G Justo, *Highway Materials Testing Laboratory Manual*, Nem Chand Bros. Roorkee,2nd edition (2013)

Reference Book(s)

1. G. Venkatappa Rao &K. Ramachandra Rao, *Highway Material Testing and Quality Control*,I.K International Publishing House Pvt.Ltd, 1st edition (2019)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30127 _ CAD LABORATORY –II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This laboratory course enables the students to design various complex and laborious structural components using Computer Aided Design Software. The best analyzing and design software used in present scenario is STAAD PRO. The course provides a platform to use STAAD PRO Software to analyze and design real life Civil Engineering structures like buildings, trusses, water tanks, bridges, water retaining structures etc.

Course Pre/corequisites

A1117 – Design and Drawing of Reinforced Concrete Structures
A1118 – Structural Analysis-II

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30127.1 Evaluate beams with different loading conditions

A30127.2 Analyze trusses and portal frames

A30127.3 Develop building component models

A30127.4 Design footings for residential and commercial structures

A30127.5 Analyze and design cantilever retaining wall

3. Course Syllabus

1. Analysis of simply supported beam with different loading conditions
2. Analysis of continuous beam with different loading conditions
3. Analysis of plane truss
4. Analysis and design of simply supported beam
5. Analysis and design of continuous beam
6. Analysis and design of 2D portal frame
7. Analysis and design of one storey residential building
8. Analysis and design of two storey residential building
9. Import STAAD PRO output drawings of footing to AUTOCAD
10. Analysis and design residential building with pent house
11. Analysis and design of cantilever retaining Wall
12. Analysis and design of steel girder

4. Laboratory Equipment/Software/Tools Required

1. Computers installed with operating system
2. STAAD PRO software
3. AUTOCAD software

5. Books and Materials

Text Book(s)

1. M.R Deerendra Babu, *Design of RCC structures*, Falcon Publications, 1st Edition, 2019.

Reference Book(s)

1. Kumaraswamy N &A Kameswara Rao, *Building Planning & Drawing*, Charotar Publishers, 6th Edition, 2012.
2. S S Bhavikatti, *Design of RCC Structural Elements (volume-1),* New Age International Publishers, 2nd Edition, 2016.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30128 – ESTIMATION COSTING AND VALUATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Estimation plays a major role in construction projects of civil engineering. This course helps to understand the detailed cost estimates of all civil engineering structures and projects. It also covers various types of contracts, tenders, valuations and specifications.

Course Pre/corequisites

A1104–Building Materials and Construction

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30128.1 Develop knowledge on various Building items, their standard units and principles

A30128.2 Apply quantity of each item for RCC buildings by different methods of estimation

A30128.3 Evaluate various types of contracts, valuations, tenders and specifications

A30128.4 Apply rates and bill preparation for different building elements

A30128.5 Acquire valuation of assets

3. Course Syllabus

UNIT I

INTRODUCTION: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

STANDARDS SPECIFICATIONS: Standard specifications for different items of building construction

UNIT II

ESTIMATION OF BUILDINGS: Detailed Estimates of Buildings

UNIT III

EARTHWORK ESTIMATION: Earthwork for roads and canals.

REINFORCEMENT ESTIMATION: Reinforcement bar bending and bar requirement schedules.

UNIT IV

CONTRACTS AND TENDERS: Contracts – Types of contracts – Contract Documents– Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT V

RATE ANALYSIS: Working out data for various items of work over head and contingent charges.

VALUATION: Valuation of buildings.

4. Books and Materials

Text Book(s)

1. B.N. Dutta, *Estimating and Costing*, UBS publishers, 28th Edition 2016.

2. G.S. Birdie, *Estimating and Costing,* Dhanpat Rai Publications, 6th Edition2014.
3. B.S.Patil , *Civil Engineering Contracts and Estimations*, 4th edition, Universities Press,Hyderabad.4thEdition 2015.

Reference Book(s)

1. M.Chakraborthi, *Estimating and Costing & Specifications*, UBS Publications, 6th edition, 2018.
2. Kohli, D.D & Kohli, R.C., *A Text book of estimating and costing(CIVIL),* S.Chand& Company Ltd., Revised Edition., 3rd edition, 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30033 – INDIAN CONSTITUTION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100	0	100

1. Course Description

Course Overview

This course is designed in such a way that it gives an overview of Indian Constitution. This course provides the knowledge on importance of constitution, structure of executive, legislature and judiciary, central and state relation financial and administration.

Course Pre/corequisites

There are no prerequisites and corequisites for this course.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30033.1 Understand historical background of the constitution making and its importance for building a democratic India.

A30033.2 Explain the role of President and Prime Minister.

A30033.3 Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

A30033.4 Understand the value of the fundamental rights and duties for becoming good citizen of India

A30033.5 Analyze the decentralization of power between central, state and local self-government.

A30033.6 Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

3. Course Syllabus

UNIT - I

Introduction to Indian Constitution: Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT - II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre-State relationship, President: Role, power and position, Prime Minister and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions.

UNIT - III

State Government and its Administration: Governor - Role and Position – Chief Minister and Council of ministers, State Secretariat: Organization, Structure and Functions.

UNIT - IV

Local Administration: District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT - V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women.

4. Books and Materials

Text Book(s)

1. Durga Das Basu, *Introduction to the Constitution of India*, Prentice Hall of India Pvt. Ltd. New Delhi.
2. SubashKashyap, *Indian Constitution*, National Book Trust.

Reference Book(s)

1. A. Siwach, *Dynamics of Indian Government & Politics*.
2. D.C. Gupta, *Indian Government and Politics*.
3. H.M.Sreevai, *Constitutional Law of India*, 4thedition in 3 volumes (Universal Law Publication)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

VI SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30122	Concrete Technology	PC	3	0	0	3	40	60	100
A30123	Design of Steel Structures	PC	3	0	0	3	40	60	100
A30124	Transportation Engineering	PC	3	0	0	3	40	60	100
A30155 A30156 A30157 A30158	Ground Improvement Techniques Earthquake Engineering Engineering Hydrology Air Pollution and Control	PE-2	3	0	0	3	40	60	100
	Open Elective-2	OE-2	3	0	0	3	40	60	100
A30125	Concrete Technology Lab	PC	0	0	3	1.5	40	60	100
A30126	Transportation Engineering Lab	PC	0	0	3	1.5	40	60	100
A30127	CAD Lab-II	PC	0	0	3	1.5	40	60	100
A30128	Estimation Costing and Valuation	SC	1	0	2	2	40	60	100
A30033	Indian Constitution and Multiculturalism	MC	2	0	0	0	100*	0	100*
TOTAL			18	00	10	21.5	360	630	1000
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									

* The marks for Mandatory Courses are not considered for calculating SGPA

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30122 – CONCRETE TECHNOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with ingredients of concrete, techniques to enhance the strength and durability of concrete. The course covers the mix design of concrete and behavior of fresh and hardened concrete. Students will also acquire knowledge on various types of special concretes like light weight concrete, fiber reinforced concrete, self-compacting concrete etc.

Course Pre/corequisites

A1104 – Building Materials and Construction

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30122.1 Evaluate the properties and the quality of the concrete materials

A30122.2 Measure the fresh and hardened properties of concrete

A30122.3 Classify various special concretes based on their performance

A30122.4 Assess the effects of physical properties of concrete

A30122.5 Design concrete mixes for various field applications

3. Course Syllabus

UNIT I

Cement: Cement-chemical composition-hydration process-Bogue's Compound-Tests on properties of

cement-Types of cement - I.S. Specifications.

Aggregates- classification of aggregate – tests on properties of aggregates - characteristics of aggregate - I.S. Specifications. Water-quality of water - characteristics of water - I.S. Specifications.

Admixtures – classification of chemical admixtures – properties and limitations – classification of mineral admixtures – properties and limitations - I.S. Specifications. Chemical composition-Hydration of cement- Physical properties

UNIT II

Fresh concrete: Mixing of concrete-workability-factors influencing workability- measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee-Bee test) & SCC (V-Funnel, L-Box, U- Box, Slump Flow and J–Ring).

Hardened concrete: Water/Cement Ratio (Abram's Law)-Gel Space Ratio-tests on hardened concrete-Destructive Tests (Compression, Split Tensile and Flexural)-Semi Destructive Tests (Core Cutter and Pull out test) and Non-Destructive Tests (Rebound Hammer-UPV - Radiological methods)

UNIT III

Special concretes: Light Weight Concretes –Light Weight Aggregate Concrete- Cellular Concrete -

No Fines Concrete-High Density Concrete – Fiber Reinforced Concrete-Polymer Concrete-Self Compacting Concrete.

UNIT IV

Elasticity, creep & shrinkage: methods of curing-effects of improper curing-self curing-Modulus of Elasticity-Poisson's Ratio-Dynamic Modulus of Elasticity- Shrinkage and various types -Factors Affecting Shrinkage-Moisture Movement-Creep of Concrete-Factors Influencing Creep.

UNIT V

Mix design: Factors in the choice of mix proportions- Durability of concrete- Proportioning of concrete mix by normal and pump able concretes by various methods of mix design. - Road Note. No. 4 and IS Code Method- ACI method

4. Books and Materials

Text Book(s)

1. M.S. Shetty, *Concrete Technology*, S. Chand & Co. 7th edition, 2018.
2. A.M Neville, *Properties of Concrete*, low priced Edition- 4th edition, 2012.

Reference Book(s)

1. J. Prasad, C.G.K. Nair, "Non-Destructive Test and Evaluation of Materials", Tata McGraw Hill Publishers, New Delhi, 2nd edition, 2011.
2. M.L. Ghambhir, *Concrete Technology*, Tata McGraw Hill publishers, 5th edition, 2017.
3. A.R. Santa Kumar, *Concrete Technology*, Oxford University Press, 2nd edition, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30123 – DESIGN OF STEEL STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is an initial design course for civil engineers to provide the knowledge on elementary design of structural members for designing industrial steel structures. It provides relevant material properties of different types of steel. The designs will be carried out as per the provisions of Indian Standard Code IS: 800-2007. This course provides the required capabilities to solve complex engineering problems in civil engineering.

Course Pre/corequisite

A1101 – Design of RC structures

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30123.1 Estimate strength of welds and bolts to find the efficiency of various connections

A30123.2 Design and detail tension and compression members under different conditions adopting IS Code

A30123.3 Analyze and design flexural members as per code provisions

A30123.4 Design built-up compression members and slab bases with necessary connections

A30123.5 Apply IS code of practice to design various components of welded steel plate girder

3. Course Syllabus

UNIT I

CONNECTIONS: Bolted connections, Bolt value, Welded connections, Advantages and disadvantages of welding, Strength of welds, Butt and fillet welds, Permissible stresses, IS Code requirements, design of fillet weld subjected to in plane and out of plane.

UNIT II

TENSION MEMBERS AND COMPRESSION MEMBERS: Design of Tension members, Design Strength of members, design of compression members, Buckling class, slenderness ratio/ strength design

UNIT III

BEAMS: Allowable stresses, design of simple and compound beams, IS Code-provision, Beam to beam connection, shear, buckling, check for deflection and bearing, laterally unsupported beams.

UNIT IV

DESIGN OF BUILT-UP COLUMNS AND COLUMN BASES: Built-up columns with lacing and/or battening system, design of eccentrically loaded columns, splicing of columns, design of column bases, slab base and gusseted base

UNIT V

PLATE GIRDER: Design of welded plate girder, IS code provisions, design of stiffeners, splicing and connections.

4. Books and Materials

Text Book(s)

1. K Subramanian, *Design of Steel Structures,* Oxford University Press India, 1st edition, 2014.

Reference Book(s)

1. N. Krishna Raju, *Structural Design and Drawing,* New Age International Publishers, New Delhi, 3rd edition, 2016.
2. S K Duggal, *Design of Steel Structures,* Tata McGraw-Hill Publications Pvt. Ltd, 2nd edition, 2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30124 - TRANSPORTATION ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Transportation plays a major role in the development of the human civilization. It includes the solution to transportation problems which are analytically based, economically sound, socially credible, environmentally sensitive, practically acceptable and sustainable. Alternatively, the transportation solution should be safe, rapid, comfortable, convenient, and eco-friendly for general public and material. This subject also deals with various geometric elements of highways and their design, fundamentals of traffic engineering and pavement structure design by various methods.

Course Pre/corequisite

A2102-Surveying

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30124.1	Develop a strong analytical and practical knowledge of highway planning
A30124.2	Apply theories of transportation engineering to design pavements
A30124.3	Classify various highway geometrical design elements
A30124.4	Apply traffic regulations for intersection design
A30124.5	Design flexible and rigid pavements as per IRC guidelines

3. Course Syllabus

UNIT I

Highway development and planning: Highway development in India, necessity for highway planning, different road development plans- classification of roads- road network patterns, highway alignment- factors affecting alignment- engineering surveys – drawings and reports

UNIT II

Highway geometric design: Importance of geometric design- design controls and criteria- highway cross section elements, sight distance elements, stopping sight distance, overtaking sight distance and intermediate sight distance, design of horizontal alignment, design of super elevation and extra widening, design of transition curves-design of vertical alignment-gradients, vertical curves

UNIT III

Traffic engineering: Basic parameters of traffic, volume, speed and density, definitions and their inter relation, highway capacity and level of service concept, factors affecting capacity and level of service, traffic volume studies- data collection and presentation-speed studies, data collection and presentation, parking studies and parking characteristics- road accidents, causes and preventive assures, accident data recording, condition diagram and collision diagrams

Traffic regulation and management: Road traffic signs, types and specifications, road markings-need for road markings-types of road markings- specifications - design of traffic signals, Webster method, saturation flow, phasing and timing.

UNIT IV

Intersection design: Conflicts at intersections, channelization, traffic islands and design criteria-types of at-grade intersections, types of grade separated intersections, rotary intersection, concept of rotary and design criteria- advantages and disadvantages of rotary intersection

UNIT V

Pavement design: Types of pavements, difference between flexible and rigid pavements pavement components, sub grade, sub base, base and wearing course, functions of pavement components, design factors, flexible pavement design methods, GI method, CBR method, (as per IRC 37-2002),design of rigid pavements, critical load positions - Westergaard's stress equations computing radius of relative stiffness and equivalent radius of resisting section, stresses in rigid pavements, design of expansion and contraction joints in cc pavements. Design of dowel bars and tie bars

4. Books and Materials

Text Book(s)

1. S.K. Khanna & C.E.G. Justo, *Highway Engineering*, Nemchand & Bros, 10th edition, 2020.
2. L.R. Kadiyali, *Highway Engineering Design*, Khanna Publications, 1st edition, 2019.

Reference Book(s)

1. L R. Kadiyali &Lal, *Principles and Practice of Highway Engineering Design*, Khanna Publications,6th edition, 2018.
2. L.R. Kadiyali, *Traffic Engineering and Transportation planning,* Khanna Publications, 4th edition, 2016.
3. R Srinivasa Kumar, *Textbook of Highway Engineering*, Orient Blackswan, 2nd edition 2011

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30125 – CONCRETE TECHNOLOGY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	28	1	40	60	100

1. Course Description

Course Overview

The concrete laboratory intends to train the students in the field of testing the ingredients of concrete and to study the behavior of fresh concrete, its workability and strength in hardened state, which are used in the design of structural components.

Course Pre/corequisites

A1104 – Building Materials and Construction
A1124 – Concrete Technology

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30125.1 Evaluate various properties of cement and aggregate

A30125.2 Determine compressive strength of concrete by using non-destructive tests

A30125.3 Design concrete mix as per the site conditions and specifications of materials available

A30125.4 Assess the mechanical properties of concrete

3. Course Syllabus

1. Determination of normal consistency and fineness of cement
2. Finding out Initial setting time and final setting time of cement
3. Determination of specific gravity and soundness of cement
4. Determination of workability test of concrete by compaction factor, slump and vee-bee time
5. Determination of Young's modulus and compressive strength of concrete
6. Determination of specific gravity and water absorption of coarse aggregate
7. Determination of water absorption in fine aggregate
8. Testing the strength and durability of existing concrete structures
9. Designing the Concrete mix for the given site conditions

4. Laboratory Equipment/Software/Tools Required

1. Compressive testing machine
2. Aggregate impact testing machine
3. Pyconometers
4. Los angles abrasion test machine
5. Vicat's apparatus
6. Specific gravity bottle

7. Lechatlier's apparatus
8. Slump and compaction factor setups
9. Rebound hammer pulse velocity machine

5. Books and Materials

Text Book(s)

1. M.S. Shetty, *Concrete Technology*, S. Chand & Co. 7th edition 2018.

Reference Book(s)

1. M.L. Ghambhir, *Concrete Technology*, Tata McGraw Hill publishers, 5th edition, 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30126- TRANSPORTATION ENGINEERING LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Transportation engineering laboratory provides a platform for the learner to determine the properties of coarse aggregates and grade of bitumen. Students can conduct Surveys, spot speed studies, volume counts, and conflict studies for preparing road improvement plans to enhance road safety.

Course Pre/co requisites

A2124 Concrete Technology
A2126 Geotechnical Engineering

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30126.1-Identify basic engineering properties of various materials
A30126.2- Determine the grade and properties of bitumen
A30126.3-Conduct traffic studies for estimating traffic flow characteristics
A30126.4-Design traffic signals using Webster method
A30126.5-Evaluate longitudinal and cross-section details of roads

3. Course Syllabus

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Abrasion Test.
5. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

III. TRAFFIC FIELD STUDIES

1. Traffic Volume Studies at Mid-block and Data Analysis
2. Traffic Volume Studies at Intersection and Data Analysis
3. Speed Studies and Data Analysis

4. Laboratory Equipment/Software/Tools Required

1. Aggregate Impact testing machine
2. Apparatus for aggregate crushing test
3. Pyconometer
4. Bitumen penetration test setup
5. Ring and Ball Test Apparatus

5. Books and Materials

Text Book(s)

1. S.K. Khanna and C.E.G Justo, *Highway Materials Testing Laboratory Manual*, Nem Chand Bros. Roorkee,2nd edition (2013)

Reference Book(s)

1. G. Venkatappa Rao &K. Ramachandra Rao, *Highway Material Testing and Quality Control*,I.K International Publishing House Pvt.Ltd, 1st edition (2019)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30127 _ CAD LABORATORY –II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	40	60	100

1. Course Description

Course Overview

This laboratory course enables the students to design various complex and laborious structural components using Computer Aided Design Software. The best analyzing and design software used in present scenario is STAAD PRO. The course provides a platform to use STAAD PRO Software to analyze and design real life Civil Engineering structures like buildings, trusses, water tanks, bridges, water retaining structures etc.

Course Pre/corequisites

A1117 – Design and Drawing of Reinforced Concrete Structures
A1118 – Structural Analysis-II

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30127.1 Evaluate beams with different loading conditions

A30127.2 Analyze trusses and portal frames

A30127.3 Develop building component models

A30127.4 Design footings for residential and commercial structures

A30127.5 Analyze and design cantilever retaining wall

3. Course Syllabus

1. Analysis of simply supported beam with different loading conditions
2. Analysis of continuous beam with different loading conditions
3. Analysis of plane truss
4. Analysis and design of simply supported beam
5. Analysis and design of continuous beam
6. Analysis and design of 2D portal frame
7. Analysis and design of one storey residential building
8. Analysis and design of two storey residential building
9. Import STAAD PRO output drawings of footing to AUTOCAD
10. Analysis and design residential building with pent house
11. Analysis and design of cantilever retaining Wall
12. Analysis and design of steel girder

4. Laboratory Equipment/Software/Tools Required

1. Computers installed with operating system
2. STAAD PRO software
3. AUTOCAD software

5. Books and Materials

Text Book(s)

1. M.R Deerendra Babu, *Design of RCC structures*, Falcon Publications, 1st Edition, 2019.

Reference Book(s)

1. Kumaraswamy N &A Kameswara Rao, *Building Planning & Drawing*, Charotar Publishers, 6th Edition, 2012.
2. S S Bhavikatti, *Design of RCC Structural Elements (volume-1),* New Age International Publishers, 2nd Edition, 2016.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30128 – ESTIMATION COSTING AND VALUATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Estimation plays a major role in construction projects of civil engineering. This course helps to understand the detailed cost estimates of all civil engineering structures and projects. It also covers various types of contracts, tenders, valuations and specifications.

Course Pre/corequisites

A1104–Building Materials and Construction

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30128.1 Develop knowledge on various Building items, their standard units and principles

A30128.2 Apply quantity of each item for RCC buildings by different methods of estimation

A30128.3 Evaluate various types of contracts, valuations, tenders and specifications

A30128.4 Apply rates and bill preparation for different building elements

A30128.5 Acquire valuation of assets

3. Course Syllabus

UNIT I

INTRODUCTION: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

STANDARDS SPECIFICATIONS: Standard specifications for different items of building construction

UNIT II

ESTIMATION OF BUILDINGS: Detailed Estimates of Buildings

UNIT III

EARTHWORK ESTIMATION: Earthwork for roads and canals.

REINFORCEMENT ESTIMATION: Reinforcement bar bending and bar requirement schedules.

UNIT IV

CONTRACTS AND TENDERS: Contracts – Types of contracts – Contract Documents– Conditions of contract – Types of Tenders – Requirement of Tendering.

UNIT V

RATE ANALYSIS: Working out data for various items of work over head and contingent charges.

VALUATION: Valuation of buildings.

4. Books and Materials

Text Book(s)

1. B.N. Dutta, *Estimating and Costing*, UBS publishers, 28th Edition 2016.

2. G.S. Birdie, *Estimating and Costing,* Dhanpat Rai Publications, 6th Edition2014.
3. B.S.Patil , *Civil Engineering Contracts and Estimations*, 4th edition, Universities Press,Hyderabad.4thEdition 2015.

Reference Book(s)

1. M.Chakraborthi, *Estimating and Costing & Specifications*, UBS Publications, 6th edition, 2018.
2. Kohli, D.D & Kohli, R.C., *A Text book of estimating and costing(CIVIL),* S.Chand& Company Ltd., Revised Edition., 3rd edition, 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30033 – INDIAN CONSTITUTION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	0	100	0	100

1. Course Description

Course Overview

This course is designed in such a way that it gives an overview of Indian Constitution. This course provides the knowledge on importance of constitution, structure of executive, legislature and judiciary, central and state relation financial and administration.

Course Pre/corequisites

There are no prerequisites and corequisites for this course.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30033.1 Understand historical background of the constitution making and its importance for building a democratic India.

A30033.2 Explain the role of President and Prime Minister.

A30033.3 Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

A30033.4 Understand the value of the fundamental rights and duties for becoming good citizen of India

A30033.5 Analyze the decentralization of power between central, state and local self-government.

A30033.6 Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

3. Course Syllabus

UNIT - I

Introduction to Indian Constitution: Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT - II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre-State relationship, President: Role, power and position, Prime Minister and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions.

UNIT - III

State Government and its Administration: Governor - Role and Position – Chief Minister and Council of ministers, State Secretariat: Organization, Structure and Functions.

UNIT - IV

Local Administration: District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

UNIT - V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions of Commissions for the welfare of SC/ST/OBC and women.

4. Books and Materials

Text Book(s)

1. Durga Das Basu, *Introduction to the Constitution of India*, Prentice Hall of India Pvt. Ltd. New Delhi.
2. SubashKashyap, *Indian Constitution*, National Book Trust.

Reference Book(s)

1. A. Siwach, *Dynamics of Indian Government & Politics*.
2. D.C. Gupta, *Indian Government and Politics*.
3. H.M.Sreevai, *Constitutional Law of India*, 4thedition in 3 volumes (Universal Law Publication)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30155 - GROUND IMPROVEMENT TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of this course is to get the knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils. The Course covers with the dewatering and grouting of soils, Methods of granular, cohesive &Expansive soils and design the principle of Reinforced earthen walls.

Course Pre/corequisite

A1119 –Geo-Technical Engineering-I

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30155.1 Suggest the appropriate ground improvement technique as per the requirement

A30155.2 Classify the various densification methods in granular and cohesive soils

A30155.3 Implement the stabilization methods to improve soil properties for engineering a better working platform for construction

A30155.4 Interpret the concept reinforced Earth Walls and Geo-synthetics

A30155.5 Identify the problems in Expansive soils

3. Course Syllabus

UNIT I

DEWATERING: Methods of De-Watering- Sumps and Interceptor Ditches- Single, Multi Stage Well Points - Vacuum Well Points- Horizontal Wells-Foundation Drains-Blanket Drains- Criteria for Selection of Fill Material Around Drains –Electro-Osmosis**.**

GROUTING: Objectives Of Grouting- Grouts And Their Properties- Grouting Methods- Ascending, Descending And Stage Grouting- Hydraulic Fracturing In Soils And Rocks- Post Grout Test.

UNIT II

DENSIFICATION METHODS IN GRANULAR SOILS:-In – Situ Densification Methods In Granular Soils, Vibration At The Ground Surface, Impact At The Ground Surface, Vibration At Depth, Impact At Depth.

DENSIFICATION METHODS IN COHESIVE SOILS:–In – Situ Densification Methods In Cohesive Soils – Preloading Or Dewatering, Vertical Drains – Sand Drains, Sand Wick Geo-drains – Stone And Lime Columns – Thermal Methods.

UNIT III

STABILISATION: Methods Of Stabilization-Mechanical-Cement- Lime-Bituminous- Chemical Stabilization With Calcium Chloride, Sodium Silicate And Gypsum.

UNIT IV

REINFORCED EARTH: Principles – Components of Reinforced Earth – Factors Governing Design of Reinforced Earth Walls – Design Principles of Reinforced Earth Walls

GEOSYNTHETICS: Geo-textiles- Types, Functions and Applications – Geo-grids and Geo-membranes – Functions and Applications

UNIT V

EXPANSIVE SOILS: Problems of Expansive Soils – Tests for Identification – Methods of Determination of Swell Pressure. Improvement of Expansive Soils – Foundation Techniques in Expansive Soils – Under Reamed Piles

4. Books and Materials

Text Book(s)

1. Engineering Principles of Ground Modification, *Haussmann M.R. (1990*), McGraw-Hill International Edition

2. Ground Improvement Techniques by Dr.P.Purushotham Raj, LaxmiPublications, New Delhi / University Science Press, New Delhi

Reference Book(s)

1. Ground Improvement, Blackie Academic and Professional by Moseley M.P.(1993), Boca Taton, Florida, USA.

2. Ground Control and Improvement by Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994), John Wiley and Sons, New York, USA.

3. Designing with Geo-synthetics by Robert M. Koerner, Prentice Hall New Jercy,USA

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30156 – EARTHQUAKE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course introduces the basics of Earthquake Engineering to study the behavior of buildings due to earthquakes by different methods. This course also enables the students to design the shear walls and also detailing of earthquake resistant building components like beams, columns etc. according to various IS design codes.

Course Pre/corequisites

A1118 – Structural Analysis – II

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30156.1 Apply the concept of theory of vibrations to earthquake engineering to find the building response.

A30156.2 Make use of response spectrum graphs to find the maximum displacements of the building due to different ground motions.

A30156.3 Analyze the multi degree of freedom structures by using seismic coefficient and response spectrum methods to find the drifts of the building.

A30156.4 Examine the latest Indian Seismic codes IS: 4326 and IS: 13920 provisions for ductile detailing of R.C buildings

A30156.5 Assess the different plan configurations in aseismic planning of the earthquake resistance building.

3. Course Syllabus

UNIT I

Introduction to Structural Dynamics: Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT II

Multi-Degree of Freedom (MDOF) Systems: Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT III

Earthquake Analysis: Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storied buildings

– Use of response spectra. Review of the latest Indian seismic code IS:1893 – 2016 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT IV

Earthquake Seismology and Ductile detailing: Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc. – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams. Review of the latest Indian Seismic codes IS: 4326 and IS: 13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

UNIT V

Aseismic Planning: Plan Configurations – Torsion Irregularities – Re-entrant corners – Nonparallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings. Shear walls: - Types – Design of Shear walls as per IS: 13920 – Detailing of reinforcements.

4. Books and Materials

Text Book(s)

1. A.K. Chopra, *Dynamics of Structures*, Pearson Education, Indian Branch, 3rd edition,2007.
2. Clough & Penzien, *Dynamics of Structures*, McGraw Hill International, 2nd, edition, 2015.

Reference Book(s)

1. Mario Paz, Structural Dynamics, Academic Publishers, 5th edition, 2007.
2. Pankaj Agarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures*, Printice Hall of India, 2nd edition, 2006.
3. S.K. Duggal, Earthquake *Resistant Design of Structures*, Oxford University press, 2nd edition, 2007.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30157 – ENGINEERING HYDROLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The student will gain basic skills to carry out the hydrologic analyses and designs that are often encountered in engineering practice. The course covers fundamentals such as the hydrological cycle, catchment, losses, hydrographs and hyetographs. The course also deals with groundwater movement and its management by applying concepts like Hydraulic conductivity, Aquifer transmissivity, Dupuit's assumptions Storage coefficient etc.

Course Pre/corequisites

A1103 – Mechanics of Fluids

A1109 – Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30157.1 Analyze hydro-meteorological data using rain gauges, evapometer and barometers

A30157.2 Apply groundwater flow equations to aquifer parameters for computation of runoff

A30157.3 Compute yield from surface and subsurface basin

A30157.4 Develop rainfall-runoff models

A30157.5 Compute groundwater drawdown based on water well withdrawal

3. Course Syllabus

UNIT I

Basic concept of Hydrology: Basic concept of Hydrology and Hydrologic cycle - Test for consistency of rainfall records - Analysis of rainfall data - correlation between intensity and duration – intensity, duration and frequency - depth area duration (DAD) curve. Hydrologic abstractions- infiltration- - Green Ampt method-Evapotranspiration – different methods - Blaney Criddle method - penman method.

UNIT II

Catchment characteristics: classification of streams – stream pattern-stream order, stream gauging, rating of current meter -Extension of stage discharge curve - Adjustment of stage discharge curve-selection of site for stream gauging stations

Runoff - Computation of runoff, Hydrograph Analysis-Rational method, S-hydrograph - unit hydrograph from complex storm, synthetic unit hydrograph- Instantaneous unit hydrograph (Brief description only) – linear reservoir model.

UNIT III

Partial differential equation governing unsteady groundwater flow: Evaluation of aquifer parameters - Theis method -Jacob's approximation method. Well flow near aquifer boundaries -

Method of images - surface investigation of groundwater - Electrical resistivity method. Graphical representation of hadrochemical data - Pollution of groundwater, sources. Seawater intrusion- Ghyben-Herzberg relationship –Method of control of seawater intrusion- Artificial recharge of groundwater.

UNIT IV

Rainfall- runoff: correlation using linear regression and multiple linear regression analysis. Design flood and their Estimation, Different methods, Flood frequency studies -Gumbel's method.

UNIT V

Flood routing through reservoirs - ISD method- Modified Pulse method. Flood routing through channels by Muskingum method. Flood control methods - Flood forecasting and warning (Brief descriptions only)

4. Books and Materials

Text Book(s)

1. B C Punmia Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi 16thedition,2009.
2. S. K. Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, 7th edition,2008

Reference Book(s)

1. Subramanya. K, *Engineering Hydrology*, Tata McGraw Hill, 1984.
2. Bear J., *Hydraulics of Groundwater*, McGrow-Hill International, 2ndedition, 2002.
3. Raghunath. H M, *Hydrology*, New Age International Publications, 1987.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30158 – AIR POLLUTION AND CONTROL

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of this course is to provide students with a scientific and technical background in air pollution monitoring, pollution control technologies and environmental management. In this course, students will learn various sources and effects of air pollutants, properties of atmosphere, controlling process of pollutants their physical and chemical behavior in the atmosphere.

Course Pre/corequisites

A3005 – Environmental Studies

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30158.1 Classify various sources and effects of air pollution

A30158.2 Analyze plume dispersion needs to control the pollutants

A30158.3 Interpret atmospheric properties with air quality-wind rose diagrams

A30158.4 Apply various methods for the control of particulates

A30158.5 Design sampling methods of air pollution with emission quality standards

3. Course Syllabus

UNIT I

Introduction: Air pollution, definitions, scope, significance and episodes, air pollutants classifications, natural and artificial, primary and secondary, point and non- point, line and areal sources of air pollution- stationary and mobile sources. effects of air pollution:

Effects of air pollution: Effects of air pollutants on man, material and vegetation: global effects of air pollution, greenhouse effect, heat islands, acid rains, ozone holes etc.

UNIT II

Thermodynamics of air pollution: Thermodynamics and kinetics of air pollution – applications in the removal of gases like Sox, Nox, CO, HC etc., and air-fuel ratio. Computation and control of products of combustion meteorology and plume dispersion

Properties of atmosphere: Heat, pressure, wind forces, moisture and relative humidity, influence of meteorological phenomena on air quality-wind rose diagrams

UNIT III

Lapse rates: Pressure systems, winds and moisture plume behavior and plume rise models; Gaussian model for plume dispersion

UNIT IV

Control of particulates: Control at sources, process changes, equipment modifications, design and operation of control, equipment's, general methods of control of Nox and Sox emissions, in-plant control measures, process changes, dry and wet methods of removal and recycling

UNIT V

Air quality management: Air quality management, monitoring of SPM, SOx; NOX and CO emission standards– air sampling, sampling techniques, high volume air sampler, stack sampling analysis of air pollutants, air quality standards, air pollution control act.

4. Books and Materials

Text Book(s)

1. M N Rao and H V N Rao, *Air Pollution and Quality Control*, Tata McGraw Hill Company, 1st edition,2004.
2. Thod Godish, *Air Quality*, Levis Publishers, Special India Edition, New Delhi,5th edition 2016.

Reference Book(s)

1. Rao C.S. *Environmental Pollution Control Engineering*, New Age International Publishers, 6th edition 2006.
2. Environmental Pollution Control Engineering, 2nd Edition By Rao C.S. (2006), New Age International, New Delhi

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
(AUTONOMOUS)

COURSE STRUCTURE

VII – SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

VII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30159 A30160 A30161 A30162 A30173	Bridge Engineering Pavement Analysis and Design Hydropower Engineering Cost Effective Housing Techniques Ground Improvement	PE-3	3	0	0	3	40	60	100
A30163 A30164 A30165 A30166 A30175	Pre-stressed Concrete Urban Transportation and Planning Rehabilitation and Retrofitting of Structures Industrial Waste Management Geometric Design of Highways	PE-4	3	0	0	3	40	60	100
A30167 A30168 A30169 A30170 A30178	Traffic Engineering Environmental Impact Assessment and Management Foundation Engineering Design and Drawing of Irrigation Structures Municipal Solid Waste Management	PE-5	3	0	0	3	40	60	100
A30579	The Joy of Computing using Phyton	OE-3	3	0	0	3	40	60	100
A30094	Entrepreneurship	OE-4	3	0	0	3	40	60	100
A30022	**Professional Ethics**	HS	3	0	0	3	40	60	100
A30131	**ETABS LAB**	SC	1	0	2	2	40	60	100
A30132	**Industrial/Research Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester**	PW	0	0	0	3	100	0	100
TOTAL			**19**	**00**	**2**	**23**	**380**	**420**	**800**
Industrial/Research Internship (Mandatory) 2 Months during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)			4	0	0	4	40	60	100

***There is a provision for the Universities/Institutions to implement AICTE mandatory course "Universal Human Values 2: Understanding Harmony" under Humanities and social science Elective in seventh semester for 3 credits.**

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

VIII SEMESTER (IV YEAR)									
Course Code	Title of the Course	gory	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A30134	Project (Major Project) Project work, seminar and internshipin industry (Internship along with Project Work)	PW	0	0	0	12	60	140	200
Internship (6 Months)									
	TOTAL		**0**	**0**	**0**	**12**	**60**	**140**	**200**

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30159 – BRIDGE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course presents the structural design of concrete bridges, box culverts, plate girder bridges and composite bridges. It covers an overview of short, medium and long span bridges. The course enables the students to choose the appropriate bridge type for a given project. Bridge design is a common career for civil engineers, with strong demand due to the global expansion of transport infrastructure.

Course Pre/corequisites

A30110 – Structural Analysis
A30116 – Design and Drawing Reinforced Concrete Structures

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30159.1: Conduct site investigations to find the suitability of ground conditions for proposed bridge structure

A30159.2: Interpret the IRC regulations and railway bridge rules for detailed calculation of loadings

A30159.3: Design various types of bridges as per Indian Standard code provisions

A30159.4: Perform stability analysis of piers and abutments to find resistance against sliding and overturning

3. Course Syllabus

UNIT I

Introduction: importance of site investigation in bridge design, Highway Bridge loading standards, impact factor, Railway Bridge loading standards

Box culvert: Design loads, design of box culvert subjected to general loading

UNIT II

Deck Slab Bridge: Effective width method of analysis, design of deck Slab Bridge subjected to class AA tracked vehicle loading only

UNIT III

Beam and Slab Bridge: Design of interior panel of slab, Pigeaud's method, design of T-Beam Bridge subjected to class AA tracked vehicle loading only

UNIT IV

Plate Girder Bridge: Elements of a plate girder and their design, design of a deck type welded plate girder – bridge of single line B.G.

Composite Bridge: Design of composite bridges consisting of RCC slabs over steel girders including shear connectors

UNIT V

Piers and Abutments: Bed block, materials for piers & abutments, types of piers, forces acting on piers and abutments, stability analysis of piers & abutments, types of wing walls, approaches, types of bridge foundations (excluding design)

4. Books and Materials

Text Book(s)

1. N Krishna Raju. *Design of Bridges*, oxford and IBH Publishing Company, 5th edition, 2018.
2. T.R. Jagadish & M.A. Jayaram, *Design of Bridges Structure*, Prentice Hall of India Pvt., Delhi

Reference Book(s)

1. D Johnson Victor. *Essentials of Bridge Engineering*, Oxford and IBH Publishing Company, 6th edition, 2019.
2. S Ponnu Swamy, *Bridges Engineering*, TATA McGraw Hill Company, 4th edition, 2008.
3. B.C. Punmia, Ashok Kumar Jain And Arun Kumar Jain, Design of R.C.C. Structures Laxmi Publications, New Delhi

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30160- PAVEMENT ANALYSIS AND DESIGN

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is an extension of Transportation engineering which develops technical competence in the analysis and design of road pavements. It includes material characterization, properties and usage of bitumen, maintenance and management, cost and performance which are considered in the field of road infrastructure and pavement design. It enables the student to design rigid and flexible pavements as per Indian Standard Codes.

Course Pre/corequisite

A30124 – Transportation Engineering

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30160.1: Perform basic statistical analysis of traffic data to find PCU factor

A30160.2: Design flexible pavements and rigid pavement using IRC and AASHTO Methods

A30160.3: Compute pavement responses due to traffic loads and environment changes

A30160.4: Identify material components used in pavement layers to design bituminous mixes

A30160.5: Analyze structural and functional failure in pavements due to various combinations of loads

3. Course Syllabus

UNIT I

Factors Affecting Pavement Design: Variables considered in pavement design, types of pavements, functions of individual layers, classification of axle types of rigid chassis, tire pressure, contact pressure, EAL and ESWL concepts, traffic analysis: ADT, AADT, truck factor, growth factor, lane, directional distributions & vehicle damage factors, Effect of transient & moving loads.

UNIT II

Stresses in Pavements: Vehicle-pavement interaction: steady state of vibration, stress inducing factors in flexible and rigid pavements, stress in flexible pavements: visco-elastic theory and assumptions, layered systems concepts, stress solutions for one, two and three layered systems, fundamental design concepts; stresses in rigid pavements: Westergaard's theory and assumptions, stresses due to curling, stresses and deflections due to loading, frictional stresses, stresses in dowel bars & tie bars

UNIT III

Material Characterization& Mix Design Concepts: CBR and modulus of sub grade reaction of soil, mineral aggregates, blending of aggregates, binders, polymer and rubber modified bitumen, tests on aggregates, tests on bitumen, marshal's methods of bituminous concrete mix design introduction to super pave mix design, IRC cement concrete mix design, pavement drainage concepts

UNIT IV

Design of Flexible Pavements: Flexible pavement design concepts, asphalt institute's methods with HMA and other base combinations, AASHTO, IRC Methods, design of runways & taxiways, design of low volume rural roads

UNIT – V

Design of Rigid Pavements: Calibrated mechanistic design process, AASHTO & IRC specifications, introduction to prestressed and continuously reinforced cement concrete pavement design, rigid pavement design for low volume rural roads.

4. Books and Materials

Text Book(s)

1. L.R. Kadiyali & Lal. Principles and Practice of Highway Engineering Design, Khanna Publications, 6th edition 2018.
2. IRC Code for flexible pavement, IRC – 37 -2001, IRC Code for Rigid pavement, IRC – 58 – 2002

Reference Book(s)

1. S.K. Khanna & C.E.G. Justo, *Highway Engineering*, Nemchand & Bros, 10th edition 2020.
2. L.R. Kadiyali, *Transportation Engineering*, Khanna Publications, 1st edition 2019.
3. R Srinivasa Kumar, *Pavement Design*, Universities Press, Hyderabad, 2nd edition 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30161 – HYDROPOWER ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is an extension of fluid mechanics and hydraulics engineering which develops technical competence of a hydropower plant. Hydropower is the power derived from the energy of falling or fast-running water, which may be harnessed for power generation. The course deals with hydropower plants, water conveyance system, planning of power house, design of penstocks and turbines.

Course Pre/corequisites

A30103 - Fluid Mechanics
A30108 - Hydraulics and hydraulic machinery

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30161.1: Analyze the requirements of hydropower based on flow and power duration curves

A30161.2: Determine storage capacity of various hydropower plants

A30161.3: Interpret various water conveyance systems to draw water from reservoirs

A30161.4: Design penstocks and turbines for power generation

A30161.5: Plan the layout of a hydropower plant

3. Course Syllabus

Unit I

Energy Resources, Planning and Potential Power resources, Conventional and Nonconventional, Need and advantages, Overview of World Energy Scenario, energy and development linkage, Environmental Impacts of energy use, Green House Effect, Trends in energy use patterns in India, Hydropower development in India, Hydropower potential.

Unit II

Hydropower Plants Hydrological Analysis, Classification of hydropower plants, Run of river plants, Storage or Valley dam plants, Pumped storage plants, Introduction to micro hydro, Base load and Peak load plants, advantages and disadvantages, Components of hydropower plants.

Unit III

Load Assessment Estimation of electrical load on turbines. Load factor, Plant factor, peak demand and utilization factor, load curve, load duration curve, Prediction of load, Tariffs, Hydro-Thermal Mix, Combined Efficiency of Hydro-Thermal-Nuclear Power Plants.

Unit IV

Water Conductor System and Powerhouse Water Conductor System, Alignment, Intake Structures- Location and Types, Trash Rack. Penstock and pressure shaft, Types of Powerhouses,

Typical layout of powerhouse, Components, Power plant equipment's, Instrumentation and control

Unit V

Turbines Classification, Principles and design of impulse and reaction turbines, Selection of Turbine, Specific Speed, Governing of turbines, Water hammer, Hydraulic Transients and Surge tanks, Draft tubes, Cavitation.

4. Books and Materials

Text Book(s)

1. M.M. Dandekar and K.N. Sharma, "Water Power Engineering", Vikas Publishing House, New Delhi 2nd edition 2002
2. Arora, K.R., *Irrigation Water Power and Water Resources Engineering*, Standard Book Company, 2ndedition 2002.

Reference Book(s)

1. Punmia & Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi 3rd edition 2009
2. P.S. Nigam, *Handbook of Hydroelectric Engineering*, 1985.
3. R K Sharma, *A Text book of Water Power Engineering*, S Chand Publications 2nd edition 2003

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30162 – COST EFFECTIVE HOUSING TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of this course is to reduce the construction cost by using alternatives to the conventional methods and inputs. Most of low income and middle-class families are currently facing a shortage of owning a house. Therefore, an innovative concept of cost-effective housing techniques can be adopted in construction. The course covers basic terms of housing and principles of housing programs, alternative building materials for reducing cost of construction.

Course Pre/corequisites

A30107 – Building Construction and Planning

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30162.1: Categorize the various types of housing levels like low income group (LIG), Middle-income group (MIG) and high-income group (HIG) based on density norms

A30162.2: Choose housing policies and programs using concepts of GIS and MIS system in slums

A30162.3: Adopt innovative construction techniques for low cost housing

A30162.4: Make use of alternative building materials to condense overall cost of construction

A30162.5: Apply appropriate techniques and safety measures for housing in disaster prone areas

3. Course Syllabus

UNIT I

Introduction to Housing: Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy, Principle of Sustainable Housing – Integrated approach on arriving holding capacity and density norms - All basic infrastructure consideration - Institutions for Housing at National, State and Local levels.

UNIT II

Housing Programmes: Basic Concepts, Contents and Standards for Housing Programmes, Sites and Services, Neighborhoods- Plotted land development programs, Open Development Plots, Apartments, Gated communities, Townships, Rental Housing, Co-operative Housing, Slum Housing Programmes, Slum improvement – Slum redevelopment and Relocation – Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies, and Private sector in supply , quality, infrastructure and pricing – Role of Non-Government Organizations in slum housing.

UNIT III

Development and adoption of low-cost housing technology: Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements - Adopting of total prefabrication of mass housing in India- General remarks on pre cast rooting/flooring systems -Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall - Fly ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT IV

Alternative building materials for low cost housing and infrastructure services in rural houses: Introduction - Substitute for scarce materials – Ferro cement - Gypsum boards – Timber substitutions - Industrial wastes - Agricultural wastes - Low cost Infrastructure services: Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy, Rural Housing: Introduction traditional practice of rural housing continuous - Mud Housing technology-Mud roofs - Characteristics of mud – Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT – V

Housing in disaster prone areas: Introduction – Earthquake - Damages to houses - Traditional prone areas -Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirements of structural safety of thin pre-cost roofing units against Earthquake forces -Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety

4. Books and Materials

Text Book(s)

1. A.K. Lal, *Hand book of Low-Cost Housing,* New Age International publishers, 1st edition, 2011.
2. G.C. Mathur, *Low Cost Housing,* IBH Publishers,2nd edition, 1993.

Reference Book(s)

1. Francis Cherunilam and Odeyar D Heggade, *Housing in India,* Himalaya Publishing House, Bombay, 6nd edition, 1997.
2. Tushar Bhattacharya, *Disaster Science and Management,* TMH Publications, McGraw-Hill Education (India) Private Limited 4th edition, 2000.
3. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30173 – GROUND IMPROVEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of the course is to give the basic knowledge on the problems posed by problematic soils and the remedies to build the various structures in problematic soils.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30173.1 Identify the need of ground improvement

A30173.2 Implement the methods of shallow densification

A30173.3 Design the problems related to deep dynamic compaction

A30173.4 Understand the need of pre-consolidation

A30173.5 Analyze the importance of geosynthetics in ground improvement

3. Course Syllabus

UNIT I

Need for Ground Improvement: Introduction, Ground improvement methods, GI methods and classification, excavation and replacement, the simplest GI method.

UNIT II

Shallow Densification: Methods of shallow densification, Quality control and quality assurance application problems on excavation and replacement.

UNIT III

Deep dynamic Compaction: Rapid impact compaction, vibro-compaction, design steps, design parameters and procedure, application problems and quality control

UNIT IV

Deep replacement: Deep replacement methods, drainage, dewatering, dewatering design principles, Design problem, Pre-consolidation

UNIT V

Grouting: Chemical stabilization, soil nailing, geosynthetics in ground improvement, types of grout, grout machinery, grout monitoring.

4. Books and Materials

Text Book(s)

1. Ground Improvement Techniques by Dr P Purushotam Raj, Laxmi Publications, New Delhi/ University Science Press, New Delhi.

Reference Book(s)

1. Engineering Principles of Ground Modification, Haussmann M R. (2020), McGraw-Hill International Edition.
2. Ground Improvement Techniques by Nihar Ranjan Patra, Vikas Publications, New Delhi.
3. Ground Control and improvement by Xanthakos P P, Abramson, L W and Brucwe D A, John Wiley and Sons, New York USA

COURSE STRUCTURE
A30163 – PRESTRESSED CONCRETE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course enables the students to introduce the need for pre-stressing as well as the methods, types and advantages of pre-stressing systems. Students will be introduced to the design of pre-stressed concrete structures subjected to flexure and shear.

Course Pre/corequisites

A30116 – Design and Drawing Reinforced Concrete Structures

A30122 – Concrete Technology

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30163.1	Enumerate the various methods of pre-stressing to analyze the post and pre tensioning systems
A30163.2	Design various pre-stressed concrete structural elements
A30163.3	Compute losses of pre-stress due to long term properties of concrete
A30163.4	Analyze and design the sections to withstand shear and flexure
A30163.5	Predict short term and long term deflections to comply with the limit state of deflection

3. Course Syllabus

UNIT I

INTRODUCTION: Historic development – General principles of Pre-stressing, Pre-tensioning And Post Tensioning – Advantages and limitations of pre-stressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS OF PRESTRESSING: Methods and Systems of Pre-stressing, Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of pre-stressing like Hoyer System, Magnel System, Freyssinet system and Gifford – Udall System of De-Watering- Sumps and Interceptor Ditches- Single, Multi Stage Well Points - Vacuum Well Points- Horizontal Wells- Foundation Drains-Blanket Drains- Criteria for Selection Of Fill Material Around Drains –Electro-Osmosis**.**

UNIT II

LOSSES OF PRESTRESS:- Loss of pre-stress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses.

UNIT III

ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE: Elastic analysis of concrete beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons, Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT IV

DESIGN OF SECTION FOR SHEAR: Shear and Principal Stresses – Design for Shear in beams COMPOSITE SECTION: Introduction – Analysis of stress – Differential shrinkage – General design considerations.

UNIT V

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections – factors influencing deflections – short term deflections of un-cracked members' prediction of long term deflections

4. Books and Materials

Text Book(s)

1. N. Krishna Raju, *Pre-stressed Concrete*, Tata McGraw Hill Publications, 2016 7th Edition
2. K.U.Muthu, *Pre-stressed Concrete*, PHI Publications, 2014 5th Edition

Reference Book(s)

1. Dayaratnam.P, *Pre-stressed Concrete Structures*, Oxford and IBH, 2013 10th Edition
2. Praveen Nagrajan, *Pre-stressed Concrete Design*, Pearson Publications, 2013 5th Edition

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30164 – URBAN TRANSPORTATION PLANNING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Transportation plays a major role in the development of the human civilization. This subject also deals with concepts of urban transportation planning and various stages of planning such as trip generation, trip distribution, mode split and traffic assignment are dealt here. Concepts of economic evaluation of transportation plans are also introduced.

Course Pre/corequisites

A30124 – Transportation Engineering

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30164.1	Develop a strong analytical and practical knowledge in urban mobility
A30164.2	Apply theories of transportation planning to design urban roads
A30164.3	Classify economic impacts of new transportation plans
A30164.4	Apply traffic assignment regulations to urban modes
A30164.5	Acquire knowledge on trip generation and distribution

3. Course Syllabus

UNIT I

CONCEPT OF TRAVEL DEMAND: Travel Characteristics - Origin, Destination, Route, Mode, Purpose; Travel Demand as a function of independent variables; Assumptions in Demand Estimation Relation between land use and Travel.

UNIT II

TRANSPORTATION PLANNING: General concept of Trip; Four step process of Transportation Planning-Aggregate and disaggregate Models. Delineation of study area; Zoning Principles; Formation of TAZs; Types and sources of Data, Home Interview surveys; Road side interview surveys; Goods. Taxi, IPT surveys; sampling techniques; Expansion factors and accuracy check; Desire line diagram and use.

UNIT III

TRIP GENERATION: Factors governing Trip Generation and Attraction; Multiple Linear Regression Models, Category Analysis.

TRIP DISTRIBUTION: Methods of Trip Distribution; Growth Factor Models Uniform Growth Factor Method; Average Growth Factor Method; Fratar Method; Advantages and limitations of Growth Factor Models; concept of Gravity Model (Elementary Concept Only).

UNIT IV

MODE SPLIT: Factors affecting mode split; Logit Model.

TRAFFIC ASSIGNMENT: Purpose of Assignment and General Principles; Minimum path trees; Assignment Techniques - All - or- nothing Assignment; Capacity restraint Assignment; diversion curves.

UNIT V

ECONOMIC EVALUATION: Transportation plans; Costs and benefits of transportation projects; vehicle operating cost; Time savings; Accident costs, Methods of Economic Evaluation - Benefit cost Ratio Method; Net present value method; Internal Rate of Return method.

4. Books and Materials

Text Book(s):

1. Traffic Engineering and Transportation Planning by L.R.Kadiyali, Khanna Publishers, Delhi, 3rd edition, 2017.
2. Transportation Engineering -An Introduction by Khisty C.J, Prentice Hall. 2nd edition, 2016

Reference Book(s):

1. Fundamentals of Transportation Engineering by Papa Costas C.S., Prentice Hall, India.,6th edition, 2018.
2. L.R. Kadiyali, *Highway Engineering Design*, Khanna Publications, 1st edition, 2019.
3. L.R. Kadiyali, Traffic Engineering and Transportation planning, Khanna Publications, 4th edition, 2016.

COURSE STRUCTURE
A30165 – REHABILITATION AND RETROFITTING OF STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course deals with the causes of deterioration, assessment of distressed structures, repairing of structure. It provides knowledge of development of advanced structural materials and technologies for execution of the constructional works. The need of the day is to provide durable repairs and strengthening of existing structures.

Course Pre/corequisites

A30122 – Concrete Technology

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30165.1: Develop knowledge on various distress and damages to concrete and masonry structures

A30165.2: Apply quantity of each item of structures, types and properties of repair material

A30165.3: Apply Non-Destructive Testing techniques to field problems

A30165.4: Apply cost effective retrofitting strategies for repairs in buildings

A30165.5: Assessing damage to structures and various repair techniques

3. Course Syllabus

UNIT I

GENERAL INTRODUCTION – Deterioration of Structures – Distress in Structures – Causes and Prevention Mechanism of Damage – Types of Damage.

UNIT II

CORROSION OF STEEL REINFORCEMENT – Causes – Mechanism and Prevention, Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation

UNIT III

INSPECTION AND TESTING – Symptoms and Diagnosis of Distress – Damage assessment –NDT

UNIT IV

REPAIR OF STRUCTURE – Common Types of Repairs – Repair in Concrete Structures –Repairs in Under Water Structures – Guniting – Shot Crete – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT V

HEALTH MONITORING OF STRUCTURES – Use of Sensors – Building Instrumentation

4. Books and Materials

Text Book(s)

1. N. Krishna Raju, *Pre-stressed Concrete*, Tata McGraw Hill Publications, 2016 7th Edition
2. K.U.Muthu, *Pre-stressed Concrete*, PHI Publications, 2014 5th Edition

Reference Book(s)

1. Dayaratnam.P, *Pre-stressed Concrete Structures*, Oxford and IBH, 2013 10th Edition
2. Praveen Nagrajan, *Pre-stressed Concrete Design*, Pearson Publications, 2013 5th Edition

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30166 – INDUSTRIAL WASTE MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course imparts knowledge on sources and characteristics of various major industrial wastes and strategies for its prevention and control. The course intended to introduce the concepts for cleaner industrial production. This course also deals with treatment technologies for industrial effluent hazardous wastes.

Course Pre/corequisites

A30012 – Engineering Chemistry

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30166.1	Analyze the characteristics of industrial wastewaters.
A30166.2	Select appropriate cleaner production method for industries.
A30166.3	Analyze the effects of disposal of industrial wastes.
A30166.4	Design treatment options for handling industrial wastewater.
A30166.5	Identify various treatment methods for hazardous wastes.

3. Course Syllabus

UNIT I

Introduction: Types of industries and industrial pollution, characteristics of industrial wastes, population equivalent, bioassay studies, effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health environmental legislations related to prevention and control of industrial effluents and hazardous wastes.

UNIT II

Cleaner production: Waste management approach, waste audit, volume and strength reduction, material and process modifications, recycle, reuse and by product application.

UNIT III

Pollution from major industries: Sources, Characteristics, waste treatment flow sheets for selected industries such as textiles, tanneries, pharmaceuticals, electroplating industries, Dairy, sugar, paper, distilleries, steel plants, refineries, fertilizer, thermal power plants, wastewater redemption concepts.

UNIT IV

Treatment technologies: Equalization, neutralization, removal of suspended and dissolved organic solids, chemical oxidation, adsorption, removal of dissolved inorganic, combined treatment of industrial and municipal wastes, residue management, dewatering, disposal.

UNIT V

Hazardous waste management: Hazardous wastes, physico chemical treatment, solidification, incineration, secured landfills.

4. Books and Materials

Text Book(s)

1. WEF Manual of practice No. FD-3, *Industrial Wastewater Management, Treatment and Disposal,* WEF Press and McGraw-Hill, 3rd edition, 2008
2. Numersorn. N.L., *Liquid Waste from Industry – Theories, Practice and Treatment*, Addison-Wesley,1st edition, 1971

Reference Book(s)

1. Patwardhan. A.D., *Industrial Wastewater Treatment*, Prentice Hall of India, New Delhi, 1st edition, 2010.
2. Pandey, *Environmental Management*, Vikas Publications, 3rd edition, 2010.
3. Bishop, P.L., *Pollution Prevention: Fundamental & Practice*, McGraw Hill, 4th edition, 2000.

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COURSE STRUCTURE
A30175 – GEOMETRIC DESIGN OF HIGHWAYS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The geometric design of highways refers to the configuration of the visible elements of a highway that affect driver behavior, safety, and traffic flow. It focuses on creating a roadway that accommodates vehicles comfortably and safely, based on factors like speed, traffic volume, and terrain.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30175.1 Understand the Fundamentals of Highway Design

A30175.2 Design various Cross-Section Elements

A30175.3 Apply Superelevation and Curve Design

A30175.4 Design Intersections and Interchanges

A30175.5 Analyze the importance of modern tools in geometric design as per IRC

3. Course Syllabus

UNIT I

Introduction: Design controls, Classification of Roads, Space standards, Sight Distance requirements.

UNIT II

Cross-section Elements: Cross-sectional elements– single-lane, two-lane, multi-lane highways, expressways, pedestrian facilities, bicycle facilities.

UNIT III

Alignment: Alignment design– Horizontal alignment and vertical alignment; including multi-lane highways and expressways

UNIT IV

Intersection Design: Intersection layouts and geometry, channelization, Interchanges, Auxiliary lanes

UNIT V

Facilities: Design of facilities like parking areas, bus bays and shelters, truck lay-byes and Toll Plazas.

4. Books and Materials

Text Book(s)

1. Highway Engineering by Wright, Paul H. and Dixon, Karen, John Wiley and Sons

5. Reference Book(s)

1. IRC:38-1988 Guidelines for Design of Horizontal Curves for Highways and Design Tables
2. IRC:52-2019 Guidelines for the Alignment Survey and Geometric Design of Hill Roads
3. IRC:62-1976 Guidelines for Control of Access on Highways
4. IRC:66-1976 Recommended Practice for Sight Distance on Rural Highways
5. IRC:67-2022 Code of Practice for Road Signs
6. IRC:SP-23-1983 Vertical Curves for Highways

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COURSE STRUCTURE

A30167- TRAFFIC ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals will enable the student to understand the various characteristics of traffic system and make the student to have the knowledge of intersections and their design interchanges and parking facilities.

Course Pre/corequisite

A30124 - Transportation Engineering

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30167.1: To Conduct traffic studies and estimate basic characteristics of traffic stream.

A30167.2: To Analyze the traffic data and interpret the results

A30167.3: To Design the geometric elements for better traffic system

A30167.4: To Analyze and design uncontrolled and signalized intersection with collected data

A30167.5: To makes parking surveys and design parameters to be considered in parking design

3. Course Syllabus

UNIT I

Characteristics of Traffic System: Human-vehicle-environment system, Fundamental parameters of traffic and relationships; Microscopic and macroscopic characteristics

Traffic Data Collection studies: Traffic study components, types of data; Volume studies; Speed studies; Travel time and delay studies; Intersection studies, Pedestrian studies; Parking studies, Vehicle detection methods; Advanced methods: GPS, Instrumented Vehicles, Image Processing, Bluetooth, Infrared methods

UNIT II

Highway Capacity Analysis: Capacity and level of service concepts; Factors affecting capacity and LOS; Freeway and multi-lane analysis; Capacity of Urban arterials; Signalised intersections; Un- signalised intersections; US Highway Capacity Manual (HCM) and IRC standards, Indo-HCM standards.

UNIT III

Design of unsignalized intersections: At grade intersections types and their suitability, factors affecting design, data requirement, parameters selection, intersection controls, estimation of conflict points, uncontrolled intercession analysis, sight distance requirements, roundabouts and design methodologies, capacity of roundabouts, mini roundabouts.

Design of signalized intersections: Warrants for signalization, saturation flow rate and capacity, estimation of amber time, design of all aspects of signal timings, LOS studies, estimation of queue length and control delay, signal coordination, channelization and its objectives, channelizing devices, design considerations, typical channelizing examples**.**

UNIT IV

Design of Interchanges: Necessities of interchanges, classification and types of common interchanges, layouts of interchange, interchange warrants, interchange design elements.

UNIT V

Design of parking facilities: Parking and influencing factors, type of parking system, parking angles and aisle width, on-street parking design, design parameters, parking surveys and demand estimation, various parking layouts and vehicle circulation, design of off-street parking facilities,
types and layouts, design examples

4.Books and Materials

Text Book(s)

1.S.K. Khanna & C.E.G. Justo, Highway Engineering, Nemchand & Bros, 10th edition, 2020

2.L.R. Kadiyali, Highway Engineering Design, Khanna Publications, 1st edition, 2019

Reference Book(s)

1. L R. Kadiyali &Lal, Principles and Practice of Highway Engineering Design, Khanna Publications,6th edition, 2018.

2. L.R. Kadiyali, Traffic Engineering and Transportation planning, Khanna Publications, 4th edition, 2016.

3. R Srinivasa Kumar, Textbook of Highway Engineering, Orient Blackswan, 2nd edition 2011

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COURSE STRUCTURE

A30168- ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same. The student will get insight about the various impacts of development projects on environment and the mitigating measures.

Course Pre/corequisite

A30118- Environmental Engineering

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30168.1: Perform a critical quality review of an EIA and EIS

A30168.2: Structure the EIA working process considering the need for interdisciplinary

A30168.3: Perform the screening and scoping of an EIA, based on existing requirements

A30168.4: Clarify the concept of EIA and its application in an international context

A30168.5: Interpretate an EIA, present its conclusions and translate its conclusions into actions

3. Course Syllabus

UNIT I

INTRODUCTION: Basic concept of EIA, Initial environmental Examination, Elements of EIA, factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT II

EIA METHODOLOGIES: Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysisars

UNIT III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures, E I A in surface water, Air and Biological environment, Methodology for the assessment of Impacts on surface water environment, Air Pollution sources, Generalized approach for assessment of Air pollution Impacts

UNIT IV

ASSEMENT OF IMPACT ON VEGETATION AND WILD LIFE:

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation

ENVIRONEMNTAL AUDIT: Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, stages of Environmental Audit, onsite activities,

Evaluation of Audit data and preparation of Audit report

UNIT V

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION): Post Audit activities, The Environmental protection Act, The water prevention Act, The Air (Prevention & Control of pollution Act.), Wild life Act, Case studies and preparation of Environmental Impact assessment statement for various Industries.

4. Books and Materials

Text Book(s)

1. Y. Anjaneyulu, Environmental Impact Assessment Methodologies, B.S. Publication, 9th edition2013
2. J. Glynn and Gary W. Hein Ke, Environmental Science and Engineering, Prentice Hall Publishers 2014 5th Edition02

Reference Book(s)

1. Suresh K. Dhaneja, Environmental Science and Engineering, S.K.Katari & Sons Publications, New Delhi., 9th edition 2016
2. Canter, L.W, Environmental Impact Assessment, 1977, McGraw Hills, New York

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30169 – FOUNDATION ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with types and purposes of different types of foundation systems and structures. Foundation is an important component of any civil engineering structure which must be safe, stable, and economically designed. The course on Foundation Engineering provides the students necessary geotechnical engineering skills to analyze and design shallow and deep foundation systems under different loading and soil conditions.

Course Pre/co-requisites

A30117 – Geotechnical Engineering

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30169.1 Plan and execute detailed site investigation program to select type of foundation

A30169.2 Determine bearing capacity of shallow foundation based on the soil conditions

A30169.3 Explain the types of footing and raft based on contact pressure distribution

A30169.4 Interpret the load carrying capacity and settlement of piles and pile group

A30169.5 Illustrate the behaviour of soil behind retaining structures

3. Course Syllabus

UNIT I

Site Investigation and Selection of Foundation: Scope and objectives — Methods of exploration — Auguring and boring — Wash boring and rotary drilling — Depth and spacing of bore holes — Soil samples — Representative and undisturbed — Sampling methods — Split spoon sampler, Thin wall sampler, Stationary piston sampler — Penetration tests (SPT and SCPT) — Data interpretation — Strength parameters — Bore log report and Selection of foundation simplex method, big -M method and special cases.

UNIT II

Shallow Foundations: Location and depth of foundation — Codal provisions — Bearing capacity of shallow foundation on homogeneous deposits — Terzaghi's formula and BIS formula — Factors affecting bearing capacity — Bearing capacity from in-situ tests (SPT, SCPT and plate load) — Allowable bearing pressure — Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits — Total and differential settlement — Allowable settlements — Codal provision — Methods of minimizing total and differential settlements.

UNIT III

Footings and Rafts: Types of Isolated footing, Combined footing, Mat foundation — Contact pressure and settlement distribution — Proportioning of foundations for conventional rigid behaviour — Minimum thickness for rigid behaviour — Applications — Compensated foundation — Codal provision

UNIT IV

Pile Foundations: Types of piles and their functions — Factors influencing the selection of pile — Carrying capacity of single pile in granular and cohesive soil — Static formula — Dynamic formulae (Engineering news and Hileys) — Capacity from in-situ tests (SPT and SCPT) — Negative skin friction — Uplift capacity-Group capacity by different methods (Feld's rule, Converse — Labarra formula and block failure criterion) — Settlement of pile groups — Interpretation of pile load test (routine test only), under reamed

piles.

UNIT V

Retaining Walls: Plastic equilibrium in soils — Active and passive states — Rankine's theory — Cohesion less and cohesive soil — Coulomb's wedge theory — Condition for critical failure plane — Earth pressure on retaining walls of simple configurations — Culmann's Graphical method — Pressure on the wall due to line load — Stability analysis of retaining walls — Codal provisions.

4. Books and Materials

Text Book(s)

1. A text book of soil mechanics and foundation engineering, revised and enlarged 4th edition 2015 by V.N.S. Murthy, Saikripa Technical Consultants, Bangalore
2. Soil mechanics and foundation engineering by K R Arora, Standard Publications and Distributors, Delhi, 2014.

Reference Book(s)

1. Basic and applied soil mechanics by Gopal Ranjan and ASR Rao, Wiley Easter Ltd., New Delhi.
2. Foundation Engineering by R.B. Peck, W. E. Hanson and T. H. Thournburn, John Wiley, New York.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30170 – DESIGN AND DRAWING OF IRRIGATION STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course provides the knowledge of design of various hydraulic structures like weirs, aqueducts, sluices and canal regulators. It also deals with structural drawing and detailing of various components of hydraulic structures.

Course Pre/corequisites

A30103 – Fluids Mechanics

A30108- Hydraulics and Hydraulic Machinery

A30111 – Water Resources Engineering

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30170.1	Apply the concepts of fluid mechanics to analyze an irrigation structure
A30170.2	Design various irrigation structures like head and cross regulator structure
A30170.3	Understand different aspects of design of hydraulic structures
A30170.4	Identify various types of reservoirs and their design aspects
A30170.5	Design and draw the structural details of hydraulic structures

3. Course Syllabus

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

4. Books and Materials

Text Book(s):

1. Design of Minor Irrigation And Canal Structures By C.Satyanarayana Murthy, New Age Publications.
2. Irrigation Engineering And Hydraulic Structures By S.K.Garg, Standard Book House.

Reference Book(s):

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg; Khanna Publishers, Delhi.
2. Irrigation, Waterpower and Water Resources Engineering By K R Arora; Standard Publication, New Delhi.

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COURSE STRUCTURE

A30022 - PROFESSIONAL ETHICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. CourseDescription

Course Overview

Ethical and professional values course provides a framework and a moral compass for students and help guide their professional behaviors. This course broadens ethical and professional values which underpin professional skills and behaviors. The students work efficiently by prioritizing, organizing and managing their time effectively. They make the best use of technology, including spreadsheets and data analytics, to find effective solutions to various issues by considering the importance of maintaining professional competence and pursuing life-long learning. This course also introduces them to communicate effectively in academics and in profession. The students become aware of the working structure of the society by identifying opportunities, problems and observe trends and make suitable recommendations based on them. The students explore different types of leadership approaches and qualities of effective leaders which can be adopted or adapted at any level. This course provides the students with those skills that encourage them to become open-minded and involve in innovative thinking.

Course Pre/corequisites

A30035 – Universal Human Values- understanding harmony

2. Course Outcomes (COs)

After completion of the course, the learner will be able:

A30022.1: To identify ethical and take ethical decisions

A30022.2: To consider the importance of maintaining professional competence and pursuing life-long learning

A30022.3: To understand patterns and channels of communication and their efficiency

A30022.4: To analyze and evaluate available data and information from a variety of sources

A30022.5: To demonstrate leadership qualities in teams effectively and efficiently

A30022.6: The importance of applying an enquiring mind when collecting and assessing data and information

3. Course Syllabus

UNIT I- ETHICS AND PROFESSIONALISM

Introduction, perspectives of Ethics, branches of Ethics, justice vs care, Ethics and morality,Ethics and religion, Ethics and maturity, Ethics and the professions, Rules vs principles, Ethical dilemma.

UNIT II-PERSONAL EFFECTIVENESS

Prioritizing, organizing and managing time effectively, using technology effectively- Using email effectively How to manage email, Maintaining professional competence and lifelong learning Continuing professional development, Personal development plan, How to craft your CV for the job of your dreams, Tips to prepare for an interview, The interview, Getting it wrong, Getting it right

UNIT III- COMMUNICATION AND INTER PERSONAL SKILLS

Introduction, The communication process-What can gowrong?, Barriers and distortions to the communications process, How good are you at communicating? Formal and informal communication, six elements of effective communication, Communicating in the work place- Errors and Solutions, Report Writing- the purpose of and the best practices in report writing. Interpersonal skills- Inter personal skills, Personal qualities , Verbal communication Non-verbal communication

UNIT IV - SOCIAL AWARENESS

How to enhance your commercial awareness, SWOT analysis, Deciding when to seek the help of experts Suitability, acceptability, feasibility (SAF) model

UNIT V - LEADERSHIPANDTEAMWORKING

Introduction, The nature of leadership, Situational leadership, Leader ship inaction, Action-centered leadership (Adair), Factors influencing leadership style, Blake and Mouton grid, Examples of outstanding leaders, Team development, Motivation, Accountability, responsibility and authority.

4. Books and Materials

Text Book(s)

1. Rizvi, M. Ashraf, *Effective Technical Communication,* Noida, McGraw-Hill Education. 2009.
2. Engineering Ethics (Includes Human Values)" by Govindarajan M

Reference Book(s)

1. Professional Ethics in Engineering" by I A Dhotre V S Bagad
2. Professional Ethics In Engineering" by Dr V Jayakumar and Lakshmi Publications
3. Engineering Ethics: Challenges and Opportunities" by W Richard Bowen

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COURSE STRUCTURE
A30131-ETBAS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	2	40	60	100

1. Course Description

Course Overview

This laboratory course enables the students to design various complex and laborious structural components using ETBAS Software. The best analyzing and design software used in present scenario is ETBAS. The course provides a platform to use ETBAS Software to analyze and design real life Civil Engineering structures like buildings, water tanks, bridges, water retaining structures etc.

Course Pre/corequisites

A30116 – Design and Drawing Reinforced Concrete Structures

A30127- CAD Lab-II

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30131.1	Obtain comprehensive knowledge on the ETABS software and its applications
A30131.2	Analyse & design of structures
A30131.3	Develop building component models
A30131.4	Design footings for residential and commercial structures
A30131.5	Analyze and design Water tanks with different loads

3. Course Syllabus

1. Introduction to Etabs Software
2. Modelling, Load Application, Analysis & Result.
3. Grid Preparation
4. Primary & Secondary beam concept
5. Modelling of beam and column in Etabs
6. Modelling of slab
7. Loads Calculations and applying on Model
   a. Wall Loads
   b. Slab loads
   c. Floor finish loads
   d. Wind loads
   e. Earth quake loads
   f. Over Head Water Tank Loads
8. Analysis Checking Model for
9. Analysis
10. Design

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COURSE STRUCTURE
A30178 – MUNICIPAL SOLID WASTE MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Solid waste management (SWM) in today's urbanized society is complex due to the increasing quantity and diversity of waste, funding limitations for public disposal, technological influences, and intricate infrastructure networks. This course aims to familiarize participants with the various steps involved in effective solid waste management

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30178.1 Interpret key concepts and processes in municipal solid waste management

A30178.2 Analyze different waste types and assess their environmental impacts

A30178.3 Identify and apply best practices for sustainable waste management

A30178.4 Understand policies and regulations governing waste management

A30178.5 Design community outreach programs to promote responsible waste practices

Course Syllabus

UNIT-I: Evolution, Souces, Types and Generation of Solid Waste

Introduction to solid waste, Functional elements, Types and sources of solid waste, Sampling and characteristics, Estimation of solid waste quantity, Factors affecting solid waste generation rate

Waste Handling, Storage, Processing and Types of Collection of Solid Waste

Handling, separation and storage at source, Processing at source, Primary collection, Types of collection system

UNIT-II: Analysis of Solid Waste Collection System and Types of Transfer Station

Analysis of collection system (Part I), Analysis of collection system (Part II), Analysis of collection system (Part III) , Need and types of transfer station

Solid Waste Transport Means, Methods, Separation and Processing

Transport means and methods, Unit operation for component separation, Material recovery facilities (MRF), Recycling of dry waste components.

UNIT-III: Incineration

Waste as a fuel, Incineration/Combustion, Flue gas characteristics and treatment, Solid residue generation, characterization and treatment, Waste-to-energy (WtE) plants (case studies) pyrolysis and gasification

Composting – I & II

Definition and phases of composting, Factors affecting composting process, Types of composting – I, Types of composting – II, Compost quality, Vermicomposting

UNIT-IV: Anaerobic Digestion

Definition, stages and factors affecting anaerobic digestion, Pretreatment and co-digestion for enhancement of biogas production, Types of biogas digesters

Landfill – I & II

Site selection and types of landfill, Leachate collection and treatment, Landfill gas collection and treatment, Design of landfill & Bio-minning of old dumpsite

UNIT-V: Special Waste and Integrated Solid Waste Management

Construction and demolition waste, Management of bio-mediacal, e-waste and inert waste, Integrated solid waste management (ISWM), Municipal solid waste management rules

Finance and PPP Related to Solid Waste Management

Financing in MSWM projects, Public-Private-Partnership (PPP), Public-Private-Partnership (PPP) in MSWM projects.

3. Books and Materials

Text Book(s)

1. Municipal solid waste management by Dr P Jayarama Reddy, BS Publications, BSP Books
2. Municipal solid waste management by Dr. Sunil Kumar, Published June 30, 2020 by CRC Press

Reference Book(s)

1. Soild Waste Management by Bhide A.D Indian National Scientific Documentation Edition 1983
2. Soild Waste by George Mc Graw Hill Publication,New Delhi 2022,ISBN 9780071356237
3. Soild Waste Management by SasiKumar K , PHI learning,New Delhi, 2009 ISBN 8120338693

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30579 – The Joy of Computing Using Python

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	51	0	0	3	40	60	100

1. Course Description

Course Overview

"The Joy of Computing Using Python" is an engaging introduction to programming with Python, designed for beginners. The course covers fundamental concepts such as variables, control structures, functions, and data structures in a hands-on manner. Students will learn to write and debug code while exploring practical applications in problem-solving and data manipulation. Emphasis is placed on building computational thinking and fostering creativity through interactive projects. By the end, participants will have a solid foundation in Python and the confidence to tackle more advanced programming challenges. The course combines theoretical knowledge with practical exercises to ensure a well-rounded learning experience

Course Pre/corequisites

Basic Mathematics, Computer Operation

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30579.1: Demonstrate proficiency in Python basics, including variables, loops, and conditionals for simple applications.
A30579.2: Apply abstraction and problem-solving techniques to develop applications and games using Python.
A30579.3: Implement and analyze algorithms such as recursion and sorting in practical scenarios.
A30579.4: Handle and analyze data using techniques like image processing, sentiment analysis, and natural language processing.
A30579.5: Develop interactive and automated solutions, including browser automation and calendar manipulation, using Python.

3. Course Syllabus

UNIT-I

Motivation for Computing, Welcome to Programming!! Introduction to Anaconda, Spyder IDE, Variables and Expressions: Design your own calculator, Loops and Conditionals: Hopscotch once again, Lists Crowd computing, Permutations: Jumbled Words

UNIT-II

Abstraction Everywhere: Apps in your phone, Magic Square hit, Dobble game, Counting Candies: Crowd to the rescue Birthday, Guess the movie, Dictionaries, Sorting and Searching,

UNIT-III

Substitution Cipher: What's the secret!! Sentiment, Tic tac toe: Let's play, Recursions, Snakes and Ladders: Down the memory lane. Spiral Traversing, Track the route,

UNIT-IV

Tuples, Lottery Simulation, Image Processing, Anagrams, Sentiment Analysis: Analyse your Facebook data, Natural Language Processing, six degrees of separation: Meet your favourites Image, Calculation of the Area: Don't measure.

UNIT-V

Flames, Data Compression, Browser Automation, Fun with Calendar, Page Rank: How Google Works!!

4. Books and Materials

Textbook(s)

1. **Charles R. Severance.** *Python for Everybody: Exploring Data Using Python 3.* A beginner-friendly book that explains core Python concepts like variables, loops, conditionals, and functions. It also delves into topics such as web scraping, databases, and data visualization.
2. **Allen B. Downey.** *Think Python: How to Think Like a Computer Scientist.* An introductory textbook that emphasizes problem-solving and computational thinking, aligning well with beginner-level courses in Python.

Reference Book(s)

1. **Al Sweigart.** *Automate the Boring Stuff with Python.* A highly practical reference for automating everyday tasks like file management, web scraping, and working with Excel files using Python.
2. **John Zelle.** *Python Programming: An Introduction to Computer Science.* A more computer science-oriented introduction to Python that dives into computational theory and algorithms along with Python coding.
3. **Luciano Ramalho.** *Fluent Python: Clear, Concise, and Effective Programming.* A good reference for more advanced users, focusing on writing more Pythonic and efficient code.
4. **Mark Lutz.** *Learning Python.* A comprehensive book that covers the Python language in-depth. It's a good resource for beginners and intermediate programmers who want to dive deeper into the language.

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COURSE STRUCTURE

A30094 – ENTREPRENEURSHIP

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides a comprehensive exploration of entrepreneurship as a key driver of business growth and economic value. It offers essential frameworks for success and pathways to sustainable development, covering each theme with both conceptual and practical insights. By the end of the course, students will understand entrepreneurship's role in economic progress, gain clarity on success factors and risk mitigation, and develop skills to navigate the challenges of entrepreneurship effectively.

Course Pre/corequisites

B3719- Entrepreneurship and Start -Up

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30094.1: Identify business opportunities through market research and competitive analysis.
A30094.2 Apply ideation techniques to create prototypes and MVPs for new ventures.
A30094.3 Evaluate the dynamics of business growth and the role of entrepreneurship in employment creation.
A30094.4: Analyze the impact of technological innovation on entrepreneurship
A30094.5: Explore funding sources and create financial strategies for startups.

3. Course Syllabus

UNIT-I

The Entrepreneurial Process Entrepreneurial Journey
Introduction to the entrepreneurial process, key stages, milestones, and challenges. Success stories and case studies of prominent entrepreneurs
Entrepreneurial Discovery-Techniques for identifying business opportunities and unmet market needs. Tools such as market research, competitive analysis, and consumer behavior insights.
Ideation and Innovation: Ideation and Prototyping-Creative techniques for generating ideas. Steps for developing prototypes and minimum viable products (MVP) using iterative methods and design thinking.

UNIT-II

Testing, Validation, and Commercialization-Strategies for product testing and customer validation. Refining business ideas based on feedback and scaling ideas into commercially viable products and services.
Disruption as a Success Driver-Understanding disruption in industries and its role in driving entrepreneurial success. Case studies of disruptive businesses and lessons on leveraging disruption for growth.

Technological Innovation and Entrepreneurship– 1 -The impact of emerging technologies (AI, blockchain, IoT, etc.) on entrepreneurship. Leveraging technology for innovation and competitive advantage.

UNIT-III

Technological Innovation and Entrepreneurship – 2

Advanced strategies for integrating technological innovation into startups. Digital transformation, automation, and scaling through tech-enabled processes.

Raising Financial Resources

Overview of funding sources such as venture capital, angel investors, and crowdfunding. Strategies for securing funding and best practices for financial management.

Education and Entrepreneurship-The role of education in fostering entrepreneurship. Developing entrepreneurial skills in academic institutions and promoting entrepreneurship as a career path.

UNIT-IV

Beyond Founders and Founder-Families Challenges of scaling a business beyond the founder. Building strong leadership teams and succession planning for family-owned and founder-led businesses.

India as a Start-up Nation-Overview of India's startup ecosystem. Government policies, initiatives, and success stories that support and promote startups in India.

National Entrepreneurial Culture-Examining how different national cultures influence entrepreneurship. A comparative study of entrepreneurial ecosystems across the globe

UNIT-V

Entrepreneurial Thermodynamics-The dynamics of business growth and the concept of "entrepreneurial energy." Strategies for maintaining momentum and managing burnout in startups**.**

Entrepreneurship and Employment-How entrepreneurship contributes to job creation and economic growth. The relationship between startups, employment generation, and economic development**.**

Start-up Case Studies-In-depth analysis of real-world startups. Lessons learned from both successful ventures and failures across various industries.

4. Books and Materials

Text Book(s)

1. Arya Kumar, Entrepreneurship, Pearson, Delhi, 2012.
2. Poornima M, Entrepreneurship Development –Small Business Enterprises, Pearson, Delhi, 2009

Reference Book(s)

1. Michael H. Morris, et. al., Entrepreneurship and Innovation, Cengage Learning, New Delhi, 2011

2. KanishkaBedi, Management and Entrepreneurship, Oxford University Press, Delhi, 2009
3. Good Enough! To Launch Your Company, by Randal Wimmer, Joshua Ducharme, 2023
4. Start Your Business With Confidence, by Jeff Bezos, 2023

Reference Online Resources/Materials:

1. https://onlinecourses.nptel.ac.in/noc24_mg93/announcements?force=true

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROFESSIONAL ELECTIVES

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R20 REGULATIONS

B. TECH – CIVIL ENGINEERING

Professional Electives

Professional Elective – 1	
Course Code	**Title of the Course**
A30151	Advanced Structural Analysis
A30152	Green Buildings
A30153	Watershed Management
A30154	Disaster Management and Mitigation
A30171	Engineering Geology
Professional Elective – 2	
Course Code	**Title of the Course**
A30155	Ground Improvement Techniques
A30156	Earthquake Engineering
A30157	Engineering Hydrology
A30158	Air Pollution and Control
Professional Elective – 3	
Course Code	**Title of the Course**
A30159	Bridge Engineering
A30160	Pavement Analysis and Design
A30161	Hydropower Engineering
A30162	Cost Effective Housing Techniques
A30173	Ground Improvement
Professional Elective – 4	
Course Code	**Title of the Course**
A30163	Pre-stressed Concrete
A30164	Urban Transportation and Planning
A30165	Rehabilitation and Retrofitting of Structures
A30166	Industrial Waste Management
A30175	Geometric Design of Highways
Professional Elective – 5	
A30167	Traffic Engineering
A30168	Environmental Impact Assessment and Management
A30169	Foundation Engineering
A30170	Design and Drawing of Irrigation Structures
A30178	Municipal Solid Waste Management

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COURSE STRUCTURE
A30151 – ADVANCED STRUCTURAL ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course covers various methods for the analysis of statically determinate and indeterminate structures. It deals with prediction of performance of a given structure under the action of prescribed loads. This course will enable the student to apply different methods of analysis in computing the structural parameters in elements like beams and columns.

Course Pre/corequisites

A1111 – Structural Analysis – I

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30151.1 Interpret structural actions in statically determinate and indeterminate structures

A30151.2 Analyze three hinged arches, continuous beams and portal frames using displacement method of analysis

A30151.3 Apply flexibility and stiffness method of analysis for two span continuous beams subjected to sinking of supports

A30151.4 Determine support reactions, shear forces and bending moments in beams and frames subjected to vertical and lateral loads

A30151.5 Assess the collapse mechanism and energy absorption capacity of fixed and continuous beams

3. Course Syllabus

UNIT I

Arches: Three hinged arches, elastic theory of arches, Eddy's theorem, determination of horizontal thrust, bending moment, normal thrust, radial shear and rib shortening

UNIT II

Slope deflection and moment distribution method: Analysis of single bay, single storey portal frame including side sway, stiffness and carryover factors and distribution factors

UNIT III

Rotation contribution method: Analysis of continuous beams including settlement of supports and single bay, single storey portal frames with side sway

UNIT IV

Flexibility and Stiffness method: Application to two span continuous beams including support settlement

UNIT V

Plastic analysis: Shape factor, plastic modulus, moment curvature relationship, ultimate moment, plastic hinge – lower and upper bound theorems, ultimate strength of fixed and continuous beams

4. Books and Materials

Text Book(s)

1. S Ramamrutham and R Narayan, *Theory of Structures*, Dhanpat Rai Publishers, 9th edition, 2014.
2. Hemant Patil, Yogesh Patil and Jignesh Patil, Structural Analysis – I, Synergy Knowledge ware publications, Mumbai

Reference Book(s)

1. R C Hibbeler, *Structural Analysis*, Pearson Education Publishers, 9th edition, 2017.
2. Pundit and Gupta, *Structural Analysis,* Tata Mc-Graw Hill Publishers, 2nd edition, 2015.
3. D S Prakasarao, *Structural Analysis*, University Press, Hyderabad

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30152 – GREEN BUILDINGS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objectives of this course are to expose the students to the concepts of sustainability in the context of building and conventional engineered building materials. The student will learn the concepts of embodied, operational and life cycle energy, minimizing energy consumption by optimal design and use of Building Integrated Photo-voltaic (BIPV) techniques.

Course Pre/corequisites

A1104 – Building Materials and Construction

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30152.1 Describe the importance and necessity of green building

A30152.2 Assess a building on the norms available for green building

A30152.3 Suggest materials and technologies to improve energy efficiency of building

A30152.4 Develop buildings which use minimal natural resources during construction and maintenance

A30152.5 Distinguish conventional and eco-friendly method of construction

3. Course Syllabus

UNIT I

Introduction of green building: History, concept and need of green building, assessment methods

Principles and elements of design of green building: Sustainability concept and reality, climate responsive process of design, climatic zones, design criteria of green buildings

UNIT II

Thermal comfort inside the building: Factors affecting, indices, cooling and heating requirement, heat transmission through building sections, simple calculation for U value and insulation thickness day lighting ventilation

UNIT III

Water conservation: 3 R's for water conservation, rain water harvesting, low flow fixtures, grey water recycling material conservation, concept of embodied energy

UNIT IV

Bureau of energy efficiency: Functions, policies, guidelines, energy conservation building code, study of existing green buildings introduction to energy efficiency software's, carbon calculators, energy codes ECBC requirement, concepts of OTTV etc, green Performance rating, requirements of LEED, GRIHA etc.

UNIT V

Present and future of Green building: Introduction to the wide range of resources, tools, and trends that reflect the latest approaches to green building, application of bio-mimicry, net-zero buildings, and building in high risk zones

4. Books and Materials

Text Book(s)

1. Arvind Krishnana, Simos Yannas, Nick Baker, S V Szokolay, *Climate responsive architecture (A design hand book for energy efficient buildings),* McGraw Hill Education, 7th reprint, 2013.
2. J M Fowler, *Energy and the Environment*, McGraw Hill, New York, 2nd edition, 1984.

Reference Book(s)

1. K S Jagadeesh, B V Venkata Rama Reddy & K S. Nanjunda Rao, *Alternative Building Materials and Technologies,* New Age International Publishers,1st edition 2015.
2. Bureau of energy efficiency, *Energy Conservation building code (ECBC),* 1st edition, 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30153–WATERSHED MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Watershed is the basic scientific unit for planning and management of water resources. Watershed Management is an integration of technologies within the natural boundaries of drainage area for optimum development of land, water and plant resources to meet the basic needs of the people in a sustained manner. The main objective of watershed development and management program is proper use of all available resources of a watershed for optimum production with minimum hazards to natural resources.

Course Pre/corequisites

1158 - Air Pollution and Control

A1154- Disaster Management and Mitigation

A1116 – Water Resources Engineering – I

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30153.1 Understand the concepts of watershed management and its effect on land, water and ecosystem resources

A30153.2 Suggest technical measures for soil erosion control both due to water and wind

A30153.3 Assess the current status of the watershed at field, by taking up accurate investigation measures and conduct survey

A30153.4 Suggest drought control measures, water conservation structures, including design

A30153.5 Formulate and solve deterministic optimization models for design and operation of water resources systems

A30153.6 – Develop control and mitigation techniques for watershed problems

3. Course Syllabus

UNIT I

INTRODUCTION AND BASIC CONCEPTS: Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed, introduction to watershed management, different stakeholders and their relative importance, watershed management policies and decision making, Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, Soil erosion and conservation

Watershed Management Practices in Arid and Semiarid Regions, Case studies, short term and long term strategic planning.

UNIT II

INTEGRATED WATERSHED MANAGEMENT WATERSHED MODELING: Introduction to integrated approach, Integrated water resources management, conjunctive use of water resources, rainwater harvesting; roof catchment system. Standard modeling approaches and classifications, system concept for watershed modeling, overall description of different hydrologic processes, modeling of rainfall-runoff process, subsurface flow sand groundwater flow

UNIT III

SOCIAL ASPECTS OF WATERSHED MANAGEMENT: Community participation, Private sector participation, Institutional issues, Socio-economy, Integrated development, Water legislation and implementations, Case studies. Use of modern techniques in watershed management, Applications of Geographical Information System and Remote Sensing in Watershed Management, Role of Decision Support System in Watershed Management.

UNIT IV

MANAGEMENT OF WATER QUALITY: Water quality and pollution, types and Sources of pollution, water quality modeling, environmental guidelines for water quality. Storm Water and Flood Management: Storm water management, design of drainage system, flood routing through channels and reservoir, flood control and reservoir operation, case studies on flood damage.

UNIT V

DROUGHT MANAGEMENT: Drought assessment and classification, drought analysis techniques, drought mitigation planning. Water Conservation and Recycling, Perspective on recycle and reuse, Waste water reclamation.

4. Books and Materials

Text Book(s):

1. Watershed Management by Murty, J.V.S; New Age Intl., New Delhi 1998

Reference Book(s):

1. Watershed Management in India by Murthy, J.V.S., Wiley Eastern, New Delhi, 1994.
2. Watershed Development in India by Purandare, A.P., Jaiswal A.K, NIRD, Hyderabad, 1995.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30154 – DISASTER MANAGEMENT AND MITIGATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides knowledge on environmental hazards and disasters. The objective of the course is to provide information on different types of endogenous and exogenous hazards/disasters. This course will enable the student to apply different management and mitigation measures to minimize the effects of hazards and disasters.

Course Pre/corequisites

A1005 – Environmental Studies

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30154.1 Classify different kind of hazards/disasters and their effects on environment

A30154.2 Analyze the causes of hazards/disasters which effects human life

A30154.3 Apply disaster management strategies through engineering applications

A30154.4 Apply emerging approaches in disaster management to reduce effect of disasters

3. Course Syllabus

UNIT I

Environmental Hazards & Disasters: Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental, Disasters and Environmental stress. Concept of Environmental Hazards, Environmental, stress & Environmental Disasters. Different approaches & relation with human Ecology, Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT II

Types of Environmental hazards & Disasters: Types of Environmental hazards & Disasters: Natural hazards and Disasters, Man induced hazards & Disasters, Natural Hazards- Planetary Hazards/ Disasters, Extra Planetary Hazards/ disasters, Planetary Hazards- Endogenous Hazards – Exogenous Hazards.

UNIT III

Endogenous Hazards: Endogenous Hazards, Volcanic Eruption, Earthquakes, Landslides, Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes, Hazardous effects of volcanic eruptions, Environmental impacts of volcanic eruptions, Earthquake Hazards/ disasters, Causes of Earthquakes, Distribution of earthquakes, Hazardous effects of earthquakes, Earthquake Hazards in India, Human adjustment, perception & mitigation of earthquake.

UNIT IV

Exogenous hazards/ disasters: Exogenous hazards/ disasters, Infrequent events, Cumulative atmospheric hazards/disasters Infrequent events: Cyclones, Lightning, Hailstorms Cyclones: Tropical cyclones & Local storms, Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation) Cumulative atmospheric hazards/ disasters: - Floods- Droughts- Cold waves- Heat waves. Floods: - Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation). Droughts: - Impacts of droughts- Drought hazards in India, Drought control measures, Extra Planetary Hazards/ Disasters, Man induced Hazards /Disasters, Physical hazards/ Disasters-Soil Erosion

UNIT V

Soil Erosion & Emerging approaches in Disaster Management: Mechanics & forms of Soil Erosion, Factors & causes of Soil Erosion, Conservation measures of Soil Erosion. Chemical hazards/ disasters, Release of toxic chemicals, nuclear explosion, Sedimentation processes. Sedimentation processes: - Global Sedimentation problems, Regional Sedimentation problems, Sedimentation & Environmental problems, Corrective measures of Erosion & Sedimentation. Biological hazards/ disasters: - Population Explosion. Three Stages- 1. Pre- disaster stage (preparedness), 2. Emergency Stage, 3. Post Disaster Stage-Rehabilitation.

4. Books and Materials

Text Book(s)

1. Rajib Shah, *Disaster Management*, Universities Press, India, 2nd Edition, 2003
2. Tushar Bhattacharya, Disaster Science and Management, TMH Publications, 1st Edition, 2012

Reference Book(s)

1. Donald Hyndman & David Hyndman, *Natural Hazards & Disasters*, Cengage Learning, 4th Edition, 2013
2. R.B. Singh (Ed), *Disaster Management*, Rawat Publication, New Delhi, 1st Edition, 2006
3. Kates, B.I & White, *The Environment as Hazards*, G.F, Oxford Publishers, New York, 1978

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30155 - GROUND IMPROVEMENT TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of this course is to get the knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils. The Course covers with the dewatering and grouting of soils, Methods of granular, cohesive &Expansive soils and design the principle of Reinforced earthen walls.

Course Pre/corequisite

A1119 –Geo-Technical Engineering-I

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30155.1 Suggest the appropriate ground improvement technique as per the requirement

A30155.2 Classify the various densification methods in granular and cohesive soils

A30155.3 Implement the stabilization methods to improve soil properties for engineering a better working platform for construction

A30155.4 Interpret the concept reinforced Earth Walls and Geo-synthetics

A30155.5 Identify the problems in Expansive soils

3. Course Syllabus

UNIT I

DEWATERING: Methods of De-Watering- Sumps and Interceptor Ditches- Single, Multi Stage Well Points - Vacuum Well Points- Horizontal Wells-Foundation Drains-Blanket Drains- Criteria for Selection of Fill Material Around Drains –Electro-Osmosis**.**

GROUTING: Objectives Of Grouting- Grouts And Their Properties- Grouting Methods- Ascending, Descending And Stage Grouting- Hydraulic Fracturing In Soils And Rocks- Post Grout Test.

UNIT II

DENSIFICATION METHODS IN GRANULAR SOILS:-In – Situ Densification Methods In Granular Soils, Vibration At The Ground Surface, Impact At The Ground Surface, Vibration At Depth, Impact At Depth.

DENSIFICATION METHODS IN COHESIVE SOILS:–In – Situ Densification Methods In Cohesive Soils – Preloading Or Dewatering, Vertical Drains – Sand Drains, Sand Wick Geo-drains – Stone And Lime Columns – Thermal Methods.

UNIT III

STABILISATION: Methods Of Stabilization-Mechanical-Cement- Lime-Bituminous- Chemical Stabilization With Calcium Chloride, Sodium Silicate And Gypsum.

UNIT IV

REINFORCED EARTH: Principles – Components of Reinforced Earth – Factors Governing Design of Reinforced Earth Walls – Design Principles of Reinforced Earth Walls

GEOSYNTHETICS: Geo-textiles- Types, Functions and Applications – Geo-grids and Geo-membranes – Functions and Applications

UNIT V

EXPANSIVE SOILS: Problems of Expansive Soils – Tests for Identification – Methods of Determination of Swell Pressure. Improvement of Expansive Soils – Foundation Techniques in Expansive Soils – Under Reamed Piles

4. Books and Materials

Text Book(s)

1. Engineering Principles of Ground Modification, *Haussmann M.R. (1990*), McGraw-Hill International Edition

2. Ground Improvement Techniques by Dr.P.Purushotham Raj, LaxmiPublications, New Delhi / University Science Press, New Delhi

Reference Book(s)

1. Ground Improvement, Blackie Academic and Professional by Moseley M.P.(1993), Boca Taton, Florida, USA.

2. Ground Control and Improvement by Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994), John Wiley and Sons, New York, USA.

3. Designing with Geo-synthetics by Robert M. Koerner, Prentice Hall New Jercy,USA

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30156 – EARTHQUAKE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course introduces the basics of Earthquake Engineering to study the behavior of buildings due to earthquakes by different methods. This course also enables the students to design the shear walls and also detailing of earthquake resistant building components like beams, columns etc. according to various IS design codes.

Course Pre/corequisites

A1118 – Structural Analysis – II

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30156.1 Apply the concept of theory of vibrations to earthquake engineering to find the building response.

A30156.2 Make use of response spectrum graphs to find the maximum displacements of the building due to different ground motions.

A30156.3 Analyze the multi degree of freedom structures by using seismic coefficient and response spectrum methods to find the drifts of the building.

A30156.4 Examine the latest Indian Seismic codes IS: 4326 and IS: 13920 provisions for ductile detailing of R.C buildings

A30156.5 Assess the different plan configurations in aseismic planning of the earthquake resistance building.

3. Course Syllabus

UNIT I

Introduction to Structural Dynamics: Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT II

Multi-Degree of Freedom (MDOF) Systems: Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

UNIT III

Earthquake Analysis: Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi-storied buildings

– Use of response spectra. Review of the latest Indian seismic code IS:1893 – 2016 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT IV

Earthquake Seismology and Ductile detailing: Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc. – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams. Review of the latest Indian Seismic codes IS: 4326 and IS: 13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

UNIT V

Aseismic Planning: Plan Configurations – Torsion Irregularities – Re-entrant corners – Nonparallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings. Shear walls: - Types – Design of Shear walls as per IS: 13920 – Detailing of reinforcements.

4. Books and Materials

Text Book(s)

1. A.K. Chopra, *Dynamics of Structures*, Pearson Education, Indian Branch, 3rd edition,2007.
2. Clough & Penzien, *Dynamics of Structures*, McGraw Hill International, 2nd, edition, 2015.

Reference Book(s)

1. Mario Paz, Structural Dynamics, Academic Publishers, 5th edition, 2007.
2. Pankaj Agarwal and Manish Shrikhande, *Earthquake Resistant Design of Structures*, Printice Hall of India, 2nd edition, 2006.
3. S.K. Duggal, Earthquake *Resistant Design of Structures*, Oxford University press, 2nd edition, 2007.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30157 – ENGINEERING HYDROLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The student will gain basic skills to carry out the hydrologic analyses and designs that are often encountered in engineering practice. The course covers fundamentals such as the hydrological cycle, catchment, losses, hydrographs and hyetographs. The course also deals with groundwater movement and its management by applying concepts like Hydraulic conductivity, Aquifer transmissivity, Dupuit's assumptions Storage coefficient etc.

Course Pre/corequisites

A1103 – Mechanics of Fluids

A1109 – Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30157.1 Analyze hydro-meteorological data using rain gauges, evapometer and barometers

A30157.2 Apply groundwater flow equations to aquifer parameters for computation of runoff

A30157.3 Compute yield from surface and subsurface basin

A30157.4 Develop rainfall-runoff models

A30157.5 Compute groundwater drawdown based on water well withdrawal

3. Course Syllabus

UNIT I

Basic concept of Hydrology: Basic concept of Hydrology and Hydrologic cycle - Test for consistency of rainfall records - Analysis of rainfall data - correlation between intensity and duration – intensity, duration and frequency - depth area duration (DAD) curve. Hydrologic abstractions- infiltration- - Green Ampt method-Evapotranspiration – different methods - Blaney Criddle method - penman method.

UNIT II

Catchment characteristics: classification of streams – stream pattern-stream order, stream gauging, rating of current meter -Extension of stage discharge curve - Adjustment of stage discharge curve-selection of site for stream gauging stations

Runoff - Computation of runoff, Hydrograph Analysis-Rational method, S-hydrograph - unit hydrograph from complex storm, synthetic unit hydrograph- Instantaneous unit hydrograph (Brief description only) – linear reservoir model.

UNIT III

Partial differential equation governing unsteady groundwater flow: Evaluation of aquifer parameters - Theis method -Jacob's approximation method. Well flow near aquifer boundaries -

Method of images - surface investigation of groundwater - Electrical resistivity method. Graphical representation of hadrochemical data - Pollution of groundwater, sources. Seawater intrusion- Ghyben-Herzberg relationship –Method of control of seawater intrusion- Artificial recharge of groundwater.

UNIT IV

Rainfall- runoff: correlation using linear regression and multiple linear regression analysis. Design flood and their Estimation, Different methods, Flood frequency studies -Gumbel's method.

UNIT V

Flood routing through reservoirs - ISD method- Modified Pulse method. Flood routing through channels by Muskingum method. Flood control methods - Flood forecasting and warning (Brief descriptions only)

4. Books and Materials

Text Book(s)

1. B C Punmia Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi 16thedition,2009.
2. S. K. Garg, *Irrigation Engineering and Hydraulic Structures*, Khanna Publishers, 7th edition,2008

Reference Book(s)

1. Subramanya. K, *Engineering Hydrology*, Tata McGraw Hill, 1984.
2. Bear J., *Hydraulics of Groundwater*, McGrow-Hill International, 2ndedition, 2002.
3. Raghunath. H M, *Hydrology*, New Age International Publications, 1987.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30158 – AIR POLLUTION AND CONTROL

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of this course is to provide students with a scientific and technical background in air pollution monitoring, pollution control technologies and environmental management. In this course, students will learn various sources and effects of air pollutants, properties of atmosphere, controlling process of pollutants their physical and chemical behavior in the atmosphere.

Course Pre/corequisites

A3005 – Environmental Studies

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30158.1 Classify various sources and effects of air pollution

A30158.2 Analyze plume dispersion needs to control the pollutants

A30158.3 Interpret atmospheric properties with air quality-wind rose diagrams

A30158.4 Apply various methods for the control of particulates

A30158.5 Design sampling methods of air pollution with emission quality standards

3. Course Syllabus

UNIT I

Introduction: Air pollution, definitions, scope, significance and episodes, air pollutants classifications, natural and artificial, primary and secondary, point and non- point, line and areal sources of air pollution- stationary and mobile sources. effects of air pollution:

Effects of air pollution: Effects of air pollutants on man, material and vegetation: global effects of air pollution, greenhouse effect, heat islands, acid rains, ozone holes etc.

UNIT II

Thermodynamics of air pollution: Thermodynamics and kinetics of air pollution – applications in the removal of gases like Sox, Nox, CO, HC etc., and air-fuel ratio. Computation and control of products of combustion meteorology and plume dispersion

Properties of atmosphere: Heat, pressure, wind forces, moisture and relative humidity, influence of meteorological phenomena on air quality-wind rose diagrams

UNIT III

Lapse rates: Pressure systems, winds and moisture plume behavior and plume rise models; Gaussian model for plume dispersion

UNIT IV

Control of particulates: Control at sources, process changes, equipment modifications, design and operation of control, equipment's, general methods of control of Nox and Sox emissions, in-plant control measures, process changes, dry and wet methods of removal and recycling

UNIT V

Air quality management: Air quality management, monitoring of SPM, SOx; NOX and CO emission standards– air sampling, sampling techniques, high volume air sampler, stack sampling analysis of air pollutants, air quality standards, air pollution control act.

4. Books and Materials

Text Book(s)

1. M N Rao and H V N Rao, *Air Pollution and Quality Control*, Tata McGraw Hill Company, 1st edition,2004.
2. Thod Godish, *Air Quality*, Levis Publishers, Special India Edition, New Delhi,5th edition 2016.

Reference Book(s)

1. Rao C.S. *Environmental Pollution Control Engineering*, New Age International Publishers, 6th edition 2006.
2. Environmental Pollution Control Engineering, 2nd Edition By Rao C.S. (2006), New Age International, New Delhi

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30159 – BRIDGE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course presents the structural design of concrete bridges, box culverts, plate girder bridges and composite bridges. It covers an overview of short, medium and long span bridges. The course enables the students to choose the appropriate bridge type for a given project. Bridge design is a common career for civil engineers, with strong demand due to the global expansion of transport infrastructure.

Course Pre/corequisites

A30110 – Structural Analysis
A30116 – Design and Drawing Reinforced Concrete Structures

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30159.1: Conduct site investigations to find the suitability of ground conditions for proposed bridge structure

A30159.2: Interpret the IRC regulations and railway bridge rules for detailed calculation of loadings

A30159.3: Design various types of bridges as per Indian Standard code provisions

A30159.4: Perform stability analysis of piers and abutments to find resistance against sliding and overturning

3. Course Syllabus

UNIT I

Introduction: importance of site investigation in bridge design, Highway Bridge loading standards, impact factor, Railway Bridge loading standards

Box culvert: Design loads, design of box culvert subjected to general loading

UNIT II

Deck Slab Bridge: Effective width method of analysis, design of deck Slab Bridge subjected to class AA tracked vehicle loading only

UNIT III

Beam and Slab Bridge: Design of interior panel of slab, Pigeaud's method, design of T-Beam Bridge subjected to class AA tracked vehicle loading only

UNIT IV

Plate Girder Bridge: Elements of a plate girder and their design, design of a deck type welded plate girder – bridge of single line B.G.

Composite Bridge: Design of composite bridges consisting of RCC slabs over steel girders including shear connectors

UNIT V

Piers and Abutments: Bed block, materials for piers & abutments, types of piers, forces acting on piers and abutments, stability analysis of piers & abutments, types of wing walls, approaches, types of bridge foundations (excluding design)

4. Books and Materials

Text Book(s)

1. N Krishna Raju. *Design of Bridges*, oxford and IBH Publishing Company, 5th edition, 2018.
2. T.R. Jagadish & M.A. Jayaram, *Design of Bridges Structure*, Prentice Hall of India Pvt., Delhi

Reference Book(s)

1. D Johnson Victor. *Essentials of Bridge Engineering*, Oxford and IBH Publishing Company, 6th edition, 2019.
2. S Ponnu Swamy, *Bridges Engineering*, TATA McGraw Hill Company, 4th edition, 2008.
3. B.C. Punmia, Ashok Kumar Jain And Arun Kumar Jain, Design of R.C.C. Structures Laxmi Publications, New Delhi

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30160- PAVEMENT ANALYSIS AND DESIGN

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is an extension of Transportation engineering which develops technical competence in the analysis and design of road pavements. It includes material characterization, properties and usage of bitumen, maintenance and management, cost and performance which are considered in the field of road infrastructure and pavement design. It enables the student to design rigid and flexible pavements as per Indian Standard Codes.

Course Pre/corequisite

A30124 – Transportation Engineering

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30160.1: Perform basic statistical analysis of traffic data to find PCU factor

A30160.2: Design flexible pavements and rigid pavement using IRC and AASHTO Methods

A30160.3: Compute pavement responses due to traffic loads and environment changes

A30160.4: Identify material components used in pavement layers to design bituminous mixes

A30160.5: Analyze structural and functional failure in pavements due to various combinations of loads

3. Course Syllabus

UNIT I

Factors Affecting Pavement Design: Variables considered in pavement design, types of pavements, functions of individual layers, classification of axle types of rigid chassis, tire pressure, contact pressure, EAL and ESWL concepts, traffic analysis: ADT, AADT, truck factor, growth factor, lane, directional distributions & vehicle damage factors, Effect of transient & moving loads.

UNIT II

Stresses in Pavements: Vehicle-pavement interaction: steady state of vibration, stress inducing factors in flexible and rigid pavements, stress in flexible pavements: visco-elastic theory and assumptions, layered systems concepts, stress solutions for one, two and three layered systems, fundamental design concepts; stresses in rigid pavements: Westergaard's theory and assumptions, stresses due to curling, stresses and deflections due to loading, frictional stresses, stresses in dowel bars & tie bars

UNIT III

Material Characterization& Mix Design Concepts: CBR and modulus of sub grade reaction of soil, mineral aggregates, blending of aggregates, binders, polymer and rubber modified bitumen, tests on aggregates, tests on bitumen, marshal's methods of bituminous concrete mix design introduction to super pave mix design, IRC cement concrete mix design, pavement drainage concepts

UNIT IV

Design of Flexible Pavements: Flexible pavement design concepts, asphalt institute's methods with HMA and other base combinations, AASHTO, IRC Methods, design of runways & taxiways, design of low volume rural roads

UNIT – V

Design of Rigid Pavements: Calibrated mechanistic design process, AASHTO & IRC specifications, introduction to prestressed and continuously reinforced cement concrete pavement design, rigid pavement design for low volume rural roads.

4. Books and Materials

Text Book(s)

1. L.R. Kadiyali & Lal. Principles and Practice of Highway Engineering Design, Khanna Publications, 6th edition 2018.
2. IRC Code for flexible pavement, IRC – 37 -2001, IRC Code for Rigid pavement, IRC – 58 – 2002

Reference Book(s)

1. S.K. Khanna & C.E.G. Justo, *Highway Engineering*, Nemchand & Bros, 10th edition 2020.
2. L.R. Kadiyali, *Transportation Engineering*, Khanna Publications, 1st edition 2019.
3. R Srinivasa Kumar, *Pavement Design*, Universities Press, Hyderabad, 2nd edition 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30161 – HYDROPOWER ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is an extension of fluid mechanics and hydraulics engineering which develops technical competence of a hydropower plant. Hydropower is the power derived from the energy of falling or fast-running water, which may be harnessed for power generation. The course deals with hydropower plants, water conveyance system, planning of power house, design of penstocks and turbines.

Course Pre/corequisites

A30103 - Fluid Mechanics
A30108 - Hydraulics and hydraulic machinery

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30161.1: Analyze the requirements of hydropower based on flow and power duration curves

A30161.2: Determine storage capacity of various hydropower plants

A30161.3: Interpret various water conveyance systems to draw water from reservoirs

A30161.4: Design penstocks and turbines for power generation

A30161.5: Plan the layout of a hydropower plant

3. Course Syllabus

Unit I

Energy Resources, Planning and Potential Power resources, Conventional and Nonconventional, Need and advantages, Overview of World Energy Scenario, energy and development linkage, Environmental Impacts of energy use, Green House Effect, Trends in energy use patterns in India, Hydropower development in India, Hydropower potential.

Unit II

Hydropower Plants Hydrological Analysis, Classification of hydropower plants, Run of river plants, Storage or Valley dam plants, Pumped storage plants, Introduction to micro hydro, Base load and Peak load plants, advantages and disadvantages, Components of hydropower plants.

Unit III

Load Assessment Estimation of electrical load on turbines. Load factor, Plant factor, peak demand and utilization factor, load curve, load duration curve, Prediction of load, Tariffs, Hydro-Thermal Mix, Combined Efficiency of Hydro-Thermal-Nuclear Power Plants.

Unit IV

Water Conductor System and Powerhouse Water Conductor System, Alignment, Intake Structures- Location and Types, Trash Rack. Penstock and pressure shaft, Types of Powerhouses,

Typical layout of powerhouse, Components, Power plant equipment's, Instrumentation and control

Unit V

Turbines Classification, Principles and design of impulse and reaction turbines, Selection of Turbine, Specific Speed, Governing of turbines, Water hammer, Hydraulic Transients and Surge tanks, Draft tubes, Cavitation.

4. Books and Materials

Text Book(s)

1. M.M. Dandekar and K.N. Sharma, "Water Power Engineering", Vikas Publishing House, New Delhi 2nd edition 2002
2. Arora, K.R., *Irrigation Water Power and Water Resources Engineering*, Standard Book Company, 2ndedition 2002.

Reference Book(s)

1. Punmia & Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi 3rd edition 2009
2. P.S. Nigam, *Handbook of Hydroelectric Engineering*, 1985.
3. R K Sharma, *A Text book of Water Power Engineering*, S Chand Publications 2nd edition 2003

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30162 – COST EFFECTIVE HOUSING TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of this course is to reduce the construction cost by using alternatives to the conventional methods and inputs. Most of low income and middle-class families are currently facing a shortage of owning a house. Therefore, an innovative concept of cost-effective housing techniques can be adopted in construction. The course covers basic terms of housing and principles of housing programs, alternative building materials for reducing cost of construction.

Course Pre/corequisites

A30107 – Building Construction and Planning

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30162.1: Categorize the various types of housing levels like low income group (LIG), Middle-income group (MIG) and high-income group (HIG) based on density norms

A30162.2: Choose housing policies and programs using concepts of GIS and MIS system in slums

A30162.3: Adopt innovative construction techniques for low cost housing

A30162.4: Make use of alternative building materials to condense overall cost of construction

A30162.5: Apply appropriate techniques and safety measures for housing in disaster prone areas

3. Course Syllabus

UNIT I

Introduction to Housing: Definition of Basic Terms – House, Home, Household, Apartments, Multi storied Buildings, Special Buildings, Objectives and Strategies of National Housing Policies including Slum Housing Policy, Principle of Sustainable Housing – Integrated approach on arriving holding capacity and density norms - All basic infrastructure consideration - Institutions for Housing at National, State and Local levels.

UNIT II

Housing Programmes: Basic Concepts, Contents and Standards for Housing Programmes, Sites and Services, Neighborhoods- Plotted land development programs, Open Development Plots, Apartments, Gated communities, Townships, Rental Housing, Co-operative Housing, Slum Housing Programmes, Slum improvement – Slum redevelopment and Relocation – Use of GIS and MIS in Slum Housing Projects,, Role of Public housing agencies, and Private sector in supply , quality, infrastructure and pricing – Role of Non-Government Organizations in slum housing.

UNIT III

Development and adoption of low-cost housing technology: Introduction - Adoption of innovative cost effective construction techniques - Adoption of precast elements - Adopting of total prefabrication of mass housing in India- General remarks on pre cast rooting/flooring systems -Economical wall system - Single Brick thick loading bearing wall - 19cm thick load bearing masonry walls - Half brick thick load bearing wall - Fly ash gypsum thick for masonry - Stone Block masonry - Adoption of precast R.C. plank and join system for roof/floor in the building

UNIT IV

Alternative building materials for low cost housing and infrastructure services in rural houses: Introduction - Substitute for scarce materials – Ferro cement - Gypsum boards – Timber substitutions - Industrial wastes - Agricultural wastes - Low cost Infrastructure services: Introduce - Present status - Technological options - Low cost sanitation - Domestic wall - Water supply, energy, Rural Housing: Introduction traditional practice of rural housing continuous - Mud Housing technology-Mud roofs - Characteristics of mud – Fire treatment for thatch roof - Soil stabilization - Rural Housing programs

UNIT – V

Housing in disaster prone areas: Introduction – Earthquake - Damages to houses - Traditional prone areas -Type of Damages and Railways of non-engineered buildings - Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions. Requirements of structural safety of thin pre-cost roofing units against Earthquake forces -Status of R& D in earthquake strengthening measures - Floods, cyclone, future safety

4. Books and Materials

Text Book(s)

1. A.K. Lal, *Hand book of Low-Cost Housing,* New Age International publishers, 1st edition, 2011.
2. G.C. Mathur, *Low Cost Housing,* IBH Publishers,2nd edition, 1993.

Reference Book(s)

1. Francis Cherunilam and Odeyar D Heggade, *Housing in India,* Himalaya Publishing House, Bombay, 6nd edition, 1997.
2. Tushar Bhattacharya, *Disaster Science and Management,* TMH Publications, McGraw-Hill Education (India) Private Limited 4th edition, 2000.
3. Francis Cherunilam and Odeyar D Heggade, Housing in India, Himalaya Publishing House, Bombay, 1997

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30173 – GROUND IMPROVEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of the course is to give the basic knowledge on the problems posed by problematic soils and the remedies to build the various structures in problematic soils.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30173.1 Identify the need of ground improvement

A30173.2 Implement the methods of shallow densification

A30173.3 Design the problems related to deep dynamic compaction

A30173.4 Understand the need of pre-consolidation

A30173.5 Analyze the importance of geosynthetics in ground improvement

3. Course Syllabus

UNIT I

Need for Ground Improvement: Introduction, Ground improvement methods, GI methods and classification, excavation and replacement, the simplest GI method.

UNIT II

Shallow Densification: Methods of shallow densification, Quality control and quality assurance application problems on excavation and replacement.

UNIT III

Deep dynamic Compaction: Rapid impact compaction, vibro-compaction, design steps, design parameters and procedure, application problems and quality control

UNIT IV

Deep replacement: Deep replacement methods, drainage, dewatering, dewatering design principles, Design problem, Pre-consolidation

UNIT V

Grouting: Chemical stabilization, soil nailing, geosynthetics in ground improvement, types of grout, grout machinery, grout monitoring.

4. Books and Materials

Text Book(s)

1. Ground Improvement Techniques by Dr P Purushotam Raj, Laxmi Publications, New Delhi/ University Science Press, New Delhi.

Reference Book(s)

1. Engineering Principles of Ground Modification, Haussmann M R. (2020), McGraw-Hill International Edition.
2. Ground Improvement Techniques by Nihar Ranjan Patra, Vikas Publications, New Delhi.
3. Ground Control and improvement by Xanthakos P P, Abramson, L W and Brucwe D A, John Wiley and Sons, New York USA

COURSE STRUCTURE
A30163 – PRESTRESSED CONCRETE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course enables the students to introduce the need for pre-stressing as well as the methods, types and advantages of pre-stressing systems. Students will be introduced to the design of pre-stressed concrete structures subjected to flexure and shear.

Course Pre/corequisites

A30116 – Design and Drawing Reinforced Concrete Structures

A30122 – Concrete Technology

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30163.1	Enumerate the various methods of pre-stressing to analyze the post and pre tensioning systems
A30163.2	Design various pre-stressed concrete structural elements
A30163.3	Compute losses of pre-stress due to long term properties of concrete
A30163.4	Analyze and design the sections to withstand shear and flexure
A30163.5	Predict short term and long term deflections to comply with the limit state of deflection

3. Course Syllabus

UNIT I

INTRODUCTION: Historic development – General principles of Pre-stressing, Pre-tensioning And Post Tensioning – Advantages and limitations of pre-stressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS OF PRESTRESSING: Methods and Systems of Pre-stressing, Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of pre-stressing like Hoyer System, Magnel System, Freyssinet system and Gifford – Udall System of De-Watering- Sumps and Interceptor Ditches- Single, Multi Stage Well Points - Vacuum Well Points- Horizontal Wells- Foundation Drains-Blanket Drains- Criteria for Selection Of Fill Material Around Drains –Electro-Osmosis**.**

UNIT II

LOSSES OF PRESTRESS:- Loss of pre-stress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses.

UNIT III

ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE: Elastic analysis of concrete beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons, Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT IV

DESIGN OF SECTION FOR SHEAR: Shear and Principal Stresses – Design for Shear in beams COMPOSITE SECTION: Introduction – Analysis of stress – Differential shrinkage – General design considerations.

UNIT V

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections – factors influencing deflections – short term deflections of un-cracked members' prediction of long term deflections

4. Books and Materials

Text Book(s)

1. N. Krishna Raju, *Pre-stressed Concrete*, Tata McGraw Hill Publications, 2016 7th Edition
2. K.U.Muthu, *Pre-stressed Concrete*, PHI Publications, 2014 5th Edition

Reference Book(s)

1. Dayaratnam.P, *Pre-stressed Concrete Structures*, Oxford and IBH, 2013 10th Edition
2. Praveen Nagrajan, *Pre-stressed Concrete Design*, Pearson Publications, 2013 5th Edition

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30164 – URBAN TRANSPORTATION PLANNING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Transportation plays a major role in the development of the human civilization. This subject also deals with concepts of urban transportation planning and various stages of planning such as trip generation, trip distribution, mode split and traffic assignment are dealt here. Concepts of economic evaluation of transportation plans are also introduced.

Course Pre/corequisites

A30124 – Transportation Engineering

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30164.1	Develop a strong analytical and practical knowledge in urban mobility
A30164.2	Apply theories of transportation planning to design urban roads
A30164.3	Classify economic impacts of new transportation plans
A30164.4	Apply traffic assignment regulations to urban modes
A30164.5	Acquire knowledge on trip generation and distribution

3. Course Syllabus

UNIT I

CONCEPT OF TRAVEL DEMAND: Travel Characteristics - Origin, Destination, Route, Mode, Purpose; Travel Demand as a function of independent variables; Assumptions in Demand Estimation Relation between land use and Travel.

UNIT II

TRANSPORTATION PLANNING: General concept of Trip; Four step process of Transportation Planning-Aggregate and disaggregate Models. Delineation of study area; Zoning Principles; Formation of TAZs; Types and sources of Data, Home Interview surveys; Road side interview surveys; Goods. Taxi, IPT surveys; sampling techniques; Expansion factors and accuracy check; Desire line diagram and use.

UNIT III

TRIP GENERATION: Factors governing Trip Generation and Attraction; Multiple Linear Regression Models, Category Analysis.

TRIP DISTRIBUTION: Methods of Trip Distribution; Growth Factor Models Uniform Growth Factor Method; Average Growth Factor Method; Fratar Method; Advantages and limitations of Growth Factor Models; concept of Gravity Model (Elementary Concept Only).

UNIT IV

MODE SPLIT: Factors affecting mode split; Logit Model.

TRAFFIC ASSIGNMENT: Purpose of Assignment and General Principles; Minimum path trees; Assignment Techniques - All - or- nothing Assignment; Capacity restraint Assignment; diversion curves.

UNIT V

ECONOMIC EVALUATION: Transportation plans; Costs and benefits of transportation projects; vehicle operating cost; Time savings; Accident costs, Methods of Economic Evaluation - Benefit cost Ratio Method; Net present value method; Internal Rate of Return method.

4. Books and Materials

Text Book(s):

1. Traffic Engineering and Transportation Planning by L.R.Kadiyali, Khanna Publishers, Delhi, 3rd edition, 2017.
2. Transportation Engineering -An Introduction by Khisty C.J, Prentice Hall. 2nd edition, 2016

Reference Book(s):

1. Fundamentals of Transportation Engineering by Papa Costas C.S., Prentice Hall, India.,6th edition, 2018.
2. L.R. Kadiyali, *Highway Engineering Design*, Khanna Publications, 1st edition, 2019.
3. L.R. Kadiyali, Traffic Engineering and Transportation planning, Khanna Publications, 4th edition, 2016.

COURSE STRUCTURE
A30165 – REHABILITATION AND RETROFITTING OF STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course deals with the causes of deterioration, assessment of distressed structures, repairing of structure. It provides knowledge of development of advanced structural materials and technologies for execution of the constructional works. The need of the day is to provide durable repairs and strengthening of existing structures.

Course Pre/corequisites

A30122 – Concrete Technology

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30165.1: Develop knowledge on various distress and damages to concrete and masonry structures

A30165.2: Apply quantity of each item of structures, types and properties of repair material

A30165.3: Apply Non-Destructive Testing techniques to field problems

A30165.4: Apply cost effective retrofitting strategies for repairs in buildings

A30165.5: Assessing damage to structures and various repair techniques

3. Course Syllabus

UNIT I

GENERAL INTRODUCTION – Deterioration of Structures – Distress in Structures – Causes and Prevention Mechanism of Damage – Types of Damage.

UNIT II

CORROSION OF STEEL REINFORCEMENT – Causes – Mechanism and Prevention, Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation

UNIT III

INSPECTION AND TESTING – Symptoms and Diagnosis of Distress – Damage assessment –NDT

UNIT IV

REPAIR OF STRUCTURE – Common Types of Repairs – Repair in Concrete Structures –Repairs in Under Water Structures – Guniting – Shot Crete – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT V

HEALTH MONITORING OF STRUCTURES – Use of Sensors – Building Instrumentation

4. Books and Materials

Text Book(s)

1. N. Krishna Raju, *Pre-stressed Concrete*, Tata McGraw Hill Publications, 2016 7th Edition
2. K.U.Muthu, *Pre-stressed Concrete*, PHI Publications, 2014 5th Edition

Reference Book(s)

1. Dayaratnam.P, *Pre-stressed Concrete Structures*, Oxford and IBH, 2013 10th Edition
2. Praveen Nagrajan, *Pre-stressed Concrete Design*, Pearson Publications, 2013 5th Edition

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30166 – INDUSTRIAL WASTE MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course imparts knowledge on sources and characteristics of various major industrial wastes and strategies for its prevention and control. The course intended to introduce the concepts for cleaner industrial production. This course also deals with treatment technologies for industrial effluent hazardous wastes.

Course Pre/corequisites

A30012 – Engineering Chemistry

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30166.1	Analyze the characteristics of industrial wastewaters.
A30166.2	Select appropriate cleaner production method for industries.
A30166.3	Analyze the effects of disposal of industrial wastes.
A30166.4	Design treatment options for handling industrial wastewater.
A30166.5	Identify various treatment methods for hazardous wastes.

3. Course Syllabus

UNIT I

Introduction: Types of industries and industrial pollution, characteristics of industrial wastes, population equivalent, bioassay studies, effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health environmental legislations related to prevention and control of industrial effluents and hazardous wastes.

UNIT II

Cleaner production: Waste management approach, waste audit, volume and strength reduction, material and process modifications, recycle, reuse and by product application.

UNIT III

Pollution from major industries: Sources, Characteristics, waste treatment flow sheets for selected industries such as textiles, tanneries, pharmaceuticals, electroplating industries, Dairy, sugar, paper, distilleries, steel plants, refineries, fertilizer, thermal power plants, wastewater redemption concepts.

UNIT IV

Treatment technologies: Equalization, neutralization, removal of suspended and dissolved organic solids, chemical oxidation, adsorption, removal of dissolved inorganic, combined treatment of industrial and municipal wastes, residue management, dewatering, disposal.

UNIT V

Hazardous waste management: Hazardous wastes, physico chemical treatment, solidification, incineration, secured landfills.

4. Books and Materials

Text Book(s)

1. WEF Manual of practice No. FD-3, *Industrial Wastewater Management, Treatment and Disposal,* WEF Press and McGraw-Hill, 3rd edition, 2008
2. Numersorn. N.L., *Liquid Waste from Industry – Theories, Practice and Treatment*, Addison-Wesley,1st edition, 1971

Reference Book(s)

1. Patwardhan. A.D., *Industrial Wastewater Treatment*, Prentice Hall of India, New Delhi, 1st edition, 2010.
2. Pandey, *Environmental Management*, Vikas Publications, 3rd edition, 2010.
3. Bishop, P.L., *Pollution Prevention: Fundamental & Practice*, McGraw Hill, 4th edition, 2000.

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COURSE STRUCTURE
A30175 – GEOMETRIC DESIGN OF HIGHWAYS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The geometric design of highways refers to the configuration of the visible elements of a highway that affect driver behavior, safety, and traffic flow. It focuses on creating a roadway that accommodates vehicles comfortably and safely, based on factors like speed, traffic volume, and terrain.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30175.1 Understand the Fundamentals of Highway Design

A30175.2 Design various Cross-Section Elements

A30175.3 Apply Superelevation and Curve Design

A30175.4 Design Intersections and Interchanges

A30175.5 Analyze the importance of modern tools in geometric design as per IRC

3. Course Syllabus

UNIT I

Introduction: Design controls, Classification of Roads, Space standards, Sight Distance requirements.

UNIT II

Cross-section Elements: Cross-sectional elements– single-lane, two-lane, multi-lane highways, expressways, pedestrian facilities, bicycle facilities.

UNIT III

Alignment: Alignment design– Horizontal alignment and vertical alignment; including multi-lane highways and expressways

UNIT IV

Intersection Design: Intersection layouts and geometry, channelization, Interchanges, Auxiliary lanes

UNIT V

Facilities: Design of facilities like parking areas, bus bays and shelters, truck lay-byes and Toll Plazas.

4. Books and Materials

Text Book(s)

1. Highway Engineering by Wright, Paul H. and Dixon, Karen, John Wiley and Sons

5. Reference Book(s)

1. IRC:38-1988 Guidelines for Design of Horizontal Curves for Highways and Design Tables
2. IRC:52-2019 Guidelines for the Alignment Survey and Geometric Design of Hill Roads
3. IRC:62-1976 Guidelines for Control of Access on Highways
4. IRC:66-1976 Recommended Practice for Sight Distance on Rural Highways
5. IRC:67-2022 Code of Practice for Road Signs
6. IRC:SP-23-1983 Vertical Curves for Highways

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COURSE STRUCTURE

A30167- TRAFFIC ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals will enable the student to understand the various characteristics of traffic system and make the student to have the knowledge of intersections and their design interchanges and parking facilities.

Course Pre/corequisite

A30124 - Transportation Engineering

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30167.1: To Conduct traffic studies and estimate basic characteristics of traffic stream.

A30167.2: To Analyze the traffic data and interpret the results

A30167.3: To Design the geometric elements for better traffic system

A30167.4: To Analyze and design uncontrolled and signalized intersection with collected data

A30167.5: To makes parking surveys and design parameters to be considered in parking design

3. Course Syllabus

UNIT I

Characteristics of Traffic System: Human-vehicle-environment system, Fundamental parameters of traffic and relationships; Microscopic and macroscopic characteristics

Traffic Data Collection studies: Traffic study components, types of data; Volume studies; Speed studies; Travel time and delay studies; Intersection studies, Pedestrian studies; Parking studies, Vehicle detection methods; Advanced methods: GPS, Instrumented Vehicles, Image Processing, Bluetooth, Infrared methods

UNIT II

Highway Capacity Analysis: Capacity and level of service concepts; Factors affecting capacity and LOS; Freeway and multi-lane analysis; Capacity of Urban arterials; Signalised intersections; Un- signalised intersections; US Highway Capacity Manual (HCM) and IRC standards, Indo-HCM standards.

UNIT III

Design of unsignalized intersections: At grade intersections types and their suitability, factors affecting design, data requirement, parameters selection, intersection controls, estimation of conflict points, uncontrolled intercession analysis, sight distance requirements, roundabouts and design methodologies, capacity of roundabouts, mini roundabouts.

Design of signalized intersections: Warrants for signalization, saturation flow rate and capacity, estimation of amber time, design of all aspects of signal timings, LOS studies, estimation of queue length and control delay, signal coordination, channelization and its objectives, channelizing devices, design considerations, typical channelizing examples**.**

UNIT IV

Design of Interchanges: Necessities of interchanges, classification and types of common interchanges, layouts of interchange, interchange warrants, interchange design elements.

UNIT V

Design of parking facilities: Parking and influencing factors, type of parking system, parking angles and aisle width, on-street parking design, design parameters, parking surveys and demand estimation, various parking layouts and vehicle circulation, design of off-street parking facilities,
types and layouts, design examples

4.Books and Materials

Text Book(s)

1.S.K. Khanna & C.E.G. Justo, Highway Engineering, Nemchand & Bros, 10th edition, 2020

2.L.R. Kadiyali, Highway Engineering Design, Khanna Publications, 1st edition, 2019

Reference Book(s)

1. L R. Kadiyali &Lal, Principles and Practice of Highway Engineering Design, Khanna Publications,6th edition, 2018.

2. L.R. Kadiyali, Traffic Engineering and Transportation planning, Khanna Publications, 4th edition, 2016.

3. R Srinivasa Kumar, Textbook of Highway Engineering, Orient Blackswan, 2nd edition 2011

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COURSE STRUCTURE

A30168- ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same. The student will get insight about the various impacts of development projects on environment and the mitigating measures.

Course Pre/corequisite

A30118- Environmental Engineering

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30168.1: Perform a critical quality review of an EIA and EIS

A30168.2: Structure the EIA working process considering the need for interdisciplinary

A30168.3: Perform the screening and scoping of an EIA, based on existing requirements

A30168.4: Clarify the concept of EIA and its application in an international context

A30168.5: Interpretate an EIA, present its conclusions and translate its conclusions into actions

3. Course Syllabus

UNIT I

INTRODUCTION: Basic concept of EIA, Initial environmental Examination, Elements of EIA, factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT II

EIA METHODOLOGIES: Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysisars

UNIT III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures, E I A in surface water, Air and Biological environment, Methodology for the assessment of Impacts on surface water environment, Air Pollution sources, Generalized approach for assessment of Air pollution Impacts

UNIT IV

ASSEMENT OF IMPACT ON VEGETATION AND WILD LIFE:

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation

ENVIRONEMNTAL AUDIT: Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, stages of Environmental Audit, onsite activities,

Evaluation of Audit data and preparation of Audit report

UNIT V

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION): Post Audit activities, The Environmental protection Act, The water prevention Act, The Air (Prevention & Control of pollution Act.), Wild life Act, Case studies and preparation of Environmental Impact assessment statement for various Industries.

4. Books and Materials

Text Book(s)

1. Y. Anjaneyulu, Environmental Impact Assessment Methodologies, B.S. Publication, 9th edition2013
2. J. Glynn and Gary W. Hein Ke, Environmental Science and Engineering, Prentice Hall Publishers 2014 5th Edition02

Reference Book(s)

1. Suresh K. Dhaneja, Environmental Science and Engineering, S.K.Katari & Sons Publications, New Delhi., 9th edition 2016
2. Canter, L.W, Environmental Impact Assessment, 1977, McGraw Hills, New York

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COURSE STRUCTURE

A30169 – FOUNDATION ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with types and purposes of different types of foundation systems and structures. Foundation is an important component of any civil engineering structure which must be safe, stable, and economically designed. The course on Foundation Engineering provides the students necessary geotechnical engineering skills to analyze and design shallow and deep foundation systems under different loading and soil conditions.

Course Pre/co-requisites

A30117 – Geotechnical Engineering

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30169.1 Plan and execute detailed site investigation program to select type of foundation

A30169.2 Determine bearing capacity of shallow foundation based on the soil conditions

A30169.3 Explain the types of footing and raft based on contact pressure distribution

A30169.4 Interpret the load carrying capacity and settlement of piles and pile group

A30169.5 Illustrate the behaviour of soil behind retaining structures

3. Course Syllabus

UNIT I

Site Investigation and Selection of Foundation: Scope and objectives — Methods of exploration — Auguring and boring — Wash boring and rotary drilling — Depth and spacing of bore holes — Soil samples — Representative and undisturbed — Sampling methods — Split spoon sampler, Thin wall sampler, Stationary piston sampler — Penetration tests (SPT and SCPT) — Data interpretation — Strength parameters — Bore log report and Selection of foundation simplex method, big -M method and special cases.

UNIT II

Shallow Foundations: Location and depth of foundation — Codal provisions — Bearing capacity of shallow foundation on homogeneous deposits — Terzaghi's formula and BIS formula — Factors affecting bearing capacity — Bearing capacity from in-situ tests (SPT, SCPT and plate load) — Allowable bearing pressure — Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits — Total and differential settlement — Allowable settlements — Codal provision — Methods of minimizing total and differential settlements.

UNIT III

Footings and Rafts: Types of Isolated footing, Combined footing, Mat foundation — Contact pressure and settlement distribution — Proportioning of foundations for conventional rigid behaviour — Minimum thickness for rigid behaviour — Applications — Compensated foundation — Codal provision

UNIT IV

Pile Foundations: Types of piles and their functions — Factors influencing the selection of pile — Carrying capacity of single pile in granular and cohesive soil — Static formula — Dynamic formulae (Engineering news and Hileys) — Capacity from in-situ tests (SPT and SCPT) — Negative skin friction — Uplift capacity-Group capacity by different methods (Feld's rule, Converse — Labarra formula and block failure criterion) — Settlement of pile groups — Interpretation of pile load test (routine test only), under reamed

piles.

UNIT V

Retaining Walls: Plastic equilibrium in soils — Active and passive states — Rankine's theory — Cohesion less and cohesive soil — Coulomb's wedge theory — Condition for critical failure plane — Earth pressure on retaining walls of simple configurations — Culmann's Graphical method — Pressure on the wall due to line load — Stability analysis of retaining walls — Codal provisions.

4. Books and Materials

Text Book(s)

1. A text book of soil mechanics and foundation engineering, revised and enlarged 4th edition 2015 by V.N.S. Murthy, Saikripa Technical Consultants, Bangalore
2. Soil mechanics and foundation engineering by K R Arora, Standard Publications and Distributors, Delhi, 2014.

Reference Book(s)

1. Basic and applied soil mechanics by Gopal Ranjan and ASR Rao, Wiley Easter Ltd., New Delhi.
2. Foundation Engineering by R.B. Peck, W. E. Hanson and T. H. Thournburn, John Wiley, New York.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30170 – DESIGN AND DRAWING OF IRRIGATION STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The course provides the knowledge of design of various hydraulic structures like weirs, aqueducts, sluices and canal regulators. It also deals with structural drawing and detailing of various components of hydraulic structures.

Course Pre/corequisites

A30103 – Fluids Mechanics

A30108- Hydraulics and Hydraulic Machinery

A30111 – Water Resources Engineering

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30170.1	Apply the concepts of fluid mechanics to analyze an irrigation structure
A30170.2	Design various irrigation structures like head and cross regulator structure
A30170.3	Understand different aspects of design of hydraulic structures
A30170.4	Identify various types of reservoirs and their design aspects
A30170.5	Design and draw the structural details of hydraulic structures

3. Course Syllabus

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

4. Books and Materials

Text Book(s):

1. Design of Minor Irrigation And Canal Structures By C.Satyanarayana Murthy, New Age Publications.
2. Irrigation Engineering And Hydraulic Structures By S.K.Garg, Standard Book House.

Reference Book(s):

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg; Khanna Publishers, Delhi.
2. Irrigation, Waterpower and Water Resources Engineering By K R Arora; Standard Publication, New Delhi.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30022 - PROFESSIONAL ETHICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. CourseDescription

Course Overview

Ethical and professional values course provides a framework and a moral compass for students and help guide their professional behaviors. This course broadens ethical and professional values which underpin professional skills and behaviors. The students work efficiently by prioritizing, organizing and managing their time effectively. They make the best use of technology, including spreadsheets and data analytics, to find effective solutions to various issues by considering the importance of maintaining professional competence and pursuing life-long learning. This course also introduces them to communicate effectively in academics and in profession. The students become aware of the working structure of the society by identifying opportunities, problems and observe trends and make suitable recommendations based on them. The students explore different types of leadership approaches and qualities of effective leaders which can be adopted or adapted at any level. This course provides the students with those skills that encourage them to become open-minded and involve in innovative thinking.

Course Pre/corequisites

A30035 – Universal Human Values- understanding harmony

2. Course Outcomes (COs)

After completion of the course, the learner will be able:

A30022.1: To identify ethical and take ethical decisions

A30022.2: To consider the importance of maintaining professional competence and pursuing life-long learning

A30022.3: To understand patterns and channels of communication and their efficiency

A30022.4: To analyze and evaluate available data and information from a variety of sources

A30022.5: To demonstrate leadership qualities in teams effectively and efficiently

A30022.6: The importance of applying an enquiring mind when collecting and assessing data and information

3. Course Syllabus

UNIT I- ETHICS AND PROFESSIONALISM

Introduction, perspectives of Ethics, branches of Ethics, justice vs care, Ethics and morality,Ethics and religion, Ethics and maturity, Ethics and the professions, Rules vs principles, Ethical dilemma.

UNIT II-PERSONAL EFFECTIVENESS

Prioritizing, organizing and managing time effectively, using technology effectively- Using email effectively How to manage email, Maintaining professional competence and lifelong learning Continuing professional development, Personal development plan, How to craft your CV for the job of your dreams, Tips to prepare for an interview, The interview, Getting it wrong, Getting it right

UNIT III- COMMUNICATION AND INTER PERSONAL SKILLS

Introduction, The communication process-What can gowrong?, Barriers and distortions to the communications process, How good are you at communicating? Formal and informal communication, six elements of effective communication, Communicating in the work place- Errors and Solutions, Report Writing- the purpose of and the best practices in report writing. Interpersonal skills- Inter personal skills, Personal qualities , Verbal communication Non-verbal communication

UNIT IV - SOCIAL AWARENESS

How to enhance your commercial awareness, SWOT analysis, Deciding when to seek the help of experts Suitability, acceptability, feasibility (SAF) model

UNIT V - LEADERSHIPANDTEAMWORKING

Introduction, The nature of leadership, Situational leadership, Leader ship inaction, Action-centered leadership (Adair), Factors influencing leadership style, Blake and Mouton grid, Examples of outstanding leaders, Team development, Motivation, Accountability, responsibility and authority.

4. Books and Materials

Text Book(s)

1. Rizvi, M. Ashraf, *Effective Technical Communication,* Noida, McGraw-Hill Education. 2009.
2. Engineering Ethics (Includes Human Values)" by Govindarajan M

Reference Book(s)

1. Professional Ethics in Engineering" by I A Dhotre V S Bagad
2. Professional Ethics In Engineering" by Dr V Jayakumar and Lakshmi Publications
3. Engineering Ethics: Challenges and Opportunities" by W Richard Bowen

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30129-ETBAS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	2	40	60	100

1. Course Description

Course Overview

This laboratory course enables the students to design various complex and laborious structural components using ETBAS Software. The best analyzing and design software used in present scenario is ETBAS. The course provides a platform to use ETBAS Software to analyze and design real life Civil Engineering structures like buildings, water tanks, bridges, water retaining structures etc.

Course Pre/corequisites

A30116 – Design and Drawing Reinforced Concrete Structures

A30127- CAD Lab-II

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30129.1	Obtain comprehensive knowledge on the ETABS software and its applications
A30129.2	Analyse & design of structures
A30129.3	Develop building component models
A30129.4	Design footings for residential and commercial structures
A30129.5	Analyze and design Water tanks with different loads

3. Course Syllabus

1. Introduction to Etabs Software
2. Modelling, Load Application, Analysis & Result.
3. Grid Preparation
4. Primary & Secondary beam concept
5. Modelling of beam and column in Etabs
6. Modelling of slab
7. Loads Calculations and applying on Model
   a. Wall Loads
   b. Slab loads
   c. Floor finish loads
   d. Wind loads
   e. Earth quake loads
   f. Over Head Water Tank Loads
8. Analysis Checking Model for
9. Analysis
10. Design

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30178 – MUNICIPAL SOLID WASTE MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Solid waste management (SWM) in today's urbanized society is complex due to the increasing quantity and diversity of waste, funding limitations for public disposal, technological influences, and intricate infrastructure networks. This course aims to familiarize participants with the various steps involved in effective solid waste management

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30178.1 Interpret key concepts and processes in municipal solid waste management

A30178.2 Analyze different waste types and assess their environmental impacts

A30178.3 Identify and apply best practices for sustainable waste management

A30178.4 Understand policies and regulations governing waste management

A30178.5 Design community outreach programs to promote responsible waste practices

Course Syllabus

UNIT-I: Evolution, Souces, Types and Generation of Solid Waste

Introduction to solid waste, Functional elements, Types and sources of solid waste, Sampling and characteristics, Estimation of solid waste quantity, Factors affecting solid waste generation rate

Waste Handling, Storage, Processing and Types of Collection of Solid Waste

Handling, separation and storage at source, Processing at source, Primary collection, Types of collection system

UNIT-II: Analysis of Solid Waste Collection System and Types of Transfer Station

Analysis of collection system (Part I), Analysis of collection system (Part II), Analysis of collection system (Part III) , Need and types of transfer station

Solid Waste Transport Means, Methods, Separation and Processing

Transport means and methods, Unit operation for component separation, Material recovery facilities (MRF), Recycling of dry waste components.

UNIT-III: Incineration

Waste as a fuel, Incineration/Combustion, Flue gas characteristics and treatment, Solid residue generation, characterization and treatment, Waste-to-energy (WtE) plants (case studies) pyrolysis and gasification

Composting – I & II

Definition and phases of composting, Factors affecting composting process, Types of composting – I, Types of composting – II, Compost quality, Vermicomposting

UNIT-IV: Anaerobic Digestion

Definition, stages and factors affecting anaerobic digestion, Pretreatment and co-digestion for enhancement of biogas production, Types of biogas digesters

Landfill – I & II

Site selection and types of landfill, Leachate collection and treatment, Landfill gas collection and treatment, Design of landfill & Bio-minning of old dumpsite

UNIT-V: Special Waste and Integrated Solid Waste Management

Construction and demolition waste, Management of bio-mediacal, e-waste and inert waste, Integrated solid waste management (ISWM), Municipal solid waste management rules

Finance and PPP Related to Solid Waste Management

Financing in MSWM projects, Public-Private-Partnership (PPP), Public-Private-Partnership (PPP) in MSWM projects.

3. Books and Materials

Text Book(s)

1. Municipal solid waste management by Dr P Jayarama Reddy, BS Publications, BSP Books
2. Municipal solid waste management by Dr. Sunil Kumar, Published June 30, 2020 by CRC Press

Reference Book(s)

1. Soild Waste Management by Bhide A.D Indian National Scientific Documentation Edition 1983
2. Soild Waste by George Mc Graw Hill Publication,New Delhi 2022,ISBN 9780071356237
3. Soild Waste Management by SasiKumar K , PHI learning,New Delhi, 2009 ISBN 8120338693

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

OPEN ELECTIVES

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A33147	Machine Learning Essentials	3-0-0	3	CAI
A33148	Software Testing	3-0-0	3	CAI
A33149	Knowledge Representation and Reasoning	3-0-0	3	CAI
A33150	Agile Methodologies	3-0-0	3	CAI
A33545	Fundamentals of Computer Networks	3-0-0	3	CSO
A33546	Internet of Things Fundamentals	3-0-0	3	CSO
A33547	Sensor Networks	3-0-0	3	CSO
A33548	Cloud Computing	3-0-0	3	CSO
A30181	Basic Civil Engineering	3-0-0	3	CE
A30182	Building Planning and Construction	3-0-0	3	CE
A30183	Disaster Management	3-0-0	3	CE
A30184	Water Resources Conservation	3-0-0	3	CE
A30281	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A30282	Renewable Energy Sources	3-0-0	3	EEE
A30283	Electrical Measuring Instruments	3-0-0	3	EEE
A30284	Control Systems Engineering	3-0-0	3	EEE
A30381	Optimization Techniques	3-0-0	3	ME
A30382	Mechanical Technology	3-0-0	3	ME
A30383	Introduction to Automobile Systems	3-0-0	3	ME
A30481	Basic Electronics	3-0-0	3	ECE
A30482	Introduction to Communication Systems	3-0-0	3	ECE
A30483	Fundamentals of IOT	3-0-0	3	ECE
A30484	Introduction to Embedded Systems	3-0-0	3	ECE
A30485	CISCO Networking	3-0-0	3	ECE
A30474	Introduction to internet of things	3-0-0	3	ECE
A30581	Basic Data Structures	3-0-0	3	CSE
A30582	Fundamentals of DBMS	3-0-0	3	CSE
A30583	Basics of Software Engineering	3-0-0	3	CSE
A30584	Python for Everyone	3-0-0	3	CSE
A30585	Computer Organization and Operating Systems	3-0-0	3	CSE
A30586	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A30587	Fundamentals of Web Technologies	3-0-0	3	CSE
A30588	Introduction to Java Programming	3-0-0	3	CSE
A30579	The Joy of Computing using Phyton	3-0-0	3	CSE
A30081	Research Methodology	3-0-0	3	H&S
A30082	Intellectual Property Rights	3-0-0	3	H&S
A30083	National Service Scheme	3-0-0	3	H&S
A30084	Yoga	3-0-0	3	H&S
A30085	Design Thinking	3-0-0	3	H&S
A30086	Management Science	3-0-0	3	H&S
A30087	Entrepreneurship Development	3-0-0	3	H&S
A30094	Entrepreneurship	3-0-0	3	H&S

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30181 – BASIC CIVIL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is designed to impart the basic knowledge about civil engineering to the students of other branches of engineering. The course includes materials for construction, basic surveying and other basic concepts of irrigation, water supply and geotechnical engineering. It provides the significance of the civil engineering profession satisfying societal needs.

Course Pre/corequisites

The course has no specific prerequisite and co requisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30181.1 Classify various materials and components used in building construction.

A30181.2 List out different domains like Structural, Transportation and Geotechnical Engineering in Civil engineering stream.

A30181.3 Identify types of soils and foundations for various structures.

A30181.4 Measure the linear and angular parameters using concepts of surveying.

A30181.5 Develop water supply system for domestic and irrigational needs.

3. Course Syllabus

UNIT-I

Introduction to civil engineering & construction materials: Importance and scope of civil engineering, characteristics, types and their uses of stones, bricks, timber and cement

UNIT-II

Survey and highway engineering: Definition and classification of surveying, linear and angular measurements, leveling-modern instruments

UNIT-III

Modes of transportation: classification of highways - classification of pavements, curves, super elevation

UNIT-IV

Geotechnical engineering: Origin of soil, types of soil, bearing capacity of soil, types of foundation, shallow and deep

UNIT-V

Irrigation and water supply: Definition and classification of irrigation, irrigation structures, dams, weirs, cross drainage works, canal drops and quality of water-treatment methods

4. Books and Materials

Text Book(s)

1. B.C.Punmia, Ashok K Jain, Arun K Jain, *Basic Civil Engineering*, Laxmi Publications (P) Ltd, 1st edition, 2003.
2. G K Hiraskar, *Basic Civil Engineering,* Dhanpat Rai Publication, 1st edition, 2004.

Reference Book(s)

1. K.R. Arora, *Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, Delhi, 7th edition 2014.
2. B C Punmia Lal, *Irrigation and Water Power Engineering*, Laxmi Publications Pvt. Ltd., New Delhi, 16th edition, 2005.
3. Abe Kruger, *Green Building*, 5th edition, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30182 – BUILDING PLANNING AND CONSTRUCTION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The objective of the course is to learn about building by-laws laid by planning authorities, apply the principles and methods to be followed in constructing various components of a building & understand about masonry types in brick and stone construction. This course provides sequential approach towards constructional activities like flooring, carpentry, plumbing and electrical works etc.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30182.1 Plan buildings by adhering to laws laid by regulatory bodies.

A30182.2 Classify different masonry types of brick and stones used in construction.

A30182.3 Select appropriate floors and roofs for a proposed building.

A30182.4 Identify building materials which can be employed in construction.

A30182.5 Make use of damp proofing techniques to prevent ingress of water in buildings.

3. Course Syllabus

UNIT-I

Residential Buildings: Introduction, Different types of residential buildings- Detached house, semi- detached house, row house or chawls, block of flats or terrace house, duplex type houses, selection of site for residential building, factors effecting the selection of site, components of building, by-laws and regulations, orientation of buildings-factors effecting orientation, C.B.R.I suggestions for obtaining optimum orientation.

UNIT-II

Masonry: Stone masonry - definitions of terms used in masonry, materials for stone masonry, classifications of stone masonry, dressing of stones. Brick masonry - introduction, types of bricks, bonds in brick work, comparison of brick masonry and stone masonry. Composite masonry-introduction, stone composite masonry, brick-stone masonry, concrete masonry, hollow clay blocks masonry, reinforced brick masonry.

UNIT-III

Floors and Roofs: Ground floor - components of a floor, materials used for floor construction, different types of flooring, upper floors - introduction, steel joist and stone or precast concrete Slab floor, Jack arch floors, reinforced cement concrete floors, Ribbed or hollow tiled flooring,

precast concrete floors, timber floors, types of roofs- pitched roofs, single roofs, double or purlin roofs, trussed roofs.

UNIT-IV

Doors and Windows: Introduction, frame, shutters, head, sill, horn, rebate, location of doors and windows, size of doors and windows, types of doors, classifications of doors - arrangement of components, method or manner of construction, working operations, metal doors, types of windows, classifications of windows, ventilators, fixtures and fastenings, installing door and window frames.

UNIT-V

Damp proofing: Introduction, causes of dampness on buildings, effects of dampness on buildings, precautions, materials used for damp proofing, methods of damp proofing, DPC treatment in building problems, fire hazards, fire resisting properties of common building materials.

4. Books and Materials

Text Book(s)

1. Kumara Swamy N &Kameswara Rao A, *Building planning and Drawing*, Charotar Publishers, 6th Edition, 1998.
2. B.C. Punmia, Ashok Kr. Jain, Arun Kr. Jain, *Building Construction*, Laxmi Publications, 10th Edition, 2008.

Reference Book(s)

1. S.K. Duggal, *Building Materials*, New Age International Publishers, 4th Edition, 2010.
2. D.N. Ghose, *Materials of construction*, Tata-McGraw-Hill Publishing Company Limited, 1st Edition, 1989.
3. Sushil Kumar Sushil Kumar, (2003), *Engineering Materials*, Metropolitan Book Co., Private Ltd., New Delhi.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30183 – DISASTER MANAGEMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides knowledge on environmental hazards and disasters. The syllabus includes the basics of endogenous and exogenous hazards and gives a suitable picture on the different types of hazard and disasters. This course will enable the student to apply different management techniques to the hazards and disasters.

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30183.1 Classify different kind of hazards/disasters and their effects on environment.

A30183.2 Analyze the causes of hazards/disasters which effects human life.

A30183.3 Apply disaster management through engineering applications.

A30183.4 Apply suitable mitigation measures to minimize the effects of hazards and disasters.

3. Course Syllabus

UNIT-I

Environmental Hazards and Disasters: meaning of environmental hazards, environmental, disasters and environmental stress, concept of environmental hazards, environmental, stress and environmental disasters, different approaches and relation with human ecology, landscape approach - ecosystem approach - perception approach - human ecology and its application in geographical researches.

UNIT-II

Types of Environmental Hazards and Disasters: Natural hazards and disasters, man induced hazards and disasters, natural hazards - planetary hazards/disasters, extra planetary hazards/disasters, planetary hazards - endogenous hazards – exogenous hazards.

UNIT-III

Endogenous Hazards: Endogenous hazards, volcanic eruption, earthquakes, landslides, volcanic hazards/disasters - causes and distribution of volcanoes, hazardous effects of volcanic eruptions, environmental impacts of volcanic eruptions, earthquake hazards/disasters, causes of earthquakes, distribution of earthquakes, hazardous effects of earthquakes, earthquake hazards in India, human adjustment, perception and mitigation of earthquake.

UNIT-IV

Exogenous Hazards/disasters: Exogenous hazards/disasters, infrequent events, cumulative atmospheric hazards/disasters infrequent events: cyclones, lightning, hailstorms cyclones:

tropical cyclones and local storms, destruction by tropical cyclones and local storms (causes, distribution human adjustment, perception and mitigation) cumulative atmospheric hazards/disasters: floods- droughts, cold waves, heat waves. Floods: causes of floods, flood hazards India, flood control measures (human adjustment, perception and mitigation). Droughts: impacts of droughts, drought hazards in India, drought control measures, extra planetary hazards/disasters, man induced hazards/disasters, physical hazards/disasters-soil erosion.

UNIT-V

Soil Erosion: Mechanics and forms of soil erosion, factors and causes of soil erosion, conservation measures of soil erosion. Chemical hazards/disasters, release of toxic chemicals, nuclear explosion, sedimentation processes. Sedimentation processes: global sedimentation problems-regional sedimentation problems, sedimentation and environmental problems, corrective measures of erosion and sedimentation. Biological hazards/disasters: population explosion.

4. Books and Materials

Text Book(s)

1. Rajib Shah, *Disaster Management*, Universities Press, India, 2nd Edition, 2003.
2. Tushar Bhattacharya, *Disaster Science and Management*, TMH Publications, 1st Edition, 2012.

Reference Book(s)

1. Donald Hyndman & David Hyndman, *Natural Hazards & Disasters*, Cengage Learning, 4th Edition, 2013.
2. R.B. Singh (Ed), *Disaster Management*, Rawat Publication, New Delhi, 1st Edition, 2006.
3. Kates, B.I & White, *The Environment as Hazards*, G.F, Oxford Publishers, New York, 1978.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30184 – WATER RESOURCES CONSERVATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course introduces the great need to conserve and plan the water resources in more efficient way because of urbanization and depletion of water resources. The course content enables the students to learn water hydrology, importance of water conservation and methods to conserve water resources.

Course Pre/corequisites

The Course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30184.1 Interpret ground and surface water utilization for conservation of water resources.

A30184.2 Apply the concepts of artificial ground water recharge to increase ground water level.

A30184.3 Make use of the concepts of harvesting for preservation of water.

A30184.4 Utilizenew technologies like ion exchange and UV radiation techniques to recycle and reuse waste water.

A30184.5 Plan efficient use of water resources with minimum energy.

3. Course Syllabus

UNIT-I

Ground and surface water utilization- Hydrologic cycle, water budget, ground water level fluctuations and environmental influence.

UNIT-II

Artificial ground water recharge- Concept and methods of artificial ground water recharge mounds and induced recharge, wastewater recharge for reuse, water spreading, farm ponds and percolation tanks.

UNIT-III

Water harvesting- Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, and check dams.

UNIT-IV

Reuse & recycle of waste water-Types of reuse, application of treated waste water, purity of reclaimed water, guidelines and regulations, new technologies used in recycling of waste water.

UNIT-V

Watershed management- Concept of watershed management, policies and decision making, concept of watershed development, objectives of watershed development, need for watershed development in India, integrated and multidisciplinary approach for watershed management.

4. Books and Materials

Text Book(s)

1. Ramakrishnan S., *Ground water*, Sci -Tech Publications, 2nd edition, 2010.
2. B.C. Punmia& Pande B.B. Lal, *Irrigation and Water Power Engineering*; Laxmi Publications pvt. Ltd., New Delhi.

Reference Book(s)

1. S.N. Chatterjee, *Water Resources, Conservation and management*, Atlantic Publishers, 1st edition, 2018.
2. Murthy J.V.S, *Watershed Management*, New Age International Publishers, 2nd edition, 2017.
3. Murthy V.V.N*, Land and Water Management*, Kalyani Publications, 1st edition, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30281 – FUNDAMENTALS OF ELECTRICAL ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is to familiarize the students about the basics of electrical engineering, circuit theory and electrical machines. This course introduces the fundamental concepts, basic knowledge of electrical quantities, network theorems for the analysis of basic DC and AC circuits. It also deals with the working principle, construction and operation of DC machines and AC machines. These machines are used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30281.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.

A30281.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.

A30281.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.

A30281.4 Test the Performance of DC machines, AC machines and single-phase transformers.

3. Course Syllabus

UNIT-I

DC Circuits: Circuit concept, types of network elements, ohm's law, types of sources voltage - current relationship for passive element (R, L & C), Kirchhoff's laws, network reduction techniques: series, parallel, combination of series and parallel, delta - star transformation, loop and nodal analysis.

Network Theorems: Thevenin's, Norton's, superposition and maximum power transfer theorems (DC excitation only).

UNIT-II

AC Circuits: Representation of alternating quantities, peak, average, RMS, form factor and peak factor for sinusoidal wave form. J-notation, Analysis of single-phase AC circuits consisting of pure R, L & C circuits, combination of RL, RC and RLC (only series) circuits.

UNIT-III

D.C Generators: Constructional details of D.C. generator, principle of operation of D.C. generators, types of D.C generators, E.M.F equation.

D.C Motors: Principle of operation of DC motors, back emf, torque equation, Swinburne's test, speed control of DC motors by armature and field control methods.

UNIT-IV

1-phase Transformers: Principle of operation, constructional details, E.M.F. equation, losses and efficiency, OC and SC tests.

UNIT-V

3-Phase Induction Motors: Principle of operation, types of induction motors, slip, torque equation, torque-slip characteristics.

3-phase Alternators: Principle of operation - constructional details-EMF equation.

4. Books and Materials

Text Book(s)

1. V.K. Mehta and Rohith Mehta, *Basic electrical engineering*, S. Chand publishers, 14th edition.
2. M.S. Naidu and S. Kamakshaiah, *Introduction to Electrical Engineering*, Tata McGraw Hill Publishers, 1st edition, 2004.

Reference Book(s)

1. A Sudhakar, Shyammohan S Palli, *Circuits and Networks*, Tata McGraw-Hill, 4th edition.
2. D. C. Kulshreshtha, *Basic Electrical Engineering*, McGraw Hill, 2009.
3. L. S. Bobrow, *Fundamentals of Electrical Engineering*, Oxford University Press, 2011.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30282 – RENEWABLE ENERGY SOURCES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The purpose of this course is to enable the student to acquire knowledge on various Power Generation Systems. The primary objective of this course is to introduce solar energy, its radiation, collection, storage and application. It also deals with production of quality of energy, types of generation plants and their principles of operation, methods of energy storage and economics of generation.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30282.1 Apply the principles of Renewable energy sources for the construction of Power generating station.

A30282.2 Analyze the various energy conversion systems and their limitations.

A30282.3 Analyze Renewable energy sources for various environmental conditions.

A30282.4 Analyze the generation principles and operation of variety of sources of energy.

3. Course Syllabus

UNIT-I

Principles of Solar Radiation: Role and potential of new and renewable source, the solar energy option, environmental impact of solar power, physics of the sun, the solar constant, extra-terrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar Energy Collection, Storage and Applications: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. **Storage and Applications:** Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind Energy and Bio Mass: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria.

Bio-Mass: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. engine operation and economic aspects.

UNIT-IV

Other Sources of Energy: Resources, types of wells, methods of harnessing the energy, potential in India. Ocean energy: OTEC, principles utilization, setting of OTEC plants, thermodynamic cycles. **Tidal and wave energy:** Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

Energy Storage and Economy: Energy storage - energy in transportation - Magneto hydrodynamic power generation- hydrogen economy

4. Books and Materials

Text Book(s)

1. G.D. Rai, *Non-Conventional Energy Sources*, Khanna Publishers, 4th edition 2008.
2. JhonTwidell and tony Weir, *Renewable Energy Resources*, 2nd edition, Taylor and Francis Group, 2006.

Reference Book(s)

1. Twidell&Weir, *Renewable Energy Sources*, Tata McGraw Hill Education Private Limited, New Delhi, 4th edition 2009.
2. S. N. Bhadra, D. Kastha& S. Banerjee, *Wind Electrical Systems* – Oxford University Press, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30283 – ELECTRICAL MEASURING INSTRUMENTS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different electrical measuring instruments used to measure electrical quantities. The minimization of different errors and their effects in measuring instruments are discussed. Here the concepts of single phase and three phase circuits are discussed to determine the voltage, current, power and energy. Also, the concepts of bridges are discussed, which are used for the measurement of unknown resistance, inductance and capacitance. These electrical measuring instruments are used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30283.1 Categorise various electrical instruments used for measuring electrical parameters.

A30283.2 Design appropriate arrangement for extension of range in measuring instruments.

A30283.3 Analyze the errors and compensations in various electrical measuring instruments.

A30283.4 Measure current, voltage, power and energy in 1-phase and 3-phase circuits.

A30283.5 Estimate the unknown quantities of resistance, inductance and capacitance using bridges.

3. Course Syllabus

UNIT-I

Measuring Instruments: Classification, deflecting, control and damping torques, ammeters and voltmeters, PMMC, moving iron and dynamometer type instruments, expression for the deflecting torque and control torque, errors and compensations, extension of range using shunts and Series resistance.

UNIT-II

Potentiometers: Principle and operation of D.C. Crompton's potentiometer, standardization, measurement of unknown resistance, current, voltage.

UNIT-III

Measurement of Power: Single phase dynamometer wattmeter, LPF and UPF, double element and three element dynamometer wattmeter's, expression for deflecting and control torques, extension of range of wattmeter using instrument transformers, measurement of active and reactive powers in balanced and unbalanced systems.

UNIT-IV

Measurement of Energy: Single phase induction type energy meter, driving and braking torques errors and compensations, testing by phantom loading. Three phase energy meters.

UNIT-V

DC Bridges: Method of measuring low, medium and high resistance, Whetstone's bridge, Kelvin's double bridge for measuring low resistance, measurement of high resistance, loss of charge method, megger method.

AC Bridges: Measurement of Inductance, Maxwell's bridge, Anderson's bridge. Measurement of capacitance, Desauty's bridge, Schering bridge.

4. Books and Materials

Text Book(s)

1. A.K. Sawhney, *A course on Electrical and Electronics Measurements & Instrumentation*, DhanpatRai and Co. Publishers, 19th edition, 2015.
2. J.B. Gupta, *A course on Electrical and Electronics Measurements & Instrumentation*, S.K. Kataria publishers, 14thedition, 2014.

Reference Book(s)

1. U.A. Bakshi, A. V. Bakshi, *Electrical measurements and Instrumentation*, Technical publications, 1st edition, 2009.
2. E. W. Golding & F.C. Widdis, *Electrical Measurements and Measuring Instruments*, Wheeler publishers, 5th edition, 1997.
3. H S Kalsi, *Electronic Instrumentation*, Tata McGraw-Hill, 3rd edition, 2010.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30284 – CONTROL SYSTEMS ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The purpose of this course is to familiarize the students about the different control systems applied to electrical systems. This course deals with the types of control systems, mathematical modeling of physical systems, time response analysis, frequency response analysis and its stability techniques. It also covers the state space analysis of linear systems. The main applications of control systems are in automation industry, Robotics, Space Technology and Ship stabilization systems.

Course Pre/corequisites

A30002- Mathematics-I

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30284.1	Determine the transfer function of a given system using different techniques.
A30284.2	Analyze the response of a given system in time and frequency domains.
A30284.3	Test the stability, observability and controllability of a given system.
A30284.4	Apply suitable technique for calculating the gain margin and phase margin of a given system.

3. Course Syllabus

UNIT-I

Introduction: Open loop and closed loop systems and their differences, different examples of control systems, effect of feedback on gain, sensitivity and stability.

Mathematical Modelling of Physical Systems: Transfer function of translational and rotational mechanical systems, Force (Torque)-Voltage and Force (Torque)-Current analogies, block diagram reduction techniques, signal flow graphs and Mason's gain formula, transfer function of armature controlled, field controlled D.C servo motors, transfer function of A.C. Servo motor.

UNIT-II

Time Response Analysis: Standard test signals, unit impulse and step response of first order systems,unit step response of second order system, time response specifications, steady state errors and error constants, dynamic error coefficients, effects of proportional, derivative, proportional derivative, proportional integral and PID controllers.

UNIT-III

Stability Analysis: Introduction to stability, necessary and sufficient conditions for stability, Routh's stability criterions and its limitations, relative stability.

The Root Locus Concept: Root locus concept, rules to construct root locus, graphical determination of 'k' for specified damping ratio, relative stability, effect of adding zeros and poles to transfer function on root locus.

UNIT-IV

Frequency Domain Analysis: Introduction, frequency domain specifications, correlation between time and frequency responses, stability analysis from Bode plot and Nyquist plot, calculation of gain margin and phase margin, determination of transfer function from Bode diagram.

UNIT-V

Compensators: Lag, lead, lead - lag networks.

State Space Analysis: Concept of state, state variables and state model, physical, phase and canonical variable representation of state models, derivation of transfer function from state models, diagonalization, solving the time invariant state equations, state transition matrix and its properties, concepts of controllability and observability.

4. Books and Materials

Text Book(s)

1. I J Nagrath and M Gopal, *Control System Engineering,* New Age International Publication,5th edition, 2007.
2. Katsuhiko Ogata, *Modern Control Engineering*, Prentice Hall of India, 5th edition, 2010.

Reference Book(s)

1. A. Nagoor Kani, *Control Systems Engineering*, RBA publications, 2nd edition, 2009.
2. B. C. Kuo and FaridGolnaraghi, *Automatic Control Systems*, John Wiley, 8th edition, 2003.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30381 – OPTIMIZATION TECHNIQUES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with modelling and optimization of the problems with limited resources. It provides the tools and techniques to solve the real-world problems by finding the optimal solutions to the models subject to constraints of time, labour, money, material and other resources. This course helps students in better decision making regarding optimum usage of available resources.

Course Pre/corequisites

The course has no specific prerequisite and Corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30381.1 Apply various Operations Research models and methods to real world problems.

A30381.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A30381.3 Evaluate various alternatives available to find optimal solution for real world problems.

A30381.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A30381.5 Decide the best operating policy for the efficient use of resources.

3. Course Syllabus

UNIT I

Operations Research: Scope, O.R models, Linear Programming - Formulation, graphical method, simplex method, big -M method and special cases.

UNIT II

Assignment Model: Formulation, optimal solution by Hungarian method, maximization problem, balanced and unbalanced problems, restriction models.

Sequencing Models: Introduction, Johnson's Rule, processing n jobs through two machines, processing n jobs through three machines and processing n jobs through m machines.

UNIT III

Transportation Problem: Introduction, finding initial basic feasible solutions, optimality test, alternate solutions and unbalanced transportation problem.

UNIT IV

Game Theory: Introduction, minimax (maximin) method of optimal strategies, saddle point, value of the game, rectangular games without saddle point, dominance principle, graphical method.

Queuing Theory: Introduction, terminology, single channel models with finite queue length and non-finite queue length.

UNIT V

Introduction to Project Management: Terminology, methods of finding critical path -critical path method (CPM), project evaluation and review technique (PERT) - probability of completing the project within scheduled time and crashing.

4. Books and Materials

Text Book(s)

1. S.D. Sharma, *Operations Research*, New Delhi: Kedarnath Publications, 2017
2. S.R. Yadav and A.K. Malik, *Operations Research*, New Delhi: Oxford University Press, 2014.

Reference Book(s)

1. Hamdy Abdelaziz Taha,*Operations Research*: *an Introduction*, 9th edition, Pearson, Boston,2015.
2. Prem Kumar Gupta & D S Hira*, Operations Research*, Revised edition, New Delhi: S. Chand Publishing, 2015.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30382 – MECHANICAL TECHNOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides knowledge to select the required material for different engineering applications. It also deals with basic concepts of internal combustion engines, compressors, power transmission systems and welding processes. The student will be able to apply the knowledge of engines, materials and welding processes which can be used in domestic and industrial applications.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30382.1 Identify the types of engines and their cycles.

A30382.2 Classify the reciprocating air compressors and their working principles.

A30382.3 Discus the constructional features of domestic refrigeration and air conditioning systems.

A30382.4 Inspect the mechanism of power transmission elements of various engineering systems.

A30382.5 Select suitable engineering materials and welding methods for real time applications.

3. Course Syllabus

UNIT I

I.C. Engines: working principle, 4 stroke and 2 stroke engines, comparison.

UNIT II

Reciprocating Air compressors: Description and working of single stage and multistage reciprocating air compressors – inter cooling.

UNIT III

Refrigeration systems: Study of household refrigerator, window air conditioner, split air conditioner ratings and selection criteria of above devices

UNIT IV

Transmission of power: Belt, Rope, Chain and gear drive.

UNIT V

Engineering materials and welding processes: Engineering materials, properties of materials, gas welding, arc welding, soldering and brazing.

4. Books and Materials

Text Book(s)

1. R.S Khurmi & JS Gupta, *Thermal Engineering*, New Delhi S Chand, 2012.
2. P.L. Ballaney, *Refrigeration and Air Conditioning,* 2nd edition, 2012.

Reference Book(s)

1. R.K. Jain and S.C. Gupta, *Production Technology*, New Delhi, Khanna Publishers,2012.
2. S.N. Lal, Elements *of Mechanical Engineering*, Cengage Learning, 2013.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30383 – AUTOMOBILE SYSTEMS AND APPLICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides a broad knowledge about the automobile mechanisms like transmission, final drive, braking system, front axle, steering, frame and chassis. It also covers emission and electrical systems used in automobiles. This knowledge will be helpful to the student in co-relating various systems with each other and understanding the individual systems in a better manner while using them in daily life.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30383.1 Identify the different parts of the automobile systems used in daily life.

A30383.2 Analyze brakes, steering, axles, suspension and frames of an engine for better performance.

A30383.3 Inspect the mechanism of power transmission elements, and applications of various engineering systems.

A30383.4 Compare the significance of various engines in terms of their performance.

A30383.5 Classify various electrical systems that are used for efficient functioning of automobiles.

3. Course Syllabus

UNIT I

Introduction- History, Industrial revolution, Development in automobile industry, leading manufacturers.

UNIT II

Classification of vehicles: On the basis of load, wheels, final drive, fuel used, position of engine and steering transmission, body and load, layout of an automobile chassis function of major components of a vehicle such as frame, transmission (clutch and gearbox), braking system, types of suspension, principle and its components.

UNIT III

Introduction to thermodynamics: First and second laws of thermodynamics, Otto cycle, diesel cycle. Types of automotive fuels, properties of fuels, air requirement for complete combustion of fuel.

Introduction to IC engines: Concept of two stroke and four stroke petrol and diesel engines and their applications to automobiles, various terms, specification of automobile engines.

UNIT IV

Emissions from automobiles – Pollution standards national and international, pollution control techniques, multipoint fuel injection for SI engines- common rail diesel injection, emissions from alternative energy sources– hydrogen, biomass, alcohols, LPG, CNG.

UNIT V

Electrical system- Charging circuit, generator, current and voltage regulator, starting system, Bendix drive, mechanism of solenoid switch, lighting systems, horn, wiper, fuel gauge, oil pressure gauge, engine temperature indicator.

4. Books and Materials

Text Book(s)

1. Kirpal Singh, Automotive *Mechanics – Vol. 1 & Vol. 2*, Standard Publishers Distributors, 13th edition, 2013
2. R.S Khurmi & JS Gupta, Thermal Engineering, New Delhi S. Chand, 2012.

Reference Book(s)

1. PL Ballaney, *Thermal Engineering*, New Delhi, Khanna Publishers,2013.
2. M.L. Mathur, F.S. Mehta and R.P. Tiwari, Elements of Mechanical Engineering, New Delhi, Jain Brothers,2013

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30384 – MANUFACTURING PROCESSES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides details about converting raw material into finished products using various manufacturing processes. With the knowledge acquired through this course, the students will be able to manufacture the products by reducing the wastage of material.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30384.1 Identify the properties of crystallization of ferrous and nonferrous materials.

A30384.2 Select suitable material for preparing the patterns.

A30384.3 Make use of moulding systems to prepare a product.

A30384.4 Identify the suitable special casting process used for the given application.

A30384.5 Identify the suitable welding process used for the given application.

3. Course Syllabus

UNIT I

Engineering Materials-Industrial Bonds in crystallization of metals, grain and grain boundaries, Determination of Grain size, solid solutions and types, structure and properties of various materials.

UNIT II

Casting: Introduction, steps involved in making a casting, advantages of casting, applications, pattern making, types of patterns, materials used for patterns, pattern allowances, principles of gating system, gating ratio, design of gating system, mould materials, types of moulds, molding methods and molding machines.

UNIT III

Risers - Types, function, casting design considerations, design of feeding systems like sprue, runner, gate, riser and molding flasks.

UNIT IV

Special Casting Processes - Centrifugal, die, investment casting, methods of melting, crucible melting, cupola operation, steel making processes, casting inspection and defects.

UNIT V

Welding: Classification of welding processes, types of welds, welded joints, gas welding, arc welding, forge welding, resistance welding, thermit welding, plasma (air and water) welding, TIG welding, MIG welding, welding defects, causes and remedies.

4. Books and Materials

Text Book(s)

1. P.N. Rao, *Manufacturing Technology*, Volume-I, Tata McGraw Hill, 4th edition, 2013.

Reference Book(s)

1. Schmid and Kalpakin, *Manufacturing Technology*, Pearson education, 7thedition, 2014.
2. P. N. Rao, *Manufacturing Technology*, *Foundry forming and welding*, Volume-I, McGraw Hill education, 5th edition, 2018.
3. R.K. Jain, *Production Technology*, Khanna Publishers, 18thedition, 2013.

COURSE STRUCTURE
A30481 – PRINCIPLES OF COMMUNICATION SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides the basic knowledge of analog communication systems and their applications. This course covers different continuous modulation techniques and analog pulse modulation schemes. This course also covers the operation of AM and FM receivers and effect of noise on AM, FM and PM receiver performance. This course helps the students in understanding and design of communication systems that are being used today.

Course Pre/corequisites

A30405 - Signals and Systems

2. Course Outcomes (COs)

After completion of this course, the student will be able to:

A30481.1 Explain the operation of different analog communication systems.

A30481.2 Analyze the performance of different modulation schemes used in analog communication systems.

A30481.3 Make use of sampling theorem to generate pulse modulation signals.

A30481.4 Analyze the performance of AM, FM and PM receivers in the presence of noise.

A30481.5 Choose an appropriate modulation technique to design an analog communication system.

3. Course Syllabus

UNIT - I

Amplitude Modulation and Demodulation: Elements of communication systems, Modulation, Amplitude Modulation (AM) - Single tone modulation, power calculations, generation and demodulation of AM signals. Generation and demodulation of DSBSC, SSBSC and VSBSC signals.

UNIT - II

Angle Modulation: Generation and demodulation of Frequency Modulation (FM) and Phase modulation (PM) signals. Narrow band frequency Modulation and wide band frequency modulation.

UNIT - III

Pulse Modulation: Sampling theorem, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM).

UNIT - IV

Receivers and Multiplexing: Super-heterodyne AM receiver, pre-emphasis, and de-emphasis, FM capture Effect, FM receiver, frequency-division multiplexing (FDM), time-division multiplexing (TDM).

UNIT - V

Noise: Types of Noise, Narrowband noise - Time domain representation and quadrature representation, filtered white noise, signal to noise ratio, noise equivalent bandwidth, effective noise temperature, and noise figure, Performance analysis of AM, FM, PM receivers in the presence of noise.

4. Books and Materials

Text Book(s)

1. Simon Haykin, *Communication Systems*, Wiley-India edition, 3rd edition, 2010.

Reference Book(s)

1. B.P.Lathi and Zhi Ding, *Modern Digital and Analog Communication Systems*, Oxford University Press, 4th edition, 2010.
2. A. Bruce Carlson and Paul B. Crilly, *Communication Systems– An Introduction to Signals and Noise in Electrical Communication*, McGraw-Hill,5th edition, 2010.
3. Kennedy and Davis, *Electronic Communication Systems*, McGraw-Hill 4th edition, 1999.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30482 – SIGNAL PROCESSING AND APPLICATIONS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This is an introductory course to all communication engineering subjects. This course deals withclassification of signals and systems in continuous and discrete time domains. The representation of signals in frequency domain is discussed in detail. This course also presents the sampling process of the signals and applications of the signals in various fields.

This course serves as an elementary subject for signal and image processing.

Course Pre/Co-requisites

1. A30002 – Mathematics – I
2. A30010 – Mathematics – II

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:
A30482.1 Distinguish between different signals and systems.
A30482.2 Make use of Fourier series for the representation of signals.
A30482.3 Analyze different signals by using an appropriate transform.
A30482.4 Examine the transmission characteristics of linear systems.
A30482.5 Select an appropriate transform to find the transfer function of linear systems.

3. Course Syllabus

UNIT - I

Classification of Signals: Continuous time and discrete time, analog and digital, periodic and aperiodic, energy and power, even and odd, causal and non-causal, deterministic and random, standard test signals.

Operations on signals: Time shifting, time scaling, time reversal and combined operations.

UNIT - II

Classification of Systems: Continuous time and discrete time, analog and digital, instantaneous and dynamic, causal and non-causal, linear and non-linear, time-invariant and time varying, stableand unstable. LTI Systems - Continuous, discrete time systems and properties of LTI systems.

UNIT – III

FOURIER SERIES

Representation of the Fourier series, Properties of Fourier Series and Dirichlet's conditions.

FOURIER TRANSFORMS:

Deriving Fourier Transform from Fourier series, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform.

UNIT – IV

SAMPLING: Sampling of continuous time signals, sampling theorem, reconstruction of signal from its samples, the effect of under sampling- aliasing, practical aspects of sampling.

UNIT –V Applications of Signal Processing

Audio and video processing, Image processing, Speech processing, Biomedical engineering and Control systems.

4. Books and Materials

Text Book(s)

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, Signals and Systems, Pearson Education, 2nd edition, 1997.
2. B. P. Lathi, Principles of Linear Systems and Signals, Oxford University Press, 2nd edition, 2009.

Reference Book(s)

1. A.Anand Kumar, Signals and Systems, Prentice Hall of India, 2012.
2. Simon Haykin and Van Veen, Signals and Systems, Wiley, 2nd edition, 1998.
3. B.P. Lathi, Signals, Systems and Communications, BS Publications, 2009

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30483 – FUNDAMENTALS OF IOT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course covers the development of internet of things (IoT) products and services including devices for sensing, actuation, processing and communication. This course helps the students to describe the technology around the Internet of Things (IoT). In this course students' study, python concepts, how to interface I/O devices, sensors using Arduino uno and raspberry pi. This course has simple examples with integration of techniques turned into an application.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30483.1 Analyze IoT applications using IoT enablers and connectivity layers, components.

A30483.2 Distinguish sensors and actuators in terms of their functions and applications.

A30483.3 Interface I/O devices, Sensors using Arduino UNO.

A30483.4 Develop Raspberry Pi Interfacing programs using python concepts.

A30483.5 Apply Raspberry Pi and Arduino Uno programming for IoT bases projects.

3. Course Syllabus

UNIT-I

Introduction to IoT: Characteristics of IoT, applications of IoT, IoT categories, IoT enablers and connectivity layers, IoT components.

UNIT-II

Sensors and Actuators: Sensors-definition, characteristics of sensor, classification of sensors, Actuators-definition, types of Actuators.

UNIT-III

Programming with Arduino: Introduction to Arduino UNO, Arduino IDE, Basic commands, serial commands. LED Interface, switch interface, serial interface, temperature sensor interface.

UNIT-IV

Python: Overview of Python, features, comments, variables, operators, data types, If statement, functions, for loop, while loop, strings, lists, tuples, dictionaries.

UNIT-V

Programming with Raspberry Pi: Introduction to Raspberry Pi, Installation of raspbian OS, connecting to laptop, terminal commands, LED Interface, button Interface, DHT sensor interface.

4. Books and Materials

Text Book(s)

1. Jeeva Jose, *Internet of Things,* 1st edition, Khanna Book Publishing, 2019.
2. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahindra Swain, *Internet of Things with Raspberry Pi and Arduino,* 1st edition, CRC Press, 2019.

Reference Book(s)

1. Vijay Madisetti, Arshdeep Bahga, *Internet of Things – A hands on Approach*, 1st edition, University Press, 2014.
2. Adrian McEwen, Hakim Cassimally, *Designing the Internet of Things*, 1stedition, John Wiley and Sons, 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30484 – INTRODUCTION TO EMBEDDED SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides an introduction to embedded systems and their architecture considerations. Focus is on TM4C123GH6PM microcontroller which includes internal architecture, instruction set, register organization, addressing modes, on-chip peripherals and data communication protocols. This course is accompanied by a laboratory course directly linked to the lecture topics for hands-on learning of the material. This course will be useful to students as a first level course for embedded systems.

Course Pre/Corequisites

A30432 - Microprocessors and Microcontrollers

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30484.1 Analyze the embedded systems features and architecture considerations

A30484.2 Develop Programs using TM4C123GH6PM Microcontroller

A30484.3 Make use of Peripherals of TM4C123GH6PM to interface I/O Devices

A30484.4 Apply Serial Communication Protocols for interfacing serial Devices.

A30484.5 Design Embedded Applications using TM4C123GH6PM Controller

3. Course Syllabus

UNIT - I

INTRODUCTION TO EMBEDDED SYSTEMS: Embedded System Introduction, Host and Target Concept, Embedded Applications, Features and Architecture Considerations for Embedded Systems- ROM, RAM, Timers, Data and Address Bus Concept, CISC vs RISC Design Philosophy, Von-Neumann Vs Harvard Architecture, Memory Types, Overview of Design Process of Embedded Systems, Programming Languages and Tools for Embedded Design.

UNIT - II

EMBEDDED CONTROLLER ARCHITECTURE: TM4C123GH6PM Block Diagram, Address Space, On-Chip Peripherals (Analog and Digital), Register Sets, Addressing Modes and Instruction Set Basics.

UNIT - III

OVERVIEW OF TM4C123GH6PM: I/O Pin Multiplexing, Pull Up/Down Registers, GPIO Control, Programming System Registers, Watchdog Timer, Need of Low Power for Embedded Systems,

System Clocks and Control, Hibernation Module on TM4C, Active Vs Standby Current Consumption. Introduction to Interrupts, Interrupt Vector Table, Interrupt Programming. Basic Timer, Real Time Clock (RTC), Motion Control Peripherals: PWM Module & Quadrature Encoder Interface (QEI).

UNIT - IV

TOOLS OF EMBEDDED SYSTEMS: Embedded Hardware and Various Building Blocks, Processor Selection for an Embedded System, I/O Devices and I/O Interfacing Concepts, Timer and Counting Devices, Design Cycle in the Development Phase for an Embedded System, Uses of In-Circuit Emulator (ICE), Use of Software Tools for Development of an Embedded System, Design Metrics of Embedded Systems – Low Power, High Performance, Engineering Cost, Time-To-Market.

UNIT - V

EMBEDDED COMMUNICATIONS PROTOCOLS: Serial Communication Basics, Synchronous/Asynchronous Interfaces (Like UART, SPI, and I2C), Baud Rate Concepts, Implementing and Programming UART, SPI and I2C, SPI Interface Using TM4C.Case Study: Tiva Based Embedded System Application using the Interface Protocols for Communication with External Devices “Sensor Hub Booster Pack”.

4. Books and Materials

Text Book(s)

1. Raj Kamal. *Embedded Systems,* 2nd Edition, Tata McGraw-Hill Education, 2011.
2. Jonathan W Valvano. *Introduction to ARM Cortex - M Microcontrollers*, 5th Edition, Create space Publications.

References

1. http://processors.wiki.ti.com/index.php/HandsOn_Training_for_TI_Embedded_Processors.
2. http://processors.wiki.ti.com/index.php/MCU_Day_Internet_of_Things_2013_Workshop.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30579 – THE JOY OF COMPUTING USING PYTHON

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	51	0	0	3	40	60	100

1. Course Description

Course Overview

"The Joy of Computing Using Python" is an engaging introduction to programming with Python, designed for beginners. The course covers fundamental concepts such as variables, control structures, functions, and data structures in a hands-on manner. Students will learn to write and debug code while exploring practical applications in problem-solving and data manipulation. Emphasis is placed on building computational thinking and fostering creativity through interactive projects. By the end, participants will have a solid foundation in Python and the confidence to tackle more advanced programming challenges. The course combines theoretical knowledge with practical exercises to ensure a well-rounded learning experience

Course Pre/corequisites

Basic Mathematics, Computer Operation

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30579.1: Demonstrate proficiency in Python basics, including variables, loops, and conditionals for simple applications.
A30579.2: Apply abstraction and problem-solving techniques to develop applications and games using Python.
A30579.3: Implement and analyze algorithms such as recursion and sorting in practical scenarios.
A30579.4: Handle and analyze data using techniques like image processing, sentiment analysis, and natural language processing.
A30579.5: Develop interactive and automated solutions, including browser automation and calendar manipulation, using Python.

3. Course Syllabus

UNIT-I

Motivation for Computing, Welcome to Programming!! Introduction to Anaconda, Spyder IDE, Variables and Expressions: Design your own calculator, Loops and Conditionals: Hopscotch once again, Lists Crowd computing, Permutations: Jumbled Words

UNIT-II

Abstraction Everywhere: Apps in your phone, Magic Square hit, Dobble game, Counting Candies: Crowd to the rescue Birthday, Guess the movie, Dictionaries, Sorting and Searching,

UNIT-III

Substitution Cipher: What's the secret!! Sentiment, Tic tac toe: Let's play, Recursions, Snakes and Ladders: Down the memory lane. Spiral Traversing, Track the route,

UNIT-IV

Tuples, Lottery Simulation, Image Processing, Anagrams, Sentiment Analysis: Analyse your Facebook data, Natural Language Processing, six degrees of separation: Meet your favourites Image, Calculation of the Area: Don't measure.

UNIT-V

Flames, Data Compression, Browser Automation, Fun with Calendar, Page Rank: How Google Works!!

4. Books and Materials

Textbook(s)

1. **Charles R. Severance.** *Python for Everybody: Exploring Data Using Python 3.* A beginner-friendly book that explains core Python concepts like variables, loops, conditionals, and functions. It also delves into topics such as web scraping, databases, and data visualization.
2. **Allen B. Downey.** *Think Python: How to Think Like a Computer Scientist.* An introductory textbook that emphasizes problem-solving and computational thinking, aligning well with beginner-level courses in Python.

Reference Book(s)

1. **Al Sweigart.** *Automate the Boring Stuff with Python.* A highly practical reference for automating everyday tasks like file management, web scraping, and working with Excel files using Python.
2. **John Zelle.** *Python Programming: An Introduction to Computer Science.* A more computer science-oriented introduction to Python that dives into computational theory and algorithms along with Python coding.
3. **Luciano Ramalho.** *Fluent Python: Clear, Concise, and Effective Programming.* A good reference for more advanced users, focusing on writing more Pythonic and efficient code.
4. **Mark Lutz.** *Learning Python.* A comprehensive book that covers the Python language in-depth. It's a good resource for beginners and intermediate programmers who want to dive deeper into the language.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30581 – BASIC DATA STRUCTURES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The aim of this course is to provide insight in organizing data types logically to access and configure the data. The concepts of linear and non-linear data structure algorithms are discussed. It improves the problem-solving ability of a learner to a great extent which can be applied in various fields of engineering.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (Cos)

After completion of the course, the student will be able to:

A30581.1 Analyze the time and space complexities of algorithms.

A30581.2 Apply various operations on linear data structures.

A30581.3 Design searching and sorting techniques for a given application.

A30581.4 Develop nonlinear programming for optimization techniques.

3. Course Syllabus

UNIT-I

Introduction and Overview: Definition, concepts of data structures, overview and implementation of data structures.

UNIT-II

Linear Data Structures: Stacks- Introduction, definition, representation of stack, operations on stacks, applications of stacks, queues- introduction, definition, representations of queues, various queue structures, applications of queues.

UNIT-III

Linked lists: Definition, single linked list, circular linked list, double linked list, circular double linked list, application of linked lists.

UNIT-IV

Sorting and Searching: Sorting- Bubble sort, selection sort, insertion sort, merge sort, quick sort, time complexity. Searching - sequential search, binary search, time complexity.

UNIT-V

Trees and Graphs: Trees- Examples, vocabulary and definitions, binary tree applications, tree traversals, binary search trees. Graphs- vocabulary and definitions, applications: BFS and DFS.

4. Books and Materials

Text Book(s)

1. Debasis Samanta, *Classic Data Structures*, 2nd edition, PHI, 2014.

Reference Book(s)

1. G A Vijaya lakshmi Pai, *Data Structures and Algorithms*, TMH, 2008.
2. Horowitz, Sahni and Anderson Freed, *Fundamentals of Data Structures in C*, 2nd edition, Universities Press, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30582 – FUNDAMENTALS OF DBMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course enlightens the learners with the fundamentals of database and its applications. It covers various data models, Entity Relationship diagrams, SQL queries and indexing techniques. The learners of this course can choose the domain of Data Engineering and can opt their carrier path in database administration or data analytics.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

A30582.1 Apply suitable data models for given application.

A30582.2 Design database using integrity constraints and ACID properties.

A30582.3 Construct optimized SQL queries to solve real time problems.

A30582.4 Apply suitable normal form to eliminate data redundancy.

A30582.5 Choose appropriate index structure to improve performance.

3. Course Syllabus

UNIT-I

Introduction: Basics of database system applications, principle of database systems, view of data - data abstraction, instances and schemas, data models, database Languages - DDL, DML, ER diagrams.

UNIT-II

Relational Model: Fundamentals of relational model - Integrity constraints over relations, enforcing integrity constraints, querying relational data, logical data base design, views, ACID properties.

UNIT-III

SQL: Basic SQL queries, introduction to sub queries, correlated sub queries, set - comparison operators, aggregate operators, NULL values, logical operators, joins.

UNIT-IV

Normalizations: Redundancy issues, decompositions, functional dependencies, various normal forms.

UNIT-V

Data on External Storage: File organization and various indexing structures.

4. Books and Materials

Text Book(s)

1. Raghurama Krishnan, *Johannes Gehrke, Database Management Systems,* McGraw-Hill Education, 3rd edition, 2014.

Reference Book(s)

1. A. Silberschatz, H.F. Korth, Sudarshan, *Database System Concepts*, McGraw Hill, 6th edition, 2012.
2. Ramez Elmasri, Shamkat B. Navathe, *Database Systems,* Pearson Education, 6th edition 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30583 – BASICS OF SOFTWARE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course deals with engineering principles and programming languages applied in software development. These principles include analyzing user requirements, designing, building, and testing software. The knowledge acquired through this course is used to handle big projects efficiently with minimizing cost and reduced complexity.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30583.1 Apply the phases of software development life cycle in application development.

A30583.2 Identify software requirements for construction.

A30583.3 Design requirement engineering process for change management.

A30583.4 Apply the design concepts for design models.

A30583.5 Construct the various testing techniques for software systems.

3. Course Syllabus

UNIT-I

Introduction: Software engineering and process models: Introduction, changing nature of software, software myths.

UNIT-II

Process Models: Waterfall model, incremental process models, evolutionary process models, the unified process, agile process models.

UNIT-III

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, the software requirements document.

UNIT-IV

Requirement Engineering Process: Feasibility studies, requirements elicitation and analysis, requirement validation, requirement management.

UNIT-V

Design: Design process and design quality, design concepts-abstraction, information hiding, functional independence, refactoring, modularity, refinement, design classes, design model.

Testing: Testing strategies-A strategic approach to software testing, test strategies for conventional software, white box testing, black box testing, validation testing, system testing.

4. Books and Materials

Text Book(s)

1. Roger S. Pressman, *Software Engineering*, A Practitioner's Approach, McGraw Hill, International Edition, 8th edition, 2015.

Reference Book(s)

1. Sommerville, *Software Engineering*, Pearson education, 7th edition, 2008.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30584 – PYTHON FOR EVERYONE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The aim of this course is to provide the fundamentals of Python language. It covers data types, operators, control statements, data structures, functions, modules, exception handling and file handling concepts. This course helps the student in selecting a domain path leading to software engineering in the segment of Artificial intelligence, Data Science and IoT.

Course Pre/Corequisites

The course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30584.1 Apply the basic constructs of Python to solve problems.

A30584.2 Organize lists, tuples and dictionaries appropriately to solve complex problems.

A30584.3 Build functions to increase code reusability.

A30584.4 Implement modular programming for organized software development.

A30584.5 Make use of exception handling for robust programming.

3. Course Syllabus

UNIT-I

Introduction to python programming: History of python, basics, python character set, tokens, data types, input and output functions, formatting numbers and strings, operators.

Control statements: Decision making statements, loop control statements, nested loops, break and continue statements.

UNIT-II

Data Structures: Sequence, lists, tuples, sets, dictionaries. Functional programming: filter (), map (), reduce (), python strings.

UNIT-III

Functions- Basics of functions, syntax, local and global scope of a variable, Recursions, lambda functions, parameters and arguments in functions.

UNIT-IV

Modules: The from…import statement, making your own modules, dir() function, the python module, modules and namespaces, packages, standard library modules.

UNIT-V

Exceptions: Introduction, handling exceptions, multiple except blocks, else clause, raising exceptions, finally block, re-raising exception.

File Handling: Introduction, need of file handling, text input and output files, seek function, binary files, extracting data from a file.

4. Books and Materials

Text Book(s)

1. Ashok Namdev Kamthane, Amit Ashok Kamthane, *Programming and problem solving with python,* McGraw-Hill Education, 2018.

Reference Book(s)

1. Martin C.Brown, *The Complete Reference: Python*, McGraw-Hill, 2018.
2. Reema Thareja, *Python programming using problem solving approach*, Oxford, 2019.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30585 – COMPUTER ORGANISATION AND OPERATING SYSTEMS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course is a combination of computer organization and operating system concepts. It provides the concepts of Computer Architecture and Organization which focuses on register transfers, micro-operations and computer arithmetic concepts. Operating Systems covers the basic operating system abstractions, mechanisms, and their implementations. The learner of this course can choose his/her carrier as system architect or as system programmer.

Course Pre/Corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the student will be able to:

A30585. 1 Analyze the fundamentals of computer organization in designing a system.

A30585.2 Apply the concepts of programming language to solve system problems.

A30585.3 Make use of the Operating Systems design structure and its services for system programming.

A30585.4 Develop Process Scheduling algorithms and Inter-Process Communication systems for resource management.

A30585.5 Classify memory management techniques and virtual memory mechanisms for apt implementations.

3. Course Syllabus

UNIT-I

Basic Computer Organization and Design: Instruction codes, computer registers, computer instructions, timing and control, instruction cycle, memory reference instructions, input/output and interrupt, complete computer description, design of basic computer.

UNIT-II

Programming the Basic Computer: Introduction, machine language, assembly language, the assembler, programming arithmetic and logic operations.

UNIT-III

Operating Systems: Introduction, What operating systems do, operating system -structure, operations, services, user operating system interface, system calls, types of system calls.

UNIT-IV

Process Management: Process concept, process scheduling, scheduling criteria, scheduling algorithms, operations on processes, inter process communication, examples of IPC systems, process synchronization, critical section problem, semaphores, and monitors.

UNIT-V

Memory Management: Main memory-background, swapping, contiguous memory allocation, segmentation, paging, virtual memory-background, demand paging, page replacement, allocation of frames.

Deadlocks: System model, deadlock characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock.

4. Books and Materials

Text Book(s)

1. M. Morris Mano, *Computer system architecture*, Pearson Education, 5th edition, 2016.

Reference Book(s)

1. Willam Stallings, *Computer Organization and Architecture Designing for Performance*, Pearson, PHI, 6th edition, 2010.
2. Silberschatz, Galvin and Gagne, *Operating System Concepts*, 9th edition, 2013, Wiley India edition.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30587 – FUNDAMENTALS OF WEB TECHNOLOGIES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course makes the students to practice the principles of creating an effective web page and learn the language of the web with HTML and CSS. It Develop skills in analysing the usability of a web site and how to plan and conduct user research related to web usability.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30587.1 Apply the principles of creating an effective web page.

A30587.2 Apply the elements of design with regard to the web.

A30587.3 Create the language of the web: HTML and CSS.

A30587.4 Develop skills in analyzing the usability of a web site.

A30587.5 Understand how to plan and conduct user related to web usability.

3. Course Syllabus

UNIT-I

BASICS IN WEB DESIGN: Brief History of Internet, What is World Wide Web, Why create a web site and Standards, Public demand requirement.

UNIT-II

WEB DESIGN PRINCIPLES: Basic principles involved in developing a web site, Planning Process, rules of web designing, Page design, Home Page Layout and Design Concept.

UNIT-III

INTRODUCTION TO HTML: Introduction to HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags and Heading-Paragraphs

UNIT-IV

INTRODUCTION TO ELEMENTS OF HTML: Working with Text, Working with Lists, Tables and Frames Working with Hyperlinks, Images and Multimedia, Forms and controls.

UNIT-V

INTRODUCTION TO CASCADING STYLE SHEETS: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts) and block elements and objects, Lists and Tables CSS Id and Class, Box Model.

4. Books and Materials

Text Book(s)

1. Deitel and Deitel and Nieto, *Internet and World Wide Web - How to Program*, Prentice Hall, 5th Edition, 2015.

Reference Book(s)

1. Chris Bates, *Web Programming – Building Intranet Applications*, 3r Edition, Wiley Publications, 2014.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30588 – INTRODUCTION TO JAVA PROGRAMMING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course makes the students to study the syntax, semantics and features of Java Programming Language. Learn the method of creating Multi-threaded programs and handle exceptions. Learn Java features to create GUI applications & perform event handling exceptions.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30588.1 Analyze the necessity for Object Oriented Programming paradigm over structured programming and become familiar with the fundamental concepts in OOP like encapsulation, Inheritance and Polymorphism.

A30588.2 Demonstrate an ability to design and develop java programs, analyze, and interpretobject oriented data and report results.

A30588.3 Demonstrate an ability to design an object oriented system, swing components andmultithreaded processes as per needs and specifications.

A30588.4 Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications both for standalone and Applets programs.

A30588.5 Demonstrate skills to use latest object oriented programming language and software toanalyze OOP problems.

A30588.6 Develop confidence for self-education and ability for life-long learning needed foradvanced java technologies.

3. Course Syllabus

UNIT-I

The History and Evolution of Java:

Java‟s Lineage, The Creation of java, how java changed the internet, **Java's magic:** The byte code, **Servlets:** java on the server side, java Buzzwords, Evolution of java.

An Overview of Java:

Object Oriented Programming, Two control statements, Using blocks of codes, Lexical issues,The java class Libraries.

Data Types, Arrays and Variables:

UNIT-II

Operators:

Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logic operators, The assignment operator, The ? Operator, Operator Precedence, Using Parentheses.

Control Statements:

Java‟s selection Statements, Iteration statements, Jump Statements.

Introducing Classes:

Class Fundamentals, Declaring Objects, Assuming Object reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The Finalize() method, A

Stack class. Overloading Methods, Using Object as Parameter, Argument Passing, Returning Objects, Recursion, Introducing Access control, Understanding static, Introducing Nested and Inner classes, Exploring the String class, Using Command line Arguments, Varargs: variable- Length Arguments.

UNIT-III

Inheritance:

Basics, Using super, creating a multi-level hierarchy, when constructors are executed, method overriding, dynamic method dispatch, using abstract class, using final with inheritance, the objectclass.

Packages and Interfaces: Packages, Access protection, Importing Packages, Interfaces, Default Interfaces, Default interface methods, Use static methods in an Interface, Final thoughts on Packages and interfaces.

Exception Handling: Exception handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch clauses, Nested try statements, throw, throws, finally, Java Built-in Exceptions, Creating your own exception subclasses, Chained Exceptions, Three Recently added Exceptions features, Using Exceptions.

UNIT-IV

Multithreaded Programming:

The java Thread Model, The main thread , Creating Thread, Creating Multiple Threads, Using isAlive() and join(), Thread Priorities, Synchronization, Interthread Communication, Suspending, resuming and stopping threads, Obtaining a thread state, Using Multithreading.

Input and Output operations:

I/O basics, Reading Console input, Writing console Output, The PrintWriter class, Reading andwriting files, Automatically closing a file.

UNIT-V

Introducing Swing: The Origins of Swing, Two Key Swing Features, Components and Containers, The Swing Packages, A Simple Swing Application, Event Handling, Create a SwingApplet.

Exploring Swing: JLabel and ImageIcon, JTextField, The Swing Buttons, JScrollPane, JList,JComboBox, JTree, JTable.

4. Books and Materials

Text Book(s)

1. ”Java The Complete Reference”, Herbert Schildt, MC GRAW HILL Education, 9th Edition,2016.

Reference Book(s)

1. “Programming with Java” T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan PearsonEdition.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30589 - SOCIAL NETWORK ANALYSIS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course mainly describes about social network and semantic web which are used to learn knowledge representation using ontology and also understand human behavior in social web and related communities. covering theoretical foundations, research design, data collection techniques, methods for the analysis and visualization of network data, and statistical modelling of networks.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30589.1 To understand the concept of semantic web and related applications.

A30589.2 To learn knowledge representation using ontology.

A30589. 3 understand human behavior in social web and related communities.

A30589.4 To learn visualization of social networks.

A30589.5 To have access to a variety of descriptive measures for networks and software to calculate them, and have the ability to interpret the results.

3. Course Syllabus

UNIT I

Introduction to colab, NetworkX - Part I: Where is the similarity, Online SocialMedia, Network Measures Degree Distribution, Cumulative Degree Distribution, Power law Graph Preliminaries, Clusters in Social Network Analysis Types of Clusters, Connected Components Centrality PageRank, Hub & Authority Assortative Mixing, Transitivity, Reciprocity, Measuring Structural Equivalence, Degeneracy.

Introduction to NetworkX - Part II: Rise of Online Social Networks, Synthetic Networks, Properties of Real-World Networks, Small-world Property Synthetic Networks, Erdos-Renyi Networks Regular Ring Laticce Network model, Watts-Strogatz Network Model Barabasi-Albert Network Model Prices Network Model.

UNIT II

Preferencial Attachment Model, Vertex Copying Model, Other Models-Local-World Network Growth Model, Network Model with Accelarating Growth, Short-Term Memory Preferential Attachment

Mechanism ,What are links,Link Analysis,Balance Theory, Signed Networks,Interpersonel Ties, Strength of tie, Triadic Closure, Quantifying Strength, Clustering Co-efficient, Dunbar Number, Bridges,Page Rank,DivRank,SimRank, Heterogeneous Network, PathSim,Homophily in the Society,Communities in a network, Community Detection in Network, Community Structure,Types of Communities,Cut, Types of Cuts, Edge Betweenness,Community Detection.

UNIT III

Permaence and Communiuty Detection,Clique Percolation Method, Link Partition Method,BigClam,Evaluvation of Community Detection Methods,Label Propagation,Asynchronous Label Propagation, Synchronous Label Propagation, Local Community Detection,Detection Methods,Temporal changes in a network, Link Prediction-Application Areas,Link Prediction,Evaluating Link Prediction, Confusion Matrix,Link Prediction Methods:Local Heuristic,Global Heuristic,Probabilistic Models,Supervised Random Walk.

UNIT IV

Information Diffusion:Cascade Model: Decision Based Cascade Model,Cascade in Infinite Chain Model: Generic Model,Generic Model: Case Study,Probabilistic Cascade Model,Compartmental Model of Epidemiology,Analysing Romour Spread: SEIZ Model,Independent Cascade Model,Graph Based Anaomoly Detection: Introduction,Outline,Static Graphs,Static Attributed Graphs,Dynamic Graphs,Deep Learning: Introduction, McMculloch Pitts Neuron, Perceptron Learning Algorithm,Feed Forward Netwrok, Back Propogation,Convolution Nueural Network, Recurrent Neural Network,Mchine Learning Pipelines, Graph Representation Learning,GRL Metod Categories,Matrix Factorisation based GRL Method,Higher Order Proximity Preserved Embedding.

UNIT V

LINE: Large Scale Information Network Embedding,Random Walk Based Methods, Deep walk,Graph Convolution Network, Variations of GCN,SAN Tutorial,Model A Problem Using Networks, Malicious Activities on online Social Networks,Sockpuppets on online Social Networks,Shortcut to become popular on social media,Modelling the spread of COVID-19 Pandemic-SIR Model,Types of Recommender Systems.

TEXT BOOKS:

1. Peter Mika, —Social Networks and the Semantic Web, First Edition, Springer 2007.

2. Borko Furht, —Handbook of Social Network Technologies and Applications, 1st

Edition, Springer, 2010

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33147-AGILE METHODOLOGIES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provide the students with a theoretical as well as practical understanding of agile software development practices and how small teams can apply them to create high-quality software, good understanding of software design and a set of software technologies and APIs, to do a detailed examination and demonstration of Agile development and testing techniques, understand the benefits and pitfalls of working in an Agile team and Agile development and testing.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Realize the importance of interacting with business stakeholders in determining the requirements for a software system
2. Perform iterative software development processes: how to plan them, how to execute them.
3. Point out the impact of social aspects on software development success.
4. Develop techniques and tools for improving team collaboration and software quality.
5. Perform Software process improvement as an ongoing task for development teams.
6. Show how agile approaches can be scaled up to the enterprise level.

3. Course Syllabus

UNIT I AGILE METHODOLOGY

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II AGILE PROCESSES

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT

Agile Information Systems – Agile Decision Making - Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment , Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile – Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development

4. Books and Materials

Text Book(s)

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results‖, Prentice Hall, 2003.
2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science‖, Springer, 2009.

Reference Book(s)

1. Craig Larman, —Agile and Iterative Development: A Manager_s Guide‖, Addison-Wesley, 2004.
2. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management‖, Butterworth-Heinemann, 2007.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33148-HUMAN COMPUTER INTERACTION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of foundations of Human Computer Interaction, can familiar with the design technologies for individuals and persons with disabilities, aware of mobile Human Computer interaction.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Understand the structure of models and theories of human computer interaction and vision.
2. Understand the usability engineering models
3. Understand the cognitive models in user interface
4. Apply the user interface for mobile ecosystem
5. Design an interactive web interface on the basis of models studied.
6. Apply speech recognition and multimodal system

3. Course Syllabus

UNIT I:

Human: I/O channels – Memory – Reasoning and problem solving; The computer: Devices –Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms.

UNIT II:

Interactive Design basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process – software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules – principles, standards, guidelines, rules. Evaluation Techniques – Universal Design.

UNIT III:

Cognitive models –Socio-Organizational issues and stake holder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT IV:

Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools.

UNIT V:

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow. Case Studies.

Recent Trends: Speech Recognition and Translation, Multimodal System

4. Books and Materials

Text Book(s)

1. David 1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, “Human Computer Interaction”, 3rd Edition, Pearson Education, 2004
2. Brian Fling, “Mobile Design and Development”, First Edition , O Reilly Media Inc., 2009

Reference Book(s)

1. Bill Scott and Theresa Neil, “Designing Web Interfaces”, First Edition, O’Reilly, 2009.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33149-AI FOUNDATIONS FOR EVERYONE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of Artificial Intelligence, machine learning environment, searching Technique for Problem Solving, Natural Language Processing and Robotics

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Apply searching techniques for solving a problem
2. Design Intelligent Agents
3. Develop Natural Language Interface for Machines
4. Design mini robots
5. Summarize past, present and future of Artificial Intelligence

3. Course Syllabus

UNIT-I Introduction

Introduction: What is AI, Foundations of AI, History of AI, The State of Art.Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT-II Solving Problems by searching

Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

UNIT-III Reinforcement Learning & Natural Language Processing

Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

UNIT-IV Natural Language for Communication

Natural Language for Communication: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

UNIT-V Robotics

Robotics: Introduction, Robot Hardware, Robotic Perception, Planning to move, Planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.

4. Books and Materials

Text Books

1.Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rdEdition, Pearson Education, 2019.

Reference Books

1.Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.

2.Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33150- INTRODUCTION TO DATA SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of concepts, techniques and tools they need to deal with various facets of data science, practice, including data collection and integration, basic types of data and basic statistics. Identify the importance of data reduction and data visualization techniques

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Understand basic terms what Statistical Inference means.
2. Identify probability distributions commonly used as foundations for statistical modelling. Fit a model to data
3. describe the data using various statistical measures
4. utilize R elements for data handling
5. perform data reduction and apply visualization techniques.

3. Course Syllabus

UNIT - I

Introduction: Definition of Data Science- Big Data and Data Science hype – and getting past the hype - Datafication - Current landscape of perspectives - Statistical Inference - populations and samples - Statistical modeling, probability distributions, fitting a model – Over fitting. Basics of R: Introduction, REnvironment Setup, Programming with R, Basic Data Types.

UNIT - II

Data Types & Statistical Description

Types of Data: Attributes and Measurement, What is an Attribute? The Type of an Attribute, The Different Types of Attributes, Describing Attributes by the Number of Values, Asymmetric Attributes,Binary Attribute, Nominal Attributes, Ordinal Attributes, Numeric Attributes, Discrete versus Continuous Attributes. Basic Statistical Descriptions of Data: Measuring the Central Tendency: Mean, Median, and Mode, Measuring the Dispersion of Data: Range, Quartiles, Variance, Standard Deviation, and Interquartile Range, Graphic Displays of Basic Statistical Descriptions of Data.

UNIT - III

Vectors: Creating and Naming Vectors, Vector Arithmetic, Vector sub setting, Matrices: Creating and Naming Matrices, Matrix Sub setting, Arrays, Class. Factors and Data Frames: Introduction to Factors: Factor Levels, Summarizing a Factor, Ordered Factors, Comparing Ordered Factors, Introduction to Data Frame, subsetting of Data Frames, Extending Data Frames, Sorting Data Frames.Lists: Introduction, creating a List: Creating a Named List, Accessing List Elements, Manipulating List Elements, Merging Lists, Converting Lists to Vectors

UNIT - IV

Conditionals and Control Flow: Relational Operators, Relational Operators and Vectors, Logical Operators, Logical Operators and Vectors, Conditional Statements. Iterative Programming in R: Introduction, While Loop, For Loop, Looping Over List. Functions in R: Introduction, writing a Function in R, Nested Functions, Function Scoping, Recursion, Loading an R Package, Mathematical Functions in R.

UNIT - V

Data Reduction: Overview of Data Reduction Strategies, Wavelet Transforms, Principal Components Analysis, Attribute Subset Selection, Regression and Log-Linear Models: Parametric Data Reduction, Histograms, Clustering, Sampling, Data Cube Aggregation. Data Visualization: Pixel-Oriented Visualization Techniques, Geometric Projection Visualization Techniques, Icon-Based Visualization Techniques, Hierarchical Visualization Techniques, Visualizing Complex Data and Relations.

4. Books and Materials

TEXT BOOKS:

1. Doing Data Science, Straight Talk from The Frontline. Cathy O'Neil and Rachel Schutt, O'Reilly, 2014
2. Jiawei Han, Micheline Kamber and Jian Pei. Data Mining: Concepts and Techniques, 3rd ed. The Morgan Kaufmann Series in Data Management Systems.
3. K G Srinivas, G M Siddesh, "Statistical programming in R", Oxford Publications.

REFERENCE BOOKS:

1. Introduction to Data Mining, Pang-Ning Tan, Vipin Kumar, Michael Steinbanch, Pearson Education.
2. Brain S. Everitt, "A Handbook of Statistical Analysis Using R", Second Edition, 4 LLC, 2014.
3. Dalgaard, Peter, "Introductory statistics with R", Springer Science & Business Media, 2008.
4. Paul Teetor, "R Cookbook", O'Reilly, 2011

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33545- AD HOC AND WIRELESS SENSOR NETWORKS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of Ad-hoc & Sensor Networks, various fundamental and emerging protocols of all layers, issues pertaining to major obstacles in establishment and efficient management of Ad-hoc and sensor networks, nature and applications of Ad-hoc and sensor networks, various security practices and protocols of Ad-hoc and Sensor Networks.

Course Pre/Corequisites

Computer networking concepts

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Identify different issues in wireless ad hoc and sensor networks.
2. To analyze protocols developed for ad hoc and sensor networks.
3. To identify and address the security threats in ad hoc and sensor networks.
4. Establish a Sensor network environment for different type of applications.

3. Course Syllabus

UNIT I -MAC & TCP IN AD HOC NETWORKS

Fundamentals of WLANs, IEEE 802.11 Architecture, Self-configuration and Auto configuration, Issues in Ad-Hoc Wireless Networks, MAC Protocols for Ad-Hoc Wireless Networks,Contention Based Protocols-TCP over Ad-Hoc networks, TCP protocol overview-TCP and MANETs, solutions for TCP over Ad-Hoc Networks.

UNIT II-ROUTING IN AD HOC NETWORKS

Routing in Ad-Hoc Networks, Introduction, Topology based versus Position based Approaches, Proactive, Reactive, Hybrid Routing Approach, Principles and issues ,Location services,DREAM ,Quorums based location service, Grid–Forwarding strategies, Greedy packetforwarding ,Restricted directional flooding, Hierarchical Routing, Issues and Challenges inproviding QoS.

UNIT III-MAC, ROUTING & QOS IN WIRELESS SENSOR NETWORKS

Introduction, Architecture, Single node architecture, Sensor network design considerations ,Energy Efficient Design principles for WSNs, Protocols for WSN, Physical Layer : Transceiver Design considerations, MAC Layer Protocols ,IEEE802.15.4 Zigbee, Link Layer and Error Control issues-Routing Protocols, Mobile Nodes and Mobile Robots, Data Centric & ContentionBased Networking ,Transport Protocols & QOS, Congestion Control issues ,Application Layersupport.

UNIT IV -SENSOR MANAGEMENT

Sensor Management, Topology Control Protocols and Sensing Mode Selection Protocols, Time synchronization, Localization and positioning, Operating systems and Sensor Networkprogramming, Sensor Network Simulators.

UNIT V -SECURITY IN AD HOC AND SENSOR NETWORKS

Security in Ad-Hoc and Sensor networks, Key Distribution and Management, Software based Anti-

tamper techniques, water marking techniques, Defence against routing attacks, Secure Adhoc routing protocols, Broadcast authentication WSN protocols, TESLA, Biba, Sensor NetworkSecurity Protocols, SPINS.

4. Books and Materials

TEXT BOOKS:

1) Adrian Perrig, J. D. Tygar, "Secure Broadcast Communication: In Wired and Wireless Networks", Springer, 2006.
2) Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc and Sensor Networks: Theory and Applications (2nd Edition), World Scientific Publishing, 2011.
3) C.Siva Ram,Murthy and B.S.Manoj, “Ad Hoc Wireless Networks–Architectures and Protocols”, Pearson Education, 2004.

REFERENCE BOOKS:

1) C.K.Toh, “Ad Hoc Mobile Wireless Networks”, Pearson Education, 2002.
2) Erdal Çayırcı , Chunming Rong, “Security in Wireless Ad Hoc and Sensor Networks”, John Wiley and Sons, 2009

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33546- ETHICS IN INFORMATION TECHNOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge about professional ethics and understand Organizational culture and Climate, impact of IT Profession, software development Cyber laws and regulations in society. Familiarize with standards, policies, procedures and controls for Information Security Management.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. understand professional ethics and organizational culture conduct in information technology.
2. choose various leadership styles and the suitability for the specific organization
3. identify the possible Computer crimes and the rules and regulations for protection.
4. describe the various types of IPR and the procedures for obtaining IPR
5. explain the various types of Social Networking and issues
6. relate to the different national and international organizational models with intellectual ability.

3. Course Syllabus

UNIT 1: Overview of Professional Ethics

Professional Ethics - Big Picture View - Organizational Culture and Climate- Senses of 'EngineeringEthics-Leadership theories: Transactional, Transformational, charismatic leadership, situationalleadership-Participative style of management- Engineers as Managers - Concept of Continuousimprovement- PDCA Cycle- Suggestion Schemes and Quality circles

UNIT 2: Cyber-Crimes and Cyber Laws

Ethics for IT Workers and IT Users-IT Professionals-IT professional malpractice-IT , IT Act cyber laws - Information Technology Act, 2000 ("IT Act") - Digital Signature - Confidentiality, Integrity and Authenticity (CIA)

UNIT 3: Intellectual Property Rights

Key Issues-Intellectual Property - Software CopyRights- Patents- Patentable Software related Products- IPR Procedures- Patent Application, Publication, examination, awarding

UNIT 4: Software Development and Information Technology

Strategies to Engineer Quality Software-Key Issues in Software Development- The impact of IT onthe Standard of Living and Productivity -Industry 4.0 standards and applications in areas like Food,Water, Energy and Health care

UNIT 5: Social Networking, Ethics of Information Technology OrganizationsSocial Networking Web Site - Business Applications of Online Social Networking-Social NetworkingEthical IssuesOnline Virtual Worlds-Key ethical issues for Organizations- Outsourcing-WhistleBlowing-Green Computing-ICT

Industry Code for Conduct.

4. Books and Materials

Text Book:

1. George Reynolds, “Ethics in Information Technology”, CENGAGE Learning Fourth Edition, 2012. ISBN: 9788131518755, 8131518752

Reference Books:

1. Richard A. Spinello, “Case Studies in Information Technology Ethics”, Prentice Hall, Second Edition, 2003. ISBN:978-0130991508.

2. Sara Base, “A Gift of Fire:social, legal, and ethical issues for computing and the Internet”, Prentice Hall, Second Edition, 2008, ISBN: 978-0132492676

3. IT Act https://indiacode.nic.in/bitstream/123456789/1999/3/A2000-21.pdf

4. IPR in India Laws and Procedures: https://www.india-briefing.com/news/intellectualproperty-rights-india-laws-procedures-registration-14312.html/

5. Industry 4.0 the Fourth Industrial Revolution https://www.i-scoop.eu/industry-4-0/

6. ISMS Policy Oil India https://oilweb.oilindia.in/policy/Information_Security_Polciy_2013.pdf

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33547 - DRONE TECHNOLOGIES

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge about the basics of drone concepts, fundaments of design, fabrication and programming of drone, flying and operation of drone, various applications of drone, safety risks and guidelines of fly safely.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Analyze the impact of drone technology on various businesses.
2. Compare and contrast different methods of programming a drone.
3. Identify the various flight controls and management tools used in drone operation.
4. Utilize drones effectively in insurance inspections and claim assessments.
5. Design and implement safety protocols for operating drones in various scenarios.

3. Course Syllabus

UNIT I-INTRODUCTION TO DRONE TECHNOLOGY

Drone Concept - Vocabulary Terminology- History of drone - Types of current generation of drones based on their method of propulsion- Drone technology impact on the businesses- Drone business through entrepreneurship- Opportunities/applications for entrepreneurship and employability

UNIT II-DRONE DESIGN, FABRICATION AND PROGRAMMING

Classifications of the UAV -Overview of the main drone parts- Technical characteristics of the parts - Function of the component parts -Assembling a drone- The energy sources- Level of autonomy- Drones configurations -The methods of programming drone- Download program - Install program on computer- Running Programs- Multi rotor stabilization- Flight modes -Wi-Fi connection.

UNIT III-DRONE FLYING AND OPERATION

Concept of operation for drone -Flight modes- Operate a small drone in a controlled environment- Drone controls Flight operations –management tool –Sensors-Onboard storage capacity -Removable storage devices- Linked mobile devices and applications

UNIT IV-DRONE COMMERCIAL APPLICATIONS

Choosing a drone based on the application -Drones in the insurance sector- Drones in delivering mail, parcels and other cargo- Drones in agriculture- Drones in inspection of transmission lines and power distribution -Drones in filming and panoramic picturing

UNIT V-FUTURE DRONES AND SAFETY

The safety risks- Guidelines to fly safely -Specific aviation regulation and standardization- Drone license- Miniaturization of drones- Increasing autonomy of drones -The use of drones in swarms

4. Books and Materials

Text Book:

Editor(s):Sachi Nandan Mohanty, J.V.R. Ravindra, G. Surya Narayana, Chinmaya Ranjan Pattnaik, Y. Mohamed Sirajudeen

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A33548 -COMPUTER COMMUNICATION NETWORKS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview:

This course provide the students with knowledge of data communication and networking, comprehend the layering architecture of OSI reference model and TCP/IP protocol suite, different protocols associated with each layers.

Course Pre/Corequisites

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2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

1. Understand the components and layered architecture of communication networks
2. Identify the protocols and services of data link layer.
3. Analyze the different LAN technologies for building networks.
4. Describe the wireless WAN technologies for wireless transmission.
5. Design network model and determine the routing protocols for different applications.
6. Construct communication networks for supporting different applications

3. Course Syllabus

Unit I :Physical Layer

Uses of Computer Networks – Network Hardware – Network Software – Reference Models – Example Networks – Example Data Communication Services – Network Standardization –The Theoretical Basis for Data Communication – Transmission Media – WirelessTransmission – The Telephone System – Narrow band ISDN , Broadband ISDN and ATM –Cellular Radio – Communication Satellites

Unit II :Data Link Layer

Data Link Layer Design Issues – Error Detection and Correction – Elementary Data Link Protocols – Sliding Window Protocols – Protocol Specification and Verification – Example Data Link Protocols – The Channel Allocation Problem – Multiple Access Protocols – IEEE Standard 802 for LANS and MANS – Bridges – High Speed LANS – Satellite Networks

Unit III :Network Layer

Network Layer Design Issues – Routing Algorithms – Congestion Control Algorithms –Internetworking – The Network Layer in the Internet – The Network Layer in ATM Networks Transport LayerTransport Service – Elements of Transport Protocols – A simple transport protocol – TheInternet Transport Protocols (TCP and UDP) – The ATM AAL Layer Protocols – Performance Issues

Unit IV : Application Layer

Network Security – Domain Name System (DNS) – Simple Network Management Protocol (SNMP) – Electronic Mail – Usenet News – The World Wide Web – Multimedia

Unit V :ATM Networks

Introduction - ATM – Historical perspective – protocol architecture – logical connectives – cells – transmission of ATM cells – SDH – SONET – Switches. ATM Protocol – Connection setup – routing , switching

4. Books and Materials

Text Book(s)

1. Andrew S.Tanenbaum , Computer Networks, Prentice Hall of India ,1997
2. Rainer Handel, Manfred N.Huber, Stefan Schroder, "ATM Networks", Addison Wesley, 1999.

Reference Book(s)

1. W.Stallings ,Data and Computer Communication, Prentice Hall of India ,New Delhi,
Fourth Edition ,1996
2. F.Halsai ,Data Communications, Computer Networks and Open Systems, Addison Wesley Publications , Third Edition ,1994.
3. Peterson, Computer Networks, Second edition.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30081 – RESEARCH METHODOLOGY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of this course is to have a general understanding of statistics as applicable to business and its use in areas of engineering research. The Course addresses the methods of research with an emphasis on various stages that are necessary to obtain and process information to enable well informed decision-making. It allows the students to grasp and comprehend the methods and techniques used in research and provide with the knowledge and skill to undertake research.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30081.1 Interpret the importance of literature survey to identify the research problem.

A30081.2 Develop suitable research methodologies to conduct engineering research.

A30081.3 Apply the principles of research to gather the required data from various sources.

A30081.4 Evaluate the gathered data by using appropriate statistical techniques.

A30081.5 Prepare and present the research report effectively with the help of visual aids.

3. Course Syllabus

UNIT-I

Research Methodology: Objectives and motivation of research, types of research, research approaches, significance of research, research methods verses methodology, research and scientific method, important of research methodology, research process, criteria of good research, problems encountered by researchers in India, benefits to the society in general, defining the research problem: definition of research problem, problem formulation, necessity of defining the problem, technique involved in defining a problem.

UNIT-II

Literature Survey: Importance of literature survey, sources of information, assessment of quality of journals and articles, information through internet. Literature review: need of review, guidelines for review, record of research review.

UNIT-III

Research Design: Meaning of research design, need of research design, feature of a good design important concepts related to research design, different research designs, basic principles of experimental design, developing a research plan, design of experimental set-up, use of standards and codes.

UNIT-IV

Data Collection: Collection of primary data, secondary data, data organization, methods of data grouping, diagrammatic representation of data, graphic representation of data. Sample designed for sampling, some important sampling definitions, estimation of population, role of statistics for data analysis, parametric v/s non-parametric methods, descriptive statistics, measures of central tendency and dispersion, hypothesis testing, use of statistical software. Data analysis: deterministic and random data, uncertainty analysis, tests for significance: chi-square, student's t-test, regression modeling, direct and interaction effects, anova, F-test, time series analysis, autocorrelation and autoregressive modeling.

UNIT-V

Research Report Writing: Format of the research report, synopsis, dissertation, thesis its differentiation, references/bibliography/webliography, technical paper writing/journal report writing, making presentation, use of visual aids. Research proposal preparation: writing a research proposal and research report, writing research grant proposal.

4. Books and Materials

Text Book(s)

1. O.R Krishnaswami and M. Ranganatham, *Methodology of Research in Social Sciences,* Mumbai: Himalaya Publishing House, ISBN 81-8318-454-5, 2005.

Reference Book(s)

1. C.R Kothari, *Research Methodology, Methods & Technique*; Hyderabad: New Age International Publishers, 2004.
2. R. Ganesan, *Research Methodology for Engineers*, New Delhi: MJP Publishers, 2011.
3. Ratan Khananabis and SuvasisSabha, *Research Methodology*, Universities Press, Hyderabad, 2015.
4. Y. P. Agarwal, *Statistical Methods: Concepts, Application and Computation*, Sterling Publications Pvt., Ltd., New Delhi, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30082 – INTELLECTUAL PROPERTY RIGHTS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of the course is to have a general understanding of the basics of Intellectual Property Rights, Copy Right Laws, Trade Marks and Issues related to Patents. The Course addresses the means of innovations with an emphasis on trade secret that are necessary to obtain IPR through protect their innovations. It also encourages the students to take up innovations and establish start-ups.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30082.1 Analyze ethical and professional issues which arise in the intellectual property law context.

A30082.2 Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.

A30082.3 Analyze the social impact of intellectual property law and policy.

A30082.4 Make use of copyrighted material so that it does not obstruct the progress of human knowledge.

A30082.5 Analyze IPR policies before filing patentable inventions and discoveries.

3. Course Syllabus

UNIT-I

Introduction to Intellectual Property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT-II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT-III

Law of Copy Rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law. Law of patents: foundation of patent law, patent searching process, ownership rights and transfer.

UNIT-IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation. Unfair competition: misappropriation right of publicity, false advertising.

UNIT-V

New Developments of Intellectual Property: New developments in trade mark law; copy right law, patent law, intellectual property audits. International overview on intellectual property, international – trade mark law, copy right law, international patent law, international development in trade secrets law.

4. Books and Materials

Text Book(s)

1. K Bansal& P Bansal, *Fundamentals of Intellectual Property for Engineers,* BS Publications, ISBN: 9788178002774, 8178002779, Edition: 2013.

Reference Book(s)

1. Deborah E. Bouchoux, *Intellectual Property: The Law of Trademarks Copyrights Patents and Trade Secrets*, 4th Edition, New Delhi: Cengage India, 2015, ISBN:9788131528976.
2. Prabuddha Ganguli, *Intellectual Property Rights– Unleashing the Knowledge Economy,* McGraw Hill Education; 1st Edition, 1st July 2017.
3. Integrating Intellectual Property Rights and Development Policy: *Report of the Commission on Intellectual Property Rights,* London September 2002 (web source: http://www.iprcommission.org/papers/pdfs/final_report/ciprfullfinal.pdf).

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30083 – NATIONAL SERVICE SCHEME

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The main objectives of National Service Scheme (NSS) are : understand the community in which they work, understand themselves in relation to their community, identify the needs and problems of the community and involve them in problem-solving, develop among themselves a sense of social and civic responsibility, utilize their knowledge in finding practical solutions to individual and community problems, develop competence required for group-living and sharing of responsibilities, gain skills in mobilizing community participation, acquire leadership qualities and democratic attitudes, develop capacity to meet emergencies and natural disasters and, practice national integration and social harmony

Course Pre/corequisites

This course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30083.1 Classify the organizational structure of NSS and its activities.

A30083.2 Identify the methods of mobilization and importance of youth Leadership.

A30083.3 Develop a sense of social and civic responsibility and provide solutions to individual and community problems.

A30083.4 Recognize the need for lifelong learning capabilities with the concepts of volunteerism and its functions.

A30083.5 Develop capacity to meet emergencies and natural disasters.

3. Course Syllabus

UNIT-I

Introduction and Basic Concepts of NSS - History, philosophy, aims & objectives of NSS, Emblem, flag, motto. Song, badge etc., Organizational structure, rules and responsibilities of various NSS functionaries.

UNIT-II

NSS Programmes and Activities - Concept of regular activities, special camping, Day Camps, basis of adoption of village/slums. Methodology of conducting Survey, financial pattern of the scheme, other youth prog. /schemes of Goal, coordination with different agencies, maintenance of the Diary.

UNIT-III

Understanding Youth - Definition, profile of youth, categories of youth, issues, challenges and opportunities for youth, youth as an agent of social change.

Importance and Role of Youth Leadership -Meaning and types of leadership, qualities of good leaders; traits of leadership, importance and rule of youth leadership.

UNIT-IV

Community Mobilization- Mapping of community stakeholders, designing the message in the context of the problem and the culture of the community, identifying methods of mobilization.

UNIT-V

Volunteerism and Shramdan: Indian Tradition of volunteerism, needs & importance of volunteerism, motivation and constraints of volunteerism, shramdan as a part of volunteerism.

4. Books and Materials

Reference Book(s)

1. Khwajala Ghulama Saiyidain, *National Service Scheme: A Report*, Published by Ministry of Education, Govt. of India, 1961.
2. N. F. Kaikobad, Krishan K. Kapil, *Training and consultancy needs in national service scheme*, Published by the Tata Institute of Social Sciences (TISS), 1971.
3. *National Service Scheme: guide-lines to project-masters*, by Andhra University, Dept. of Sociology & Social Work. Published by Dept. of Sociology & Social Work, Andhra University, 1971.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A30084 – YOGA

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

Yoga is an invaluable gift of ancient Indian tradition. It embodies unity of mind and body; thought and action; restraint and fulfilment; harmony between man and nature and a holistic approach to health and well-being. Yoga is not about exercise but to discover the sense of oneness with ourselves, the world and Nature. By changing our lifestyle and creating consciousness, it can help us to deal with climate change. Stress and Depression have become silent killers. Yoga offers a solution to these ailments. Practicing Yoga helps fight stress and find peace. All you need is willingness to practice it.

Course Pre/corequisites

There is no specific prerequisite and corequisite

2. Course Outcomes (COs)

After completion of the course, the learner will be able to do

A30084.1 Improve physical conditioning related to flexibility through participation in yoga.

A30084.2 Develop and maintain a personal yoga practice.

A30084.3 Recognize and apply the value and benefits of an on-going yoga practice.

A30084.4 Select asanas appropriate for personal needs.

A30084.5 Identify and apply relaxation techniques for stress reduction.

3. Course Syllabus

UNIT-I

Introduction of human body and its systems, definition of anatomy and physiology and importance in yogic practices, respiratory system, digestive system, endocrine system. Origin of yoga & its brief development, meaning of yoga & its importance, yoga as a science of art (yoga philosophy), meaning of meditation and its types and principles.

UNIT-II

Classification of yoga/types of yoga - hatha yoga, raja yoga, laya yoga, bhakti yoga, gyan yoga, karma yoga, asthang yoga.

UNIT-III

Classification of asanas and its mechanism, cultural asana (standing, sitting, supinline, praline position & topsy-turvy), meditative asana and relaxative asana, nervous system, circulatory system.

UNIT-IV

Introduction of Kriya, bandha and mudra, importance of KRIYA and its scientific approach, importance of BANDHA and its scientific approach, importance of MUDRA and its scientific approach.

UNIT-V

Effect of asanas on various systems, difference between asana and exercise, difference between pranayama and deep breathing and yogic diet.

4. Books and Materials

References:

1. Georg Feuerstein, *The Yoga Tradition: Its History, Literature, Philosophy and Practice*, New Delhi, Bhavana Books & Prints, 2002.
2. Joshi, K.S. *Yoga in daily life*, Delhi, Orient paper backs, 1985.
3. Taimni I.K, *The Science of Yoga (The Yoga Sutras of Patanjali)*, The Theosophical Publishing House, Adyar, 1961/1999.

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COURSE STRUCTURE

A30085 – DESIGN THINKING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course introduces design thinking and its application to developing new products, services, and the organization of businesses. Design thinking is a human-centric, interdisciplinary approach towards innovation. Design thinking as practiced in this course blends creative thinking and logical or rational thinking, and involves a process consisting of empathizing, ideating, and prototyping. Students will learn design principles, methodologies, and frameworks, and apply them through exercises and projects. The course is divided into four main aspects, all interconnected but which we also separately emphasize. They are: (1) design methodologies, (2) the "thing" to be designed (i.e., products, services, or the business itself, e.g. the business model), (3) human attitudes and behaviors (towards the designs), and (4) design contexts.

Course Pre/corequisites

This course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30085.1 Appreciate various design processes for creativity and innovation.

A30085.2 Develop design ideas through different techniques.

A30085.3 Identify the significance of reverse engineering about products.

A30085.4 Make use of design drawings to communicate ideas effectively.

A30085.5 Build organizations that support creative and innovative thinking.

3. Course Syllabus

UNIT-I

Introduction to design thinking, definition, why is design thinking important, how is design thinking different, process of design - introduction – product life cycle - design ethics, creativity, innovation and design, design process - creativity and innovation in design process - design limitation, preparing mind for innovation-the physics of innovation.

UNIT-II

Idea generation- The idea, generation process, mind mapping tool. Experimentation-What works, learning launch tool, strategic opportunities, creative people, creative organizations, ideas, and tools to help both people and organizations work more creatively.

UNIT-III

Creative thinking - generating design ideas - lateral thinking –analogies – brainstorming - mind mapping - national group technique – synectic's - development of work - analytical thinking - group activities recommended.

UNIT-IV

Reverse engineering - introduction - reverse engineering leads to new understanding about products -reasons for reverse engineering - reverse engineering process - step by step – case study.

UNIT-V

Basics of drawing to develop design ideas- introduction - many uses of drawing - communication through drawing – drawing basis – line - shape/ form – value – colour – texture –overview of drawing -practice using auto cad recommended.

4. Books and Materials

Text Book(s)

1. John.R.Karsnitz, Stephen O 'Brien and John P. Hutchinson, *Engineering Design*, Cengage learning (International edition) Second Edition, 2013.
2. Yousef Haikand Tamer M. Shahin, *Engineering Design Process*, Cengage Learning, Second Edition, 2011.

Reference Online Resources

1. https://courses.edx.org/register?course_id=coursev1%3AUQx%2BCORPINN1x%2B2T2020&enrollment_action=enroll&email_opt_in=false
2. https://www.coursera.org/programs/coursera-response-program-for-pcek-brht?collectionId=&productId=bfnQqUbbEeeMtBKozo_2UA&productType=course&showMiniModal=true
3. www.tutor2u.net/business/presentations/.../productlifecycle/default.html orhttps://www.mindtools.com/brainstm.html
4. https://www.quicksprout.com/.../how-to-reverse-engineer-your-competit www.vertabelo.com/blog/documentation/reverse-engineeringhttps://support.microsoft.com/en-us/kb/273814
5. https://support.google.com/docs/answer/179740?hl=en https://www.youtube.com/watch?v=2mjSDIBaUlMthevirtualinstructor.com/foreshortening.html
6. https://docs.oracle.com/cd/E11108_02/otn/pdf/.../E11087_01.pdfwww.bizfilings.com›Home › Marketing› Product Development
7. https://canvas.uw.edu/courses/1023376/assignments/syllabus

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COURSE STRUCTURE

A30086 – MANAGEMENT SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of this course is to provide the knowledge of Management in Success of Business. Further, students will be able to apply the Concepts, Theories, Principles of Management in various functional areas of an organization such as in Designing organization structures for managing the operations, Human Resource, Marketing and Production Departments. The student will able to evaluate cost and time of each business project by using PERT and CPM techniques and also formulate the new strategies that enhance competitive edge.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30086.1 Apply the concepts, theories, and principles of management in professional life.

A30086.2 Design suitable organization structure for managing the operations in the organization.

A30086.3 Apply principles of management to the various functional areas of an organization such as Human Resource, Marketing and Production.

A30086.4 Evaluate cost and time of each business project by using PERT and CPM techniques.

A30086.5 Formulate the new strategies that enhance competitive edge.

3. Course Syllabus

UNIT-I

Introduction to Management: Concept-Nature and importance of management, functions-evaluation of scientific management, modern management-motivation theories-leadership styles-decision making process-designing organization structure-principles and types of organization.

UNIT-II

Operations Management: Plant location and layout, methods of production, work-study-statistical quality control through control charts, objectives of inventory management, need for inventory control – EOQ & ABC analysis (simple problems)

Marketing Management: Meaning, nature, functions of marketing, marketing mix, channels of distribution - advertisement and sales promotion - marketing strategies - product life cycle.

UNIT-III

Human Resource Management: Significant and basic functions of HRM-Human Resource Planning (HRP), job evaluation, recruitment and selection, placement and induction-wage and salary administration, employee training and development – Methods - Performance appraisal - employee grievances - techniques of handling Grievances.

UNIT-IV

Strategic Management: Vision, mission, goals and strategy- corporate planning process-environmental scanning-SWOT analysis-Different steps in strategic formulation, implementation and evaluation.

Project Management: Network analysis-PERT, CPM, identifying critical path-probability-project cost analysis, project crashing.

UNIT-V

Contemporary Management Issues & Practices: Basic concepts of MIS-Materials Requirement Planning (MRP),Just-In-Time (JIT) system, Total Quality Management(TQM)-Six Sigma and Capability Maturity Models (CMM) evies, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process Outsourcing(BPO), business process re-engineering, bench marking, and balance score card.

4. Books and Materials

Text Book(s)

4. A.R Aryasri, *Management Science,* 4th edition, New Delhi: Tata McGraw Hill, 2013.

Reference Book(s)

1. Ashima B. Chhalill, P. Vijaya Kumar, N. AppaRaohalill, *Introduction to Management Science*, 1st edition, New Delhi: Cengaage, 2012.
2. Vijay Kumar & Apparo: *Introduction to Management Science*, New Delhi Cengage, 2011.

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COURSE STRUCTURE

A30087 – ENTREPRENEURSHIP DEVELOPMENT

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

The primary objective of this course is to provide common knowledge on the basics of entrepreneurship, risk and reward. Further, the course addresses on promotion and institutional support by various institutions, ways and means of project planning, feasibility studies, project proposal and report preparation and, also the role of angel investors in promotion and expansion of start-ups in India. It also encourages the student to take up local challenges and establish start-ups. Hence, students will be able to transform himself/herself from a job seeker to provider.

Course Pre/corequisites

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30087.1 Analyze the nature of entrepreneurship, risk and reward in modern business scenario.

A30087.2 Identify the business challenges and opportunities by various case studies.

A30087.3 Assess the promotion and institutional support by various agencies in India.

A30087.4 Evaluate the role of angel investors in promotion and expansion of start-ups in India.

A30087.5 Prepare effective and feasible project proposals and project reports.

3. Course Syllabus

UNIT-I

Introduction to Entrepreneurship: Introduction to entrepreneurship definition types of entrepreneur, entrepreneurial traits, Entrepreneur vs. Manager, Entrepreneur Vs Intrapreneur, Entrepreneurial decision process, Ethics and social responsibility of entrepreneurs, Opportunities for entrepreneurs in India and abroad. Creating and starting the venture, sources of new ideas, methods of generating ideas, creative problem solving, and product planning and development process.

UNIT-II

Business Plan: The business plan nature and scope of business plan, writing business plan, evaluating business plans, using and implementing business plans, Marketing plan, financial plan, the organizational plan and Launching formalities.

UNIT-III

The Financing & managing New Venture: Financing and managing the new venture, sources of capital, venture capital, angel investment, record keeping, recruitment, motivating and leading teams, financial controls, Marketing and sales controls, E-commerce, entrepreneurship and internet advertising.

UNIT-IV

The new Venture Expansion Strategies: New venture expansion strategies and issues, features and evaluation of joint ventures, acquisitions, mergers, franchising. Public issues, rights issues, bonus issues and stock splits. Choosing location and layout, Issues related to selection of layout.

UNIT-V

Production & Marketing Management: Production and Marketing Management: thrust of production management, selection of production techniques, plant utilization and maintenance, designing the work place, inventory control, material handling and quality control, Marketing functions, market segmentation, market research and channels of distribution, sales promotion and product pricing, global aspects of entrepreneurship.

4. Books and Materials

Text Books:

1. Vasanth Desai, *The Dynamics of Entrepreneurial Development and Management,* Sixth edition, Himalaya Publishing House, New Delhi, 2011.

Reference Books:

1. Poornima M Charantimath, *Entrepreneurship Development and Small Business Enterprises,* 2nd Edition, Pearson Education India: Bengaluru, August 2013.
2. S.S. Khanka, *Entrepreneurial Development*, 2nd Edition, S Chand Publishing: New Delhi, ISBN: 9788121918015, 2014.
3. Robert D Hisrich, Michael P Peters and Dean A Shepherd, *Entrepreneurship*, 6th Edition, TATA McGraw-Hill: New Delhi, 2007.

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COURSE STRUCTURE

A30474 - INTRODUCTION TO INTERNET OF THINGS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

Course Overview

Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

Course Pre/corequisites

The course has no specific prerequisite and corequisites.

2. Course Outcomes (COs)

After completion of the course, the learner will be able to:

A30474.1 Analyze IoT applications using IoT design principles, protocols and levels.

A30474.2 Distinguish sensors and actuators in terms of their functions and applications.

A30474.3 Interface I/O devices, Sensors using Arduino uno.

A30474.4 Apply Python concepts for programming of Raspberry Pi.

A30474.5 Develop IoT applications using Raspberry Pi and Arduino uno.

3. Course Syllabus

Unit I

Introduction to IoT: Part I, Part II, Sensing, Actuation, Basics of Networking: Part-I, Communication Protocols: Part III, Part IV, Part V

UNIT-II

Sensor Networks: Part I, Part II, Part III, Part IV, Part V, Part VI, Machine-to-Machine Communications, Interoperability in IoT, Introduction to Arduino Programming: Part I, Part II, Integration of Sensors and Actuators with Arduino: Part I, Part II

Unit III

Introduction to Python programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Implementation of IoT with Raspberry Pi (contd), Introduction to SDN, SDN for IoT

UNIT-IV

Data Handling and Analytics, Cloud Computing, Sensor-Cloud, Fog Computing, Smart Cities and Smart Homes

UNIT-V

Connected Vehicles, Smart Grid, Industrial IOT, Industrial IOT (contd), Case Study: Agriculture, Healthcare, Activity Monitoring

4. Books and Materials

Text Book(s)

1. S. Misra, A. Mukherjee, and A. Roy, 2020. Introduction to IoT. Cambridge University Press.
2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
3. Jeeva Jose, *Internet of Things,* 1st edition, Khanna Book Publishing, 2019.
4. Rajesh Singh, Anita Gehlot, Lovi Raj Gupta, Bhupendra Singh, Mahendra Swain, *Internet of Things with Raspberry Pi and Arduino,* 1st edition, CRC Press, 2019.

Reference Book(s)

1. Vijay Madisetti, Arshdeep Bahga, *Internet of Things – A hands on Approach*, 1st Edition, University press, 2014.
2. Adrian McEwen, Hakim Cassimally, *Designing the Internet of Things*, 1st edition, John Wiley and sons 2014.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A30579 – The Joy of Computing Using Python

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	51	0	0	3	40	60	100

1. Course Description

Course Overview

"The Joy of Computing Using Python" is an engaging introduction to programming with Python, designed for beginners. The course covers fundamental concepts such as variables, control structures, functions, and data structures in a hands-on manner. Students will learn to write and debug code while exploring practical applications in problem-solving and data manipulation. Emphasis is placed on building computational thinking and fostering creativity through interactive projects. By the end, participants will have a solid foundation in Python and the confidence to tackle more advanced programming challenges. The course combines theoretical knowledge with practical exercises to ensure a well-rounded learning experience

Course Pre/corequisites

Basic Mathematics, Computer Operation

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30579.1: Demonstrate proficiency in Python basics, including variables, loops, and conditionals for simple applications.
A30579.2: Apply abstraction and problem-solving techniques to develop applications and games using Python.
A30579.3: Implement and analyze algorithms such as recursion and sorting in practical scenarios.
A30579.4: Handle and analyze data using techniques like image processing, sentiment analysis, and natural language processing.
A30579.5: Develop interactive and automated solutions, including browser automation and calendar manipulation, using Python.

3. Course Syllabus

UNIT-I

Motivation for Computing, Welcome to Programming!! Introduction to Anaconda, Spyder IDE, Variables and Expressions: Design your own calculator, Loops and Conditionals: Hopscotch once again, Lists Crowd computing, Permutations: Jumbled Words

UNIT-II

Abstraction Everywhere: Apps in your phone, Magic Square hit, Dobble game, Counting Candies: Crowd to the rescue Birthday, Guess the movie, Dictionaries, Sorting and Searching,

UNIT-III

Substitution Cipher: What's the secret!! Sentiment, Tic tac toe: Let's play, Recursions, Snakes and Ladders: Down the memory lane. Spiral Traversing, Track the route,

UNIT-IV

Tuples, Lottery Simulation, Image Processing, Anagrams, Sentiment Analysis: Analyse your Facebook data, Natural Language Processing, six degrees of separation: Meet your favourites Image, Calculation of the Area: Don't measure.

UNIT-V

Flames, Data Compression, Browser Automation, Fun with Calendar, Page Rank: How Google Works!!

4. Books and Materials

Textbook(s)

1. **Charles R. Severance.** *Python for Everybody: Exploring Data Using Python 3.* A beginner-friendly book that explains core Python concepts like variables, loops, conditionals, and functions. It also delves into topics such as web scraping, databases, and data visualization.
2. **Allen B. Downey.** *Think Python: How to Think Like a Computer Scientist.* An introductory textbook that emphasizes problem-solving and computational thinking, aligning well with beginner-level courses in Python.

Reference Book(s)

1. **Al Sweigart.** *Automate the Boring Stuff with Python.* A highly practical reference for automating everyday tasks like file management, web scraping, and working with Excel files using Python.
2. **John Zelle.** *Python Programming: An Introduction to Computer Science.* A more computer science-oriented introduction to Python that dives into computational theory and algorithms along with Python coding.
3. **Luciano Ramalho.** *Fluent Python: Clear, Concise, and Effective Programming.* A good reference for more advanced users, focusing on writing more Pythonic and efficient code.
4. **Mark Lutz.** *Learning Python.* A comprehensive book that covers the Python language in-depth. It's a good resource for beginners and intermediate programmers who want to dive deeper into the language.

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COURSE STRUCTURE

A30094 – ENTREPRENEURSHIP

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	60	100

1. Course Description

Course Overview

This course provides a comprehensive exploration of entrepreneurship as a key driver of business growth and economic value. It offers essential frameworks for success and pathways to sustainable development, covering each theme with both conceptual and practical insights. By the end of the course, students will understand entrepreneurship's role in economic progress, gain clarity on success factors and risk mitigation, and develop skills to navigate the challenges of entrepreneurship effectively.

Course Pre/corequisites

B3719- Entrepreneurship and Start -Up

2. Course Outcomes (COs)

After the completion of the course, the student will be able to:

A30094.1: Identify business opportunities through market research and competitive analysis.
A30094.2 Apply ideation techniques to create prototypes and MVPs for new ventures.
A30094.3 Evaluate the dynamics of business growth and the role of entrepreneurship in employment creation.
A30094.4: Analyze the impact of technological innovation on entrepreneurship
A30094.5: Explore funding sources and create financial strategies for startups.

3. Course Syllabus

UNIT-I

The Entrepreneurial Process Entrepreneurial Journey
Introduction to the entrepreneurial process, key stages, milestones, and challenges. Success stories and case studies of prominent entrepreneurs
Entrepreneurial Discovery-Techniques for identifying business opportunities and unmet market needs. Tools such as market research, competitive analysis, and consumer behavior insights.
Ideation and Innovation: Ideation and Prototyping-Creative techniques for generating ideas. Steps for developing prototypes and minimum viable products (MVP) using iterative methods and design thinking.

UNIT-II

Testing, Validation, and Commercialization-Strategies for product testing and customer validation. Refining business ideas based on feedback and scaling ideas into commercially viable products and services.
Disruption as a Success Driver-Understanding disruption in industries and its role in driving entrepreneurial success. Case studies of disruptive businesses and lessons on leveraging disruption for growth.

Technological Innovation and Entrepreneurship– 1 -The impact of emerging technologies (AI, blockchain, IoT, etc.) on entrepreneurship. Leveraging technology for innovation and competitive advantage.

UNIT-III

Technological Innovation and Entrepreneurship – 2

Advanced strategies for integrating technological innovation into startups. Digital transformation, automation, and scaling through tech-enabled processes.

Raising Financial Resources

Overview of funding sources such as venture capital, angel investors, and crowdfunding. Strategies for securing funding and best practices for financial management.

Education and Entrepreneurship-The role of education in fostering entrepreneurship. Developing entrepreneurial skills in academic institutions and promoting entrepreneurship as a career path.

UNIT-IV

Beyond Founders and Founder-Families Challenges of scaling a business beyond the founder. Building strong leadership teams and succession planning for family-owned and founder-led businesses.

India as a Start-up Nation-Overview of India's startup ecosystem. Government policies, initiatives, and success stories that support and promote startups in India.

National Entrepreneurial Culture-Examining how different national cultures influence entrepreneurship. A comparative study of entrepreneurial ecosystems across the globe

UNIT-V

Entrepreneurial Thermodynamics-The dynamics of business growth and the concept of "entrepreneurial energy." Strategies for maintaining momentum and managing burnout in startups**.**

Entrepreneurship and Employment-How entrepreneurship contributes to job creation and economic growth. The relationship between startups, employment generation, and economic development**.**

Start-up Case Studies-In-depth analysis of real-world startups. Lessons learned from both successful ventures and failures across various industries.

4. Books and Materials

Text Book(s)

1. Arya Kumar, Entrepreneurship, Pearson, Delhi, 2012.
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4. Start Your Business With Confidence, by Jeff Bezos, 2023

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1. https://onlinecourses.nptel.ac.in/noc24_mg93/announcements?force=true