G.Pullaiah College of Engineering and Technology

(Autonomous)

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

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

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS
GPCET - R19

B.Tech Regular Four Year Degree Programme
(for the batches admitted from the academic year 2019- 2020)
&
B.Tech (Lateral Entry Scheme)
(for the batches admitted from the academic year 2020 - 2021)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY:: KURNOOL

(Autonomous)

Department of Civil Engineering

Vision of Civil Engineering department

To be the source of imparting quality education to civil engineers along with necessary skill, knowledge and personality in order to face the challenges in the society.

Mission of Civil Engineering department

- To provide a platform for gaining knowledge regarding emerging technologies in the area of civil engineering
- To inculcate critical and innovative thinking in the minds of young engineers in order to face the challenges of the society
- To provide good ethical and moral values to the young engineers

Program Educational Objectives

PEO-1

Apply principles of civil engineering with analytical thinking and problem-solving skills for developing solutions to civil engineering problems

PEO -2

Adapt to rapidly changing industry needs by acquiring required civil engineering skills

PEO -3

Analyse and design civil engineering systems with social awareness and responsibility

PEO -4

Exhibit professionalism, ethical approach, communication skills, team work in their profession and adapt to modern trends by engaging in lifelong learning

Program Specific Outcomes

PSO-I

Design civil engineering structures using relevant codes of practice, materials, techniques and software

PSO-2

Adapt state-of art practices and materials in the field of civil engineering

PSO-3

Follow human values and ethics with team spirit in every civil engineering project undertaken

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 Course: Student who does not obtain minimum prescribed attendance in a course shall be detained in that particular course.

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):MOOC courses inculcate the habit of self-learning. MOOC courses 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 yearto 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 - R18" 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.

Student 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 2019-20

&

For B.Tech Lateral Entry batches admitted from the academic year 2020 -2021

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 fulfill 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

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
Mini project/Internship	04	02
Project work Phase I/Phase II	04/16	02/08

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	Basic Sciences	Basic Science Courses	BS	21
2	Mandatory Courses	Mandatory Courses [Environmental Sciences, Induction training, Indian Constitution, Essence of Indian Traditional Knowledge] (Non-Credit)	MC	0
3	Engineering Sciences	Engineering Science Courses including workshop, drawing, basics of electrical/mechanical/computer etc.	ES	18
4	Professional Core	Professional core courses	PC	71
5	Professional Electives	Professional Elective Courses relevant to chosen specialization/branch	PE	12
6	Open Electives	Open Subjects-Electives from other technical and / or emerging subjects	OE	12
7	Humanities & Social Sciences	Humanities and Social Sciences including Management courses	HS	13
8	Projects	Project work, Seminar and Internship in industry or elsewhere	PR	13
			Total	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 fulfillment 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, Project Work Phase-1, Socially Relevant projects and Internships are evaluated for 100 marks each and Project Work Phase- 2 shall be evaluated for 200 marks.

- For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.
- For practical subjects the distribution shall be 30 marks for Internal Evaluation and 70 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 20 marks with duration of 1 hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper)

Objective paper shall be for 10 marks. Subjective paper shall contain 5 questions of which a student has to answer 3 questions evaluated* for 20 marks

*Note: The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 20 marks, any fraction shall be rounded off to the next higher mark.

If the student is absent for the internal examination, no re-exam shall be conducted and internal marks for that examination shall be considered as zero.

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.

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 I shall contain 10 compulsory short answer questions for a total of 20 marks such that each question carries 2 marks. There shall be 2 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 for 12, 12 and 11 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 30 sessional marks and end examination shall be for 70 marks. Day-to-day work in the laboratory shall be evaluated for 30 marks by the concerned laboratory teacher based on the regularity/record/ viva. The end examination shall be conducted by the concerned laboratory teacher and senior expert in the same subject of the department.

In a practical subject consisting of two parts (Eg: Electrical & Mechanical Lab), the end examination shall be conducted for 35 marks in each part. Internal examination shall be evaluated as above for 30 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 audit 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 conducted for 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 30 marks for internal evaluation and 70 marks for end examination.

Day-to-day work shall be evaluated for 10 marks by the concerned subject teacher 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 30 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 20 marks, any fraction (0.5 & above) shall be rounded off to the next higher mark. There shall be no objective paper in internal examination. 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 two comprehensive assessments, one at the end of IV Semester and the other at the end of VI Semester, with 100 objective questions for 100 marks on the subjects studied in the respective years. A student shall acquire 1 credit assigned to each of the comprehensive online examination when he/she secures 40% or more marks. In case, if a student fails in comprehensive online examination, he/she shall reappear/re-register by following a similar procedure adopted for the lab examinations.

6.9 There shall be an Open Elective/**Choice Based Credit Course (CBCC)** from V Semester, where in the students have to choose an elective offered by various departments including his/her own department.

6.10 **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. In order to earn a Minor in a discipline a student has to earn 20 extra credits by studying four theory subjects and a minor discipline project.

a. Students who have a CGPA 8.5 (for SC/ST students CGPA 8.0) or above (up to II year-I semester) and without any backlog subjects will be permitted to register for Minor discipline programme. An 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 from **third** year **first** semester onwards and must opt for a Minor in a discipline other than the discipline he/she is registered in. However, Minor discipline registrations are not allowed in the **Fourth** year.
c. Students are not allowed to register and pursue more than two subjects in any semester. Students may register for minor discipline project from **third** year **first** semester onwards and may complete the same before **fourth** year **second** semester.
d. Each department enlisted a set of subjects from its curriculum which are core for the discipline without any prerequisites. The Evaluation pattern of theory subjects and minor discipline project work will be similar to the regular programme evaluation. The minor discipline project shall be evaluated by the committee consisting of Head of the Department along with the two senior faculty members of the department.
e. Students are not allowed to pursue minor discipline programme subjects under Self study and/or MOOCs manner.
f. 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.
g. Minimum strength for offering Minor in a discipline is considered as One-Fifth (i.e., 20% of the class) of the class size and Maximum size would be Four-Fifth of Class size (i.e., 80% of the class).
h. 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.
i. 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.
j. A Student registered for Minor in a discipline and pass in all subjects that constitute the requirement for the Minor discipline programme.No class/division (i.e., second class, fist class and distinction etc.) shall be awarded for Minor discipline programme.
k. 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 and a project taken for Minor programme with CGPA mentioned separately.

6.11 **Honors degree in a discipline:**

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. In order to earn a Honors degree in his/her discipline, a student has to earn 20 extra credits by studying five advanced courses for 15 credits and by carrying out a mini project for 5 credits in the concerned branch of Engineering. In place of advanced courses, he/she can study equivalent MOOC courses available under SWAYAM platform, as decided by the University from time to time. The Evaluation pattern of theory subjects will be similar to the regular programme evaluation. The mini project shall be evaluated by the committee consisting of Head of the department, Supervisor and External examiner. Students aspiring for Honors degree must register from V semester onwards. However, Honors degree registrations are not

allowed before V semester and after VI semester. Student may register for mini project from V semester onwards and complete the same before VIII semester after completing at least two advanced courses or equivalent.

Procedure for Conduct and Evaluation of Honors degree Mini project:

- Out of a total of 100 marks for the Mini project, 30 marks shall be for Internal Evaluation and 70 marks for the End Semester Examination (Viva-voce). The Viva-Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the University. The evaluation of project work shall be conducted at the end of the VIII semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department and one senior faculty member of the Department and Supervisor).

  Students having a CGPA of 8.0 (for SC/ST students CGPA of 7.5) or above up to II year-I semester and without any backlog subjects will be permitted to register for degree with Honors. An SGPA and CGPA of 7.5 (for SC/ST students CGPA of 7.0) has to be maintained in the subsequent semesters without any backlog subjects in order to keep the degree with Honors registration live or else it will be cancelled.

6.12 A Socially relevant Project is introduced in IV & V/VI semesters for 1 credit in each semester. The student has to work on any socially relevant project and submit a report for evaluation. This shall be evaluated for 100 mark s in each of the above semesters by a committee consisting of Head of the department, Project mentor and one senior faculty member of the department. A student shall acquire 1 credit assigned, when he/she secures 40% or more marks for the total of 100 marks. In case, if a student fails, he/she shall resubmit the report. There shall be no external evaluation.

6.13 An Internship/Mini Project is introduced for 2 credits in the curriculum. The students need to take up the Internship during the break of end of VI Semester for a period of four weeks. The students who have not taken up the Internship may take up the Mini Project during the VII semester. The student who has taken up Internship shall submit a technical report along with internship certificate from the Internship organization in order to obtain the 2 credits. The organization in which the student wishes to carry out Internship need to be approved by Internal Department Committee comprising of Head of Department and 2 senior faculty. The evaluation of Mini Project shall be conducted at the end of the VII semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department, two senior faculty members of the department and Supervisor), on the basis of project submitted by the student.

B. Tech Civil Engineering students need to take up the Mini project on Water Resource Engineering during the break of end of VI Semester for a period of four weeks for 2 credits. This shall be evaluated at the end of IV Year by a committee consisting of Head of Civil Engineering Department along with two senior faculty members of the department

6.14 **Procedure for Conduct and Evaluation of Project I:**

There shall be a presentation of Abstract of the main project in the VII Semester. After selecting the specific topic, the student shall collect the information and prepare a report, showing his/her understanding of the topic and submit the same to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the Department, Project supervisor and a senior faculty member. It shall be evaluated for 100 marks. A student shall acquire 2 credits assigned to the Project 1, when he/she secures 40% or more marks for the total of 100 marks. The Project 1 shall be evaluated at the end of VII semester by the department committee. There shall be no external evaluation for Project I. In

case, if a student fails in Project I, a re examination shall be conducted within a month. In case if he/she fails in the re examination also, he/she shall not be permitted to register for Project II. Further, such students shall reappear as and when VII semester supplementary examinations are conducted.

6.15 Procedure for Conduct and Evaluation of Project II:

Out of a total of 200 marks for the Project stage - II, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). The Viva-Voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner. Project work shall start in VII semester and shall continue in the VIII semester. The evaluation of project work shall be conducted at the end of the VIII semester. The Internal Evaluation shall be made by the departmental committee (Head of the Department, two senior faculty members of the department and Supervisor), on the basis of two seminars given by each student on the topic of his/her project.

7. Attendance Requirements:

- A student shall be eligible to appear for University examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a 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.
- 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 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 readmission for that semester when offered next.

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 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. In case of audit courses and technical seminar & comprehensive 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 as per 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 in case if student is detained for want of credits for particular academic year by sections 8.2 and 8.3 above, the student may make up the credits through supplementary examinations and only after securing the required credits he/she shall be permitted to join in the V Semester or VII Semester as the case may be.

8.5 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.

8.6 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 fulfillment 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 **audit** 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 i^{th} subject and GP_i is the grade point scored by the student in the i^{th} 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 j^{th} 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 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 fulfillment 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 rejoining.

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, Comprehensive Viva-Voce 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 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

(x) 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 writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that course.
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 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.	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.
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.(R19)
(LATERAL ENTRY SCHEME)

(Effective for the students getting admitted into II year through Lateral Entry Scheme from the Academic Year 2020-2021 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 fulfills 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 120.5 credits and secures all *120.5* credits from II to IV year of Regular B. Tech. program.

(a) Students, who fail to fulfill the requirement for the award of the degree in six consecutive academic years from the year of admission, shall forfeit their seat.

(b) 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 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 fulfills 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 if 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 fulfillment 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 shall be placed in one of the following four classes:

FirstClass with Distinction	70% and above	From the aggregate Marks secured for 120.5 Credits (i.e. II year to IV year)
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

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).

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 R19 Regulations

B. Tech. - Regular Four-Year Degree Program

(For batches admitted from the Academic Year 2019 - 2020)

&

B. Tech. - Lateral Entry Scheme

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

(An Autonomous Institution affiliated to JNTU, Ananthapuramu)

DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

B. TECH – CIVIL ENGINEERING

I SEMESTER (I YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2002	Mathematics-I	BS	3	1	0	4	30	70	100
A2003	Engineering Physics	BS	3	0	0	3	30	70	100
A2501	Computer Programming	ES	3	1	0	4	30	70	100
A2001	Communicative English	HS	2	0	0	2	30	70	100
A2006	Communicative English Laboratory	HS	0	0	3	1.5	30	70	100
A2007	Engineering Physics Laboratory	BS	0	0	3	1.5	30	70	100
A2502	Computer Programming Laboratory	ES	0	0	3	1.5	30	70	100
	TOTAL		**11**	**02**	**09**	**17.5**	**210**	**490**	**700**

II SEMESTER (I YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2010	Mathematics-II	BS	3	1	0	4	30	70	100
A2012	Engineering Chemistry	BS	3	0	0	3	30	70	100
A2503	Data Structures	ES	3	0	0	3	30	70	100
A2303	Engineering Mechanics	ES	3	0	0	3	30	70	100
A2301	Engineering Graphics and computer aided drafting	ES	1	0	0	3	30	70	100
A2013	Engineering Chemistry Laboratory	BS	0	0	3	1.5	30	70	100
A2504	Data Structures Laboratory	ES	0	0	3	1.5	30	70	100
A2304	Applied Mechanics Laboratory	ES	0	0	3	1.5	30	70	100
A2308	Co-Engineering Laboratory	ES	0	0	3	1.5	30	70	100
	TOTAL		**13**	**01**	**12**	**22**	**270**	**630**	**900**

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PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

B. TECH – CIVIL ENGINEERING

III SEMESTER (II YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2014	Transform Techniques and Numerical Methods	BS	3	0	0	3	30	70	100
A2101	Strength of Materials – I	PC	3	0	0	3	30	70	100
A2102	Surveying	PC	3	0	0	3	30	70	100
A2103	Building Materials and Construction	PC	3	0	0	3	30	70	100
A2104	Mechanics of Fluids	PC	3	0	0	3	30	70	100
A2105	Engineering Geology	PC	3	0	0	3	30	70	100
A2106	Strength of Materials Laboratory	PC	0	0	2	1	30	70	100
A2107	Surveying Laboratory	PC	0	0	2	1	30	70	100
A2108	Engineering Geology Laboratory	PC	0	0	2	1	30	70	100
A2017	Quantitative Aptitude and Reasoning – I	BS	1	0	0	1	30	70	100
A2031	Environmental Science	MC	2	0	0	0	100*	0	100*
	TOTAL		**21**	**00**	**06**	**22**	**300**	**700**	**1000**

IV SEMESTER (II YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2019	Managerial Economics and Financial Analysis	HS	3	0	0	3	30	70	100
A2109	Hydraulics and Hydraulic Machinery	PC	3	1	0	4	30	70	100
A2110	Water Resources Engineering-I	PC	3	0	0	3	30	70	100
A2111	Strength of Materials- II	PC	3	0	0	3	30	70	100
A2112	Structural Analysis-I	PC	3	0	0	3	30	70	100
A2113	Fluid Mechanics and Hydraulics Machinery Laboratory	PC	0	0	4	2	30	70	100
A2114	Computer Aided Drawing for Civil Engineering	PC	0	0	3	1.5	30	70	100
A2018	Quantitative Aptitude and Reasoning – II	BS	1	0	0	1	30	70	100
A2115	Socially Relevant Project-I	PW	0	0	2	1	100	0	100
A2116	Comprehensive Assessment – I	PC	0	0	0	1	100	0	100
A2032	Human Values and Professional Ethics	MC	2	0	0	0	100*	0	100*
	TOTAL		**18**	**01**	**09**	**22.5**	**440**	**560**	**1000**

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

B. TECH – CIVIL ENGINEERING

V SEMESTER (III YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2117	Design of Reinforced Concrete Structures	PC	3	0	0	3	30	70	100
A2118	Geotechnical Engineering-I	PC	3	0	0	3	30	70	100
A2119	Water Resources Engineering-II	PC	3	0	0	3	30	70	100
A2120	Structural Analysis-II	PC	3	0	0	3	30	70	100
	Professional Elective-I	PE	3	0	0	3	30	70	100
	Open Elective-I	OE	3	0	0	3	30	70	100
A2121	Soil Mechanics Laboratory	PC	0	0	2	1	30	70	100
A2122	Computer Aided Design Laboratory	PC	0	0	2	1	30	70	100
A2123	Socially Relevant Project-II	PW	0	0	2	1	100	0	100
A2034	Gender Sensitization	MC	2	0	0	0	100*	0	100
		TOTAL	20	00	06	21	340	560	900

VI SEMESTER (III YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2124	Concrete Technology	PC	3	0	0	3	30	70	100
A2125	Environmental Engineering-I	PC	3	0	0	3	30	70	100
A2126	Geotechnical Engineering-II	PC	2	0	0	2	30	70	100
A2127	Estimation Costing and Valuation	PC	3	0	0	3	30	70	100
	Professional Elective – II	PE	3	0	0	3	30	70	100
	Open Elective – II	OE	3	0	0	3	30	70	100
A2128	Concrete Technology Laboratory	PC	0	0	2	1	30	70	100
A2129	Environmental Engineering Laboratory	PC	0	0	2	1	30	70	100
A2020	Professional English Communication Skills	HS	0	0	2	1	30	70	100
A2130	Comprehensive Assessment – II	PC	0	0	0	1	100	0	100
A2033	Indian Constitution and Multiculturalism	MC	2	0	0	0	100*	0	100*
		TOTAL	19	00	06	21	370	630	1000

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

B. TECH – CIVIL ENGINEERING

VII SEMESTER (IV YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2131	Environmental Engineering-II	PC	3	0	0	3	30	70	100
A2132	Transportation Engineering	PC	3	0	0	3	30	70	100
A2133	Design of Steel Structures	PC	3	0	0	3	30	70	100
	Professional Elective-III	PE	3	0	0	3	30	70	100
	Open Elective-III	OE	3	0	0	3	30	70	100
A2134	Transportation Engineering Laboratory	PC	0	0	2	1	30	70	100
A2135	Mini Project/Internship	PW	0	0	4	2	100	0	100
A2136	Project Work Phase – I	PW	0	0	4	2	100	0	100
	TOTAL		**15**	**00**	**10**	**20**	**380**	**420**	**800**

VIII SEMESTER (IV YEAR)

Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
	Professional Elective-IV	PE	3	0	0	3	30	70	100
	Open Elective-IV	OE	3	0	0	3	30	70	100
A2137	Project Work phase – II	PW	0	0	16	8	60	140	200
	TOTAL		**06**	**00**	**16**	**14**	**110**	**290**	**400**

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

B. TECH – CIVIL ENGINEERING

Professional Electives

Professional Elective – 1	
Course Code	**Title of the Course**
A2151	Cost Effective Housing Techniques
A2152	Remote Sensing and GIS
A2153	Hydropower Engineering
A2154	Disaster Management and Mitigation
Professional Elective – 2	
Course Code	**Title of the Course**
A2155	Bridge Engineering
A2156	Earthquake Engineering
A2157	Design and Drawing of Irrigation Structures
A2158	Air Pollution and Control
Professional Elective – 3	
Course Code	**Title of the Course**
A2159	Construction Planning and Project Management
A2160	Pavement Analysis and Design
A2161	Watershed Management
A2162	Environmental Impact Assessment and Management
Professional Elective – 4	
Course Code	**Title of the Course**
A2163	Pre-stressed Concrete
A2164	Urban Transportation and Planning
A2165	Ground Improvement Techniques
A2166	Green Buildings

Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A2181	Basic Civil Engineering	3-0-0	3	CE
A2182	Building Planning and Construction	3-0-0	3	CE
A2183	Disaster Management	3-0-0	3	CE
A2184	Water Resources Conservation	3-0-0	3	CE
A2281	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A2282	Renewable Energy Sources	3-0-0	3	EEE
A2283	Electrical Measuring Instruments	3-0-0	3	EEE
A2381	Optimization Techniques	3-0-0	3	ME
A2382	Mechanical Technology	3-0-0	3	ME
A2383	Introduction to Automobile Systems	3-0-0	3	ME
A2481	Basic Electronics	3-0-0	3	ECE
A2482	Introduction to Communication Systems	3-0-0	3	ECE
A2483	Fundamentals of IoT	3-0-0	3	ECE
A2581	Basic Data Structures	3-0-0	3	CSE
A2582	Fundamentals of DBMS	3-0-0	3	CSE
A2583	Basics of Software Engineering	3-0-0	3	CSE

Course Code	Title of the Course	L-T-P	Credits	Offered by
A2584	Python for Everyone	3-0-0	3	CSE
A2585	Computer Organization and Operating Systems	3-0-0	3	CSE
A2586	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A2081	Research Methodology	3-0-0	3	H&S
A2082	Intellectual Property Rights	3-0-0	3	H&S
A2083	National Service Scheme	3-0-0	3	H&S
A2084	Yoga	3-0-0	3	H&S
A2085	Design Thinking	3-0-0	3	H&S
A2086	Entrepreneurship Development	3-0-0	3	H&S

Mandatory Courses

Course Code	Title of the Course
A2031	Environmental Science
A2032	Human Values and Professional Ethics
A2033	Indian Constitution and Multiculturalism
A2034	Gender Sensitization

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(Autonomous)

CURRICULUM STRUCTURE (2019-20)

CIVIL ENGINEERING-CE									
I Semester									
Course Code	**Course**	**Category**	**Periods per Week**			**Credits**	**Scheme of Examination Maximum Marks**		
			L	**T**	**P**		**Internal**	**External**	**Total**
A2002	Mathematics-I	BS	3	1	0	4	30	70	100
A2003	Engineering Physics	BS	3	0	0	3	30	70	100
A2501	Computer Programming	ES	3	1	0	4	30	70	100
A2001	Communicative English	HS	2	0	0	2	30	70	100
A2006	Communicative English Lab	HS	0	0	3	1.5	30	70	100
A2007	Engineering Physics Lab	BS	0	0	3	1.5	30	70	100
A2502	Computer Programming Lab	ES	0	0	3	1.5	30	70	100
TOTAL			**11**	**2**	**9**	**17.5**	**210**	**490**	**700**
II Semester									
Course Code	**Course**	**Category**	**Periods per Week**			**Credits**	**Scheme of Examination Maximum Marks**		
			L	**T**	**P**		**Internal**	**External**	**Total**
A2010	Mathematics-II	BS	3	1	0	4	30	70	100
A2012	Engineering Chemistry	BS	3	0	0	3	30	70	100
A2503	Data Structures	ES	3	0	0	3	30	70	100
A2303	Engineering Mechanics	ES	3	0	0	3	30	70	100
A2301	Engineering Graphics and computer aided drafting	ES	1	0	4	3	30	70	100
A2013	Engineering Chemistry Lab	BS	0	0	3	1.5	30	70	100
A2504	Data Structures Lab	ES	0	0	3	1.5	30	70	100
A2304	Applied Mechanics Lab	ES	0	0	3	1.5	30	70	100
A2302	Co-Engineering Laboratory	ES	0	0	3	1.5	30	70	100
TOTAL			**13**	**1**	**16**	**22**	**270**	**630**	**900**

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Mathematics-I

Title of the Course :	**Mathematics-I**				
Branches for which this course is offered**:**	I.B.Tech I Sem (Common to all)	L	T	P	C
		3	1	0	4

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&minimaEvaluate the double and Triple integrals and its applicatons,Special functions.The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program

Course Objectives:
• To enlighten the concepts of calculus and linear algebra • To prepare the students with standard concepts and tools in mathematics • To develop the confidence and ability among the students to handle various real world problems and their applications.

Course Outcomes :	
After successful completion of the course , the student will be able to	
CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications
CO2	Interpret the Eigen values and Eigen vectors of matrix in terms of the transformation it represents in to a matrix Eigen value problem
CO3	Utilize mean value theorems to real life problems
CO4	familiarize with functions of several variables which is useful in optimization
CO5	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
CO6	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

Course Content:		
Unit-I	**Matrix Opreations And Solving Systems Of Linear Equations**	**Lecturer Hours:10Hrs**
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, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix,		
Unit-II	**Quadratic forms and Mean Value Theorems**	**Lecturer Hours:8Hrs**
Quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.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**	**Lecturer Hours:8Hrs**
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**	**Lecturer Hours:8Hrs**
Double integrals, change of variables ,change of order of integration, double integration in polar coordinates, areas enclosed by plane curves		
UNIT-V	**Multiple Integrals and Special Functions**	**Lecturer Hours:8Hrs**
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.		

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

2. Engineering Mathematics-I by by E. Rukmangadachari, E. Keshava Reddy, Pearson Publications

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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

ENGINEERING PHYSICS

Title of the Course	Engineering Physics				
Branches for which this course is offered	I B.Tech I Sem (CE & ME)	L	T	P	C
		3	0	0	3

Course Overview

There has been an exponential growth of knowledge in the recent past opening up new areas and challenges in the understanding of basic laws of nature. 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 in basic concepts of mechanics, acoustics, material properties,lasers and fiber optics are introduced, types of sensors for various engineering applications are to be familiarized.

Course Objectives

- To disseminate knowledge in basic concepts of mechanics
- To enlighten the concepts of acoustics and ultrasonics with their engineering applications.
- To impart knowledge in the basic concepts of elasticity
- To impart knowledge in basic concepts of optical fiber and laser along with its engineering applications
- Familiarize types of sensors for various engineering applications.

Course Outcomes	
After Successful completion of the course, the student will able to	
CO1	**apply**mechanics for solving engineering problems
CO2	**apply** the principles of acoustics for noise cancellation and in designing buildings
CO3	**analyze** the applications of ultrasonics in various engineering fields
CO4	**explain**the relationship between elastic constants
CO5	**interpret** the concepts of lasers and optical fibers in various applications
CO6	**identify** the sensors for various engineering applications

Course Content			
Unit-I	**MECHANICS**	**Lecture Hours**	**10**
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**	**Lecture Hours**	**10**
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	**ELASTICITY**	**Lecture Hours**	**8**
Concepts of elasticity, plasticity, Idealization of one dimensional stress-strain curve; Generalized Hooke's law with and without thermal strains for isotropic materials; elastic constants and their relationships; Strain energy, expression for strain energy stored in a body when the load is applied gradually and suddenly.			
Unit-IV	**LASERS ANDFIBEROPTICS**	**Lecture Hours**	**14**
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 laser. **FIBEROPTICS**: Introduction-Total Internal Reflection-Construction of optical fibers, Critical angle of propagation-Acceptance angle-Numerical Aperture-Classification of fibers based on Refractive index profile& modes –Propagation of electromagnetic wave through optical fiber- importance of V number- Block Diagram of Fiber optic Communication system -Medical Applications.			
Unit-V	**SENSORS**	**Lecture Hours**	**8**
Sensors :(qualitative description only): Different types of sensors and applications; Strain and Pressure sensors- Piezoelectric, magneto strictive sensors, Fiber optic methods of pressure sensing; Temperature sensor -Hall-effect sensor, smoke and fire detectors.			
Text Books			
1	D.Kleppner and Robert Kolenkow"An introduction to Mechanics"-II -Cambridge University Press,2015		
2	Gaur R.K. and Gupta S.L., "Engineering Physics"-Dhanpat Rai publishers, 2012		
3	M.N.Avadhanulu & P.G.Kshirsagar "A Text book of Engineering Physics"-S.Chand Publications,2017		
4	Ian R Sinclair, Sensor and Transducers 3rd eds, 2001, Elsevier (Newnes)		
References			
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

(AUTONOMOUS)

COMPUTER PROGRAMMING

Title of the course:	**COMPUTER PROGRAMMING**				
Branches for which this course is offered:	B.TECH I SEMESTER (Common to all branches)	L	T	P	C
		3	1	0	4

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 OBJECTIVES :
• Understand problem solving techniques using python • Understand representation of a solution to a problem • Understand the syntax and semantics of Python programming language • Understand the significance of Control structures • Learn the features of Python language

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Comprehend the fundamental concepts of computer hardware and problem solving abilities
CO2	Knowledge on the basic concepts of algorithms, flow charts and python programming
CO3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements
CO4	Interpret the importance of functions in programming
CO5	Analyze and Modularize the problem and its solution by using functions.
CO6	Ability to relate the concepts of strings, files and preprocessors to the real world applications

Course Content:		
UNIT-I	**Introduction to Computers and Problem Solving Strategies**	**LECTURE HOURS: 8**
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.		

UNIT-II	Basics of Python Programming:	LECTURE HOURS: 10
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.		
UNIT-III	**Decision Control Statements and Sequences**	**LECTURE HOURS: 12**
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.		
UNIT-IV	**Functions and Modules**	**LECTURE HOURS: 10**
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.		
UNIT-V	**Exception and File handling**	**LECTURE HOURS: 8**
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.		

Text Books:	
1	Programming and problem solving with python by Ashok Namdev Kamthane,Amit Ashok Kamthane., McGraw-Hill Education
2	Python programming using problem solving approach by Reema Thareja, Oxford.

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

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY

(AUTONOMOUS)

COMMUNICATIVE ENGLISH

Title of the Course:	Communicative English				
Branches for which this course is offered:	I B.Tech I Sem (CIV,MEC & CSE) I B.Tech II Sem (ECE & EEE)	L	T	P	C
		2	0	0	2

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 Objectives

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

Course Outcomes:

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

CO 1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO 2	Apply grammatical structures to formulate sentences and correct word forms
CO 3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO 4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.

CO 5	Create a coherent paragraph interpreting a figure/graph/chart/table
CO 6	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English

Course Content		
UNIT – I		**Lecture Hours: 10**
Listening: Listening for comprehension. **Speaking:** Introducing oneself and describing people, places and objects. **Reading:** Skimming and scanning a piece of information. **Writing:** Paragraph writing (introduction and summarizing the points) **Grammar and Vocabulary:** Types of Sentences (Syntax): Parts of Speech (noun, adjectives, verbs, adverbs). One word Substitutes		
UNIT – II		**Lecture Hours: 10**
Listening: Listening for purpose. **Speaking:** Short structured talks on specific topics. **Reading:** Identifying and recognizing verbal techniques to link the ideas in a paragraph together. **Writing:** Mechanics of paragraph writing **Grammar and Vocabulary:** Conjunctions and Prepositions. Words often confused		
UNIT-III		**Lecture Hours: 10**
Listening: Listening for global comprehension. **Speaking:** Discussing and reporting on specific topics **Reading:** Reading for comprehension. **Writing:** Summarizing - identifying main idea/s (paraphrasing, avoiding redundancies) **Grammar and Vocabulary:** Tenses; Concord; Parallelism. Synonyms		
UNIT-IV		**Lecture Hours: 08**
Listening: Predicting conversations/ transactional dialogues (without/ with video). **Speaking:** Role plays (formal and informal). **Reading:** Interpreting the graphic elements in the texts. **Writing:** Information transfer, Letter Writing (formal and informal) **Grammar and Vocabulary:** degrees of comparison; use of antonyms.		
UNIT – V		**Lecture Hours: 08**
Listening: Listening Comprehension. **Speaking:** Formal oral presentations. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics. Technical Report Writing **Grammar and Vocabulary:** Spotting the errors. Idioms and Phrases		

Text Books:

1	Language and Life: A Skills Approach, Orient Black Swann Publishers

Reference Books

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

Sample Web Resources

Grammar/Listening/Writing
1-language.com
http://www.5minuteenglish.com/
https://www.englishpractice.com/

Grammar/Vocabulary
English Language Learning Online
http://www.bbc.co.uk/learningenglis
h/ http://www.better-english.com/
http://www.nonstopenglish.com
https://www.vocabulary.com/
BBC Vocabulary
Games Free Rice
Vocabulary Game

Reading
https://www.usingenglish.com/comprehension/
https://www.englishclub.com/reading/short-
stories.htm https://www.english-online.at/

Listening
https://learningenglish.voanews.com/z/3613
http://www.englishmedialab.com/listening.html

Speaking
https://www.talken
glish.com/
BBC Learning English – Pronunciation
tips Merriam-Webster – Perfect
pronunciation Exercises

All Skills https://www.englishclub.com/
http://www.world-english.org/
http://learnenglish.britishcouncil.org/

Online Dictionaries

Cambridge dictionary online

MacMillan dictionary

Oxford learner's dictionaries

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
COMMUNICATIVE ENGLISH LAB

Title of the Course:	Communicative English I Lab				
Branches for which this course is offered::	I B.Tech I Sem (CIV,MEC & CSE) I B.Tech II Sem (ECE & EEE)	L	T	P	C
		0	0	3	1.5

Course Overview:
The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the students with the use of English in everyday situations and contexts.

.**Course Objectives:**
• students will be exposed to a variety of self instructional, learner friendly modes of language learning • students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc. • students will learn better pronunciation through stress, intonation and rhythm • students will be trained to use language effectively to face interviews, group discussions, public speaking • students will be initiated into greater use of the computer in resume preparation, report writing, format making etc • Become active participant in the learning process and acquire proficiency in spoken English • Speak with clarity and confidence thereby enhances employability skills.

Course Outcomes:	
CO 1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO 2	Apply communication skills through various language learning activities
CO 3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO 5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO 6	Improve upon speaking skills over telephone, role plays and public speaking

COMMUNICATIVE ENGLISH LAB	
UNIT I	1. Phonetics for listening comprehension of various accents 2. Reading comprehension 3. Describing objects/places/persons
UNIT II	1. JAM 2. Small talks on general topics 3. Debates
UNIT III	1. Situational dialogues – Greeting and Introduction 2. Summarizing and Note making 3. Vocabulary Building
UNIT IV	1. Asking for Information and Giving Directions 2. Information Transfer 3. Non-verbal Communication – Dumb Charade
UNIT V	1. Oral Presentations 2. Précis Writing and Paraphrasing 3. Reading Comprehension and spotting errors

Suggested Software:

1. Kvan Advanced Communication Skills.

References:

1. A Textbook of English Phonetics for Indian Students, T. Balasubramanian, Macmillan, 2012.
2. Effective Technical Communication, M. Ashraf Rizvi The McGraw-Hill Companies,2007.
3. A Hand book for English Laboratories, E. Suresh Kumar, P. Sreehari, Foundation Books,2011

Sample Web Resources

1. https://learningenglish.voanews.com/z/3613
2. http://www.englishmedialab.com/listening.html
3. Merriam-Webster – Perfect pronunciation
4. https://www.usingenglish.com/comprehension/
5. https://www.englishclub.com/reading/short-stories.htm https://www.english-online.at/
6. 1-language.com
7. http://www.5minuteenglish.com/

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

ENGINEERING PHYSICS LAB

Title of the Course	Engineering Physics Lab				
Branches for which this course is offered	I B.Tech I Sem (CE&ME)	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

Course Overview
There has been an exponential growth of knowledge in the recent past opening up new areas and challenges in the understanding of basic laws of nature. This helped to the discovery of new phenomena in macro, micro and nano scale device technologies. 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 lab has been thoroughly revised keeping in view of the basic needs of all engineering branches.

Course Objectives
The main objective of this lab is the student • Will recognize the important of rigidity modulus of material of a wire. • Will understand the role of moment of inertia a physical object • Will understand the ultrasonic velocity in liquid • Will understand the role of optical fiber parameters and significance of laser in engineering applications • Will recognize the application of the elastic constants of the material • Will identify the various sensor applications

Course Outcomes	
After Successful completion of the course, the student will able to	
CO1	**estimate** the mechanical properties of materials
CO2	**determine** moment of inertia of a flywheel
CO3	**measure** the velocity of ultrasonics in liquid by applying the basic concepts of ultrasonics
CO4	**determine**the wavelength of laser, particle size, numerical aperture and acceptance angle by applying the principles of lasers and optical fibres
CO5	**measure** the spring constants, Poisson's ratio of the material and verify Hooke'slaw
CO6	**compare** pressure and temperature variation in strain gauge sensor and optical fibre sensor

Course Content	
Experiment No	**Name of the Experiment**
1	Polygon law of coplanar 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	Hooke's Law experiment
6	Poisson's Ratio of aluminium and rubber
7	Determination of the spring constants of the material of a flat spiral spring
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	Determination of Pressure variation using Strain Gauge sensor
13	Determination of Temperature variation using Strain Gauge sensor
14	Determination of Pressure variation using optical fiber sensor
15	Determination of Temperature variation using optical fiber sensor

References
S.Balasubramanian , M.N.Srinivasan " A Text book of Practical Physics"- S. Chand Publishers, 2017
http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

(COMPUTER PROGRAMMING LAB)

Title of the course:	**COMPUTER PROGRAMMING LAB**				
Branches for which this course is offered:	B.TECH I SEMESTER (ALL BRANCHES)	L	T	P	C
		0	0	3	1.5

Title of the course:	**COMPUTER PROGRAMMING LAB**
Branches for which this course is offered:	B.TECH I SEMESTER(Common to all branches)

COURSE OBJECTIVES :
• Demonstrate the use of problem solving techniques. • Illustrate the Python programming constructs through simple programs • To train solving computational problems • To elucidate solving mathematical problems using Python programming language

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 OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Design solutions to mathematical problems & Organize the data for solving the problem
CO2	Understand and implement modular approach using python
CO3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc
CO4	Understands about files and its applications.
CO5	Develop real-world applications, files and exception handling provided by python
CO6	Select appropriate programming construct for solving the problem

Course Content:		
TASK-1		**PRACTICAL HOURS: 2**
a). Python Program to Calculate the Average of Numbers in a Given List. b). Python Program to Exchange the Values of Two Numbers Without Using a Temporary Variable. c). Python Program to Read a Number n and Compute n+nn+nnn. d). Python Program to Check Whether a Number is Positive or Negative		
TASK-2		**PRACTICAL HOURS: 2**
a) Accept a number and display its factorial b) Accept a multi digit number and display its sum c) Accept n numbers and display big number out of them d) Accept n numbers and display big and next biggest number e) Accept n and display prime number or not		
TASK-3		**PRACTICAL HOURS:2**
a). Write a Python Program to find the longest common prefix string amongst an array of strings. b). Write a Python Program to Check if a Number is a Perfect Number. c). Write a Python Program to Check if a Number is a Strong Number. d). Write a Python Program to Generate Random Numbers from 1 to 20 and append them to the List.		
TASK-4		**PRACTICAL HOURS: 2**
a). Write a Python Program to Form a New String where the First Character and the Last Character have been Exchanged. b). Write a Python Program to Count the Number of Vowels in a String. c). Write a Python Program to Take in a String and Replace Every Blank Space with Hyphen. d). Write a Python Program that Displays which Letters are Present in both the Strings		
TASK-5		**PRACTICAL HOURS: 2**
Accept 50 student details(sno,name,m1,m2,m3) of a class and display the details along with their total and average marks. Also display the student's name and highest average, student's name with highest m1, highest m2 and highest m3.		
TASK-6		**PRACTICAL HOURS: 2**
From a class of 50 students, some appeared for JEE mains, Deemed exam and some for EAMCET exam. There are students who attended more than one examination. List out the students who answered only JEE mains, only Deemed and only advanced. Also list out the students who answered all.		
TASK-7		**PRACTICAL HOURS: 2**

If we list all the natural numbers below 10 that are multiples of 3 or 5, we get 3, 5, 6 and 9. The sum of these multiples is 23. Write a Python program to find the sum of all the multiples of 3 or 5 below 1000.

TASK-8		**PRACTICAL HOURS: 2**

Each new term in the Fibonacci sequence is generated by adding the previous two terms. By starting with 1 and 2, the first 10 terms will be: 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...
By considering the terms in the Fibonacci sequence whose values do not exceed four million, write a program to find the sum of the even-valued terms.

TASK-9		**PRACTICAL HOURS: 2**

A palindrome number reads the same both ways. The largest palindrome made from the product of two 2-digit numbers is $9009 = 91 \times 99$. Write a program to find the largest palindrome made from the product of two 3-digit numbers.

TASK-10		**PRACTICAL HOURS: 2**

The following iterative sequence is defined for the set of positive integers:
$n \rightarrow n/2$ (n is even)
$n \rightarrow 3n + 1$ (n is odd)
Using the rule above and starting with 13, we generate the following sequence: $13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$
It can be seen that this sequence (starting at 13 and finishing at 1) contains 10 terms. Although it has not been proved yet (Collatz Problem), it is thought that all starting numbers finish at 1.
Write a program to find the starting number, under one million, produces the longest chain.

TASK-11		**PRACTICAL HOURS: 2**

Given the following information, you may prefer to do some research for yourself.

- 1 Jan 1900 was a Monday.
- Thirty days for September, April, June and November.
- All the rest have thirty-one days and on leap years, twenty-nine days.
- A leap year occurs on any year evenly divisible by 4, but not on a century unless it is divisible by 400.

Write a program to find how many Sundays fell on the first of the month during the twentieth century (1 Jan 1901 to 31 Dec 2000).

TASK-12		**PRACTICAL HOURS: 2**

A perfect number is a number for which the sum of its proper divisors is exactly equal to the number. For example, the sum of the proper divisors of 28 would be $1 + 2 + 4 + 7 + 14 = 28$, which means that 28 is a perfect number.
A number n is called deficient if the sum of its proper divisors is less than n and it is called abundant if this sum exceeds n.
As 12 is the smallest abundant number, $1 + 2 + 3 + 4 + 6 = 16$, the smallest number that can be written as the sum of two abundant numbers is 24. By mathematical analysis, it can be shown that all integers greater than 28123 can be written as the sum of two abundant numbers. However, this

upper limit cannot be reduced any further by analysis even though it is known that the greatest number that cannot be expressed as the sum of two abundant numbers is less than this limit.
Write a program to find the sum of all the positive integers which cannot be written as the sum of two abundant numbers.

TASK-13		**PRACTICAL HOURS: 2**

Starting with the number 1 and moving to the right in a clockwise direction a 5 by 5 spiral is formed as follows:

21 22 23 24 **25**
20 **7** 8 **9** 10
19 6 **1** 2 11
18 **5** 4 **3** 12
17 16 15 14 **13**

TASK-14		**PRACTICAL HOURS: 2**

The decimal number, $585 = 1001001001_2$ (binary), is palindrome in both bases.
Write a program to find the sum of all numbers, less than one million, which are palindrome in base 10 and base 2.

TASK-15		**PRACTICAL HOURS: 2**

Write a program to ensure that the first and last names of people begin with a capital letter in their passports. For example, mohan kumar should be capitalized correctly as Mohan Kumar.
Given a full name, your task is to *capitalize* the name appropriately.

TASK-16		**PRACTICAL HOURS: 2**

The professor is conducting a course on Discrete Mathematics to a class of N students. He is angry at the lack of their discipline, and he decides to cancel the class if there are less than K students present after the class starts. Given the arrival time of each student, your task is to find out if the class gets cancelled or not.

TASK-17		**PRACTICAL HOURS: 2**

The prime 41, can be written as the sum of six consecutive primes:
41 = 2 + 3 + 5 + 7 + 11 + 13.
This is the longest sum of consecutive primes that adds to a prime below one-hundred. The longest sum of consecutive primes below one-thousand that adds to a prime, contains 21 terms, and is equal to 953. Write a program to find which prime, below one-million, can be written as the sum of the most consecutive primes.

TASK-18		**PRACTICAL HOURS: 2**

Given a dictionary and a character array, write a program to print all valid words that are possible using characters from the array. Note: Repetitions of characters is not allowed.
Examples: Input : Dict = ["go","bat","me","eat","goal","boy", "run"]
arr = ['e','o','b', 'a','m','g', 'l']

Output : go, me, goal.

TASK-19		**PRACTICAL HOURS: 2**

Write a Python program to write data into a file
Write a Pytnon program to read the content of accepted file
Write a Python program to read last n lines of a file.
Write a Pytnon program to read a file and list out number of words, lines and characters present in it.

TASK-20		**PRACTICAL HOURS: 2**

Write a Python program to copy the contents of a file to another file.
Merge two files and write the content into third file
Read the CSV file and display its statistics

TASK-21		**PRACTICAL HOURS: 2**

In a row of dominoes, A[i] and B[i] represent the top and bottom halves of the i-th domino. (A domino is a tile with two numbers from 1 to 6 - one on each half of the tile.)
We may rotate the i-th domino, so that A[i] and B[i] swap values. Return the minimum number of rotations so that all the values in A are the same, or all the values in B are the same. If it cannot be done, return -1.

TASK-22		**PRACTICAL HOURS: 3**

Kiran and Ramu take turns playing a game, with Kiran starting first. Initially, there is a number N on the chalkboard. On each player's turn, that player makes a *move* consisting of:

- Choosing any x with 0 < x < N and N % x == 0.
- Replacing the number N on the chalkboard with N - x.

Also, if a player cannot make a move, they lose the game.
Return True if and only if Kiran wins the game, assuming both players play optimally.

TASK-23		**PRACTICAL HOURS: 3**

On an infinite plane, a robot initially stands at (0, 0) and faces north. The robot can receive one of three instructions:

- "G": go straight 1 unit;
- "L": turn 90 degrees to the left;
- "R": turn 90 degress to the right.

The robot performs the instructions given in order, and repeats them forever.
Return true if and only if there exists a circle in the plane such that the robot never leaves the circle.

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

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
Mathematics-II

Title of the Course :	**Mathematics-II**				
Branches for which this course is offered**:**	I.B.Tech II Sem (Common to CE,EEE,ME & ECE)	L	T	P	C
		3	1	0	4

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, Multivariable Calculus (Vector differentiation &Integration).The mathematical skills derived from this course provides necessary base to analytical and theoretical concepts occurring in the program.

Course Objectives:
• To educate the learners in the concept of differential equations and multivariable calculus. • To develop the mathematical skills from this course provides necessary base for the program. • To provide the learners with basic concepts and techniques at intermediate level to lead them into advanced level by handling various real world applications.

Course Outcomes :	
After successful competion of the course , the student will be able to	
CO1	Apply the mathematical principles to solve second and higher order differential equations
CO2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters
CO3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems
CO4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs
CO5	Analyze the vector calculus involving divergence, curl and their properties along with vector identities
CO6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

Course Content:		
Unit-I	**Linear Differential Equations of Higher Order**	**Lecturer Hours:8Hrs**
Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.		
Unit-II	**Equations Reducible to Linear Differential Equations and Applications**	**Lecturer Hours:10Hrs**
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**	**Lecturer Hours:8Hrs**
First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.		
Unit-IV	**Multivariable Calculus (Vector differentiation)**	**Lecturer Hours:8Hrs**
Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.		
UNIT-V	**Multivariable Calculus (Vector integration)**	**Lecturer Hours:8Hrs**
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).		

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. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
ENGINEERING CHEMISTRY

Title of the Course:	Engineering Chemistry				
Branches for which this course is offered:	I B.Tech I Sem (CE,ME)	L	T	P	C
		3	` 0	0	3

Course Overview
This course acquaint 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 Objectives
• To acquaint the students with soft and hard water types and softening methods. • To introduce the basic concepts of electrochemical cells and Fuel cells . • To familiarize the students with Polymers,engineering materials, their properties and applications. • To impart knowledge on corrosion and its significance. • To explain nano and smart materials and their uses.To e
Course Outcomes:
After successful completion of the course, the student will be able to

CO 1	Compare the quality of drinking water with BIS and WHO standards. Illustrate problems associated with hard water and demonstrate industrial water treatment process.
CO 2	Demonstrate the corrosion prevention method and apply Nernst equation for calculating electrode and cell potentials.
CO 3	Analyze the classification of fuels along with their characteristics and calorific value involving solid fuels, liquid and gaseous fuels.
CO 4	Explain different types of polymers and their applications, demonstrate the mechanism of conduction and conducting polymers.
CO 5	Summarize the underlying chemistry of engineering materials involving Cement, lubricants.
CO 6	Summarize the applications of SEM, TEM and X-Ray diffraction in surface characterization.

Course Content		
UNIT – I	**Water Technology**	**Lecture Hours: 8**
Introduction –Soft Water and hardness of water, Estimation of hardness by EDTA Method - Boiler troubles **-** scale and sludge, Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electro dialysis		
UNIT – II	**Electrochemistry and Applications:**	**Lecture Hours: 10**
Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations. Primary cells Zinc Air Battery, Lechlanche battery. Secondary cells – lead acid, nickel-metal hydride and lithium ion batteries- working of the batteries including cell reactions. Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells. Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bed worth ratios and uses, environmental factors (pH, temperature, DO) affecting corrosion rate, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).		
UNIT-III	**Polymers and Fuel Chemistry**	**Lecture Hours: 12**
Introduction to polymers, functionality of monomers, Classification of polymerization with specific examples and mechanisms of polymer formation. Plastomers: Thermoplastics and Thermo-sets preparation properties and applications of Bakelite urea formaldehyde, nylons. Elastomers: preparation, properties and applications Buna-S, Buna-N. Conducting polymers – polyacetylene, polyaniline– mechanism of conduction and applications. Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal. Petroleum- Refining of petroleum, Synthetic petrol- Fischer Tropsch's and Bergius process, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane value. Gaseous fuels- Flue gas analysis by Orsat's method.		
UNIT-IV	**Advanced Engineering Materials**	**Lecture Hours: 8**
Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications Refractories- Classification, Properties, Factors affecting the refractory materials and Applications Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils and Applications Building materials- Portland Cement, constituents, phases and reactivity of clinker, Setting and Hardening of cement.		
UNIT – V	**Surface Chemistry and Applications**	**Lecture Hours: 10**
Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, characterization of surface by physicochemical methods (SEM, TEM, X-ray diffraction), functionalization of surface of nanomaterials– applications of colloids and nanomaterials – catalysis, medicine, sensors, etc		

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, 10/e, Oxford University Press, 2010
Reference Books
1.H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997. 2.D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992. 3.Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007. 4.K N Jayaveera, G V Subba Reddy and C Rama Chandraiah, Engineering Chemistry 1/e Mc Graw Hill Education (India) Pvt Ltd, New Delhi 2016

G.PULLAIAH COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)

DATA STRUCTURES

Title of the course:	**Data Structures**				
Branches for which this course is offered:	I B.Tech II SEMESTER	L	T	P	C
	(Common to all branches)	3	0	0	3

COURSE OVERVIEW :
• This course covers general purpose data structures and algorithms. • Topics covered include space and time complexity, analysis, static data and dynamic data structures.

COURSE OBJECTIVES:
• Understand problem solving techniques • Understand representation of a solution to a problem • Understand the syntax and semantics of programming language • Understand the significance of Control structures • Learn the features of language

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Learn to choose appropriate data structure as applied to specified problem definition.
CO2	Design and analyze linear and non-linear data structures.
CO3	Design algorithms for manipulating linked lists, stacks, queues, trees and graphs in python
CO4	Demonstrate advantages and disadvantages of specific algorithms and data structures
CO5	Develop a base for advanced computer science study.
CO6	Evaluate algorithms and data structures in terms of time and memory complexity of basic operations.

Course Content:		
UNIT-I	**Introduction to Problem Solving Using C**	**LECTURE HOURS: 12**
Introduction: Structure of C Program, Identifiers, Basic data types, Variables, Constants, I/O functions , Operators, Selection Statements – if and switch statements, Repetition statements – while, for, do-while statements, other statements related to looping – break, continue, goto, Arrays – Concepts, using arrays in C, array applications, two – dimensional, arrays, multidimensional arrays, Functions, Strings, Pointers.		

UNIT-II	Linear Data Structures	LECTURE HOURS: 14
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:**	**LECTURE HOURS: 14**
Definition- Single linked list- Circular linked list- Double linked list- Circular Double linked list- Application of linked lists		
UNIT-IV	**Sorting and Searching:**	**LECTURE HOURS: 12**
Sorting: Bubble Sort, Selection Sort, Insertion Sort, Shell Sort, Merge Sort, Quick Sort, time complexity **Search**: Sequential Search, Binary Search, Hashing, time complexity		
UNIT-V	**Trees and Graphs:**	**LECTURE HOURS: 12**
Trees: examples, vocabulary and definitions, Priority Queues with Binary Heaps, Binary Tree Applications, Tree Traversals, Binary Search Trees, AVL Tree. **Graph:** Vocabulary and definitions, Applications: BFS and DFS.		

Text Books:	
1	Classic Data Structures, Second Edition by Debasis Samanta, PHI.
2	Ron S.Gottfried, Programming with C, (TMH – Schuam Outline Series) 3rd Edition - 2011.

Reference Books:	
1	B.W. Kernignan and Dennis M.Ritchie, The C Programming Language, (PHI), 2nd Edition 2003.
2	Jean Paul Tremblay and Paul G.Sorenson[2007], An Introduction to DataStructures With Applications, TMH
3	Fundamentals of Data Structures in C – Horowitz, Sahni, Anderson- Freed, Universities Press, Second Edition

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

ENGINEERING MECHANICS

Title of the Course:	ENGINEERING MECHANICS				
Branches for which this course is offered:	**I B.Tech II Semester –CE & ME**	L	T	P	C
		3	0	0	3

Course Objectives:
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 Outcomes:	
After successful completion of the course, the student will be able to	
CO1	To analyze the basic concepts of rigid bodies subjected to different types of loads and supports.
CO2	To analyze the motion of the bodies considering friction and external loads.
CO3	To determine Centroids and area moment of inertia and centre of gravity and mass moment of inertia of simple and composite figures.
CO4	To analyse the motion of particle without considering forces and considering forces
CO5	To analyze the perfect frames using method of joints, method of sections & tension coefficient method for vertical , horizontal and inclined loads and concepts of Mechanical vibrations. (Simple, compound and torsional pendulums)
CO6	To analyse the motion of particle with and without considering forces

Course Content:

Unit – I	**Introduction of Engineering Mechanics**	Lecture Hours: 12

INTRODUCTION TO ENGINEERING MECHANICS:
Introduction to Engineering Mechanics – Basic Concepts. Resultants of Force System: Parallelogram law –Forces and components- Resultant of coplanar Concurrent Forces – Components of forces in Space – Moment of Force – principle of moments – Coplanar Applications – Couples – Resultant of any Force System. Equilibrium of Force Systems: Free

Body Diagrams, Equations of Equilibrium.		
Unit – II	**Coplanar Force Systems &Friction**	Lecture Hours: 12
Friction covering, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Motion of Bodies, Ladder friction, wedge friction.		
Unit – III	**Centroid, Center of gravity & Moment of Inertia**	Lecture Hours: 12
Centroid and Centre of Gravity, Centroid of simple figures from first principle, Centroid of composite sections, Pappus theorems. Centre of Gravity and its implications, centre of gravity of composite sections. Moment of Inertia– Area & Mass M.I – Radius of Gyration, Parallel axis– Perpendicular axis theorem – Simple Problems.		
Unit – IV	**Dynamics of Particles**	Lecture Hours: 12
Dynamics of Particles - Rectilinear Motion – Kinematics Problems, Kinetics – Problems, Work & Energy – Impulse Moment, Direct Central Impact – coefficient of restitution, Curvilinear Motion – Projectile Motion, Work & Energy in Curvilinear motion.		
Unit – V	**Frames and Vibrations**	Lecture Hours: 12
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		

Text Books:	
1	Engineering Mechanics by Jayakumar, Kumar, PHI, 2014
2	Singer's Engineering Mechanics Statics and Dynamics,Vijay Kumar Reddy, Suresh Kumar. BS Publications 2015
3	Engineering Mechanics – B. Bhattacharyya, Oxford University Publications, 2015
Reference Books:	
1	Engineering Mechanics by Seshigiri Rao, Rama Durgaiah, Universities Press, 2005
2	Engineering Mechanics by Shames & Rao – Pearson Education.
3	Engineering Mechanics by Fedrinand L.Singer – Harper Collings Publishers

G PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING

Title of the Course:	**ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING**				
Branches for which this course is offered:	I B.Tech I Sem (ECE & EEE) I B.Tech II Sem (CIV,MEC & CSE)	L	T	P	C
		1	0	4	3

Course Objectives:
Bring awareness that Engineering Drawing is the Language of Engineers. • Familiarize how industry communicates technical information. • Teach the practices for accuracy and clarity in presenting the technical information. • Develop the engineering imagination essential for successful design. • Instruct the utility of drafting & modeling packages in orthographic and isometric drawings. • Train the usage of 2D and 3D modeling. • Instruct graphical representation of machine components.

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Learning conventions of Drawing, which is an Universal Language Of Engineers. Also Interpret and Sketch the various curves which Including ellipse, parabola, hyperbola
CO2	Analyze and draft the orthographic projections of points and lines
CO3	Analyze and sketch the orthographic projections of planes and solids
CO4	Revise and Improve their visualization skills in the development of new products
CO5	Construct the isometric projection of an object employing orthographic projections
CO6	Drawing 2D and 3D diagrams of various objects

Practice	
S. No	**Title of the Experiment**
1	Introduction to engineering drawing: Principles of Engineering Graphics and their significance, Usage of Drawing instruments.
2	Lettering and dimensions
3	Conic sections- Ellipse (General methods only)
4	Conic sections- Parabola (General methods only)
5	Conic sections- Hyperbola (General methods only)
6	Principles of Orthographic Projections-Conventions.
7	Projections of Points
8	Projections of lines
9	Projections of lines inclined to one plane.
10	Projections of regular solids: Prism, Cylinder.
11	Projections of Pyramid, Cone
12	Development of surfaces of right regular solids: prism & Cylinder
13	Development of surfaces of right regular solids pyramid & Cone.
14	Isometric projections:Principles of Isometric projection, Isometric Scale
15	Isometric Views of Planes
16	Isometric Views of Simple solids –Prism & Cube
17	Isometric Views of Simple solids –Cylinder and Cone
18	Conversion of Isometric Views to Orthographic Views
19	Introduction to AutoCAD Software: The Menu System, Toolbars, Command Line, Status Bar, Shortcut menus (Button Bars)
20	Customization & CAD Drawing:, Setting of units and drawing limits, drawing simple figures.
21	Producing drawings by using Absolute coordinate input entry method to draw straight lines.
22	Producing drawings by using Relative coordinate input entry method to draw straight lines.
23	Producing drawings by using polar coordinate input entry method to draw straight lines.
24	Applying dimensions to objects.
25	Editing options.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)
ENGINEERING CHEMISTRY LAB

Title of the Course	Engineering Chemistry Lab				
Branches for which this course is offered:	CE,ME	L	T	P	C
		0	0	3	1.5

Course Overview

- Will learn practical understanding of the redox reactions
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineers these to suit diverse applications
- Will also learn the hygiene accepts of water would be in a position to design methods to Produce Portable water using modern technology.

Course Objectives

- To impart training for handling of different instruments.
- To familiarize with digital and instrumental methods of analysis
- To know the knowledge in the determination of different water samples
- To impart the knowledge in the colorimetric samples
- To excel in the analysis of moisture percentage in the samples.

Course Outcomes:

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

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

List of Experiments
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. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
5. Determination of cell constant and conductance of solutions
6. Potentiometry - determination of redox potentials and emfs
7. Determination of Strength of an acid in Pb-Acid battery
8. Preparation of a polymer
9. Determination of viscosity of the solutions using Viscometer-I
10. Determination of viscosity of the solutions using Viscometer-II
11. Determination of percentage of Iron in Cement sample by colorimetry
12. Estimation of Calcium in port land Cement
13. Preparation of nanomaterials
14. Adsorption of acetic acid by charcoal
15. Determination of percentage Moisture content in a coal sample

Reference Books
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 & TECHNOLOGY
(AUTONOMOUS)

(DATA STRUCTURES LABORATORY

Title of the course:	**DATA STRUCTURES LABORATORY**				
Branches for which this course is offered:	B.TECH II SEMESTER (CSE)	L	T	P	C
		0	0	3	1.5

COURSE OBJECTIVE:
• To strengthen the ability to identify and apply the suitable data structure for the given real world problem

COURSE OVERVIEW:
• Implement linear and non linear data structures.
• Analyze various algorithms based on their time complexity.
• Choose appropriate data structure and algorithm design method for a specific application.
• Identify suitable data structure to solve various computing problems.

COURSE OUTCOMES:	
After successful completion of the course, the student will be able to	
CO1	Learn to choose appropriate data structure as applied to specified problem definition.
CO2	Design and analyze linear and non-linear data structures.
CO3	Design and implement algorithms for manipulating linked lists, stacks, queues, trees and graphs in python
CO4	Implement recursive algorithms as they apply to trees and graphs.
CO5	Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures
CO6	Implement operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.

Course Content:		
TASK-1	**Introduction**	**PRACTICAL HOURS: 2**
Write a program to sort the number of elements using sorting by exchange. Write a program to sort the characters in a string using sorting by exchange.		

TASK-2		**PRACTICAL HOURS: 2**
Write a program to sort numbers using insertion sort. Write a program to sort the elements of an array using Selection Sort.		
TASK-3		**PRACTICAL HOURS:2**
Write a program to implement heap sort.		
TASK-4		**PRACTICAL HOURS: 3**
Write a program to search a mobile number in a list of students using linear search.		
TASK-5		**PRACTICAL HOURS: 3**
Write a program to search a mobile number using Binary Search and compare with linear search with time complexity.		
TASK-6		**PRACTICAL HOURS: 3**
Write a program to convert infix expression to postfix expression and evaluate postfix expression.		
TASK-7		**PRACTICAL HOURS: 3**
Write a program to implement stack, queue, circular queue using arrays and linked lists on employee details.		
TASK-8	**Linked List, Stack, Queue**	**PRACTICAL HOURS: 3**
Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list on student structures with members student roll no, name and total marks.		
TASK-9		**PRACTICAL HOURS: 3**
Write a program to perform the operations creation, insertion, deletion, and traversing a Doubly linked list.		
TASK-10		**PRACTICAL HOURS: 3**
Write a program to remove duplicates from ordered and unordered arrays.		
TASK-11		**PRACTICAL HOURS: 3**
Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.		
TASK-12		**PRACTICAL HOURS: 3**

Write a program for tic-tac-toe game.		
TASK-13		**PRACTICAL HOURS:3**
Write a program to perform operations creation, insertion, deletion and traversing on a binary search tree.		
TASK-14		**PRACTICAL HOURS: 3**
Write a program to implement depth first search and breadth first search on graphs.		
TASK-15		**PRACTICAL HOURS: 3**
Write a program to perform different operations on Red Black trees.		
TASK-16		**PRACTICAL HOURS: 3**
Write a program to implement external sorting.		
TASK-17		**PRACTICAL HOURS: 3**
Write a program to perform different operations of B Tree.		

Text Books:	
1	Problem Solving with Algorithms and Data Structures Using Python by David L. Ranum, Bradley N. Miller
2	Python Data Structures and Algorithms by Benjamin Baka, Packt Publishing Ltd

Reference Books:	
1	Think Python, How to Think Like a Computer Scientist
2	Python 3 Object-oriented Programming - Second Edition by Dusty Phillips

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

APPLIED MECHANICS LABORATORY

Title of the Course:	**APPLIED MECHANICS LABORATORY**				
Branches for which this course is offered:	**I B.Tech II SEMESTER – ME & CE**	L	T	P	C
		0	0	3	1.5

Course Objectives:
This lab is aimed at making the student understand the concepts of Engineering Mechanics through demonstrable experiments

Course Outcomes:	
After successful completion of the course, the student will be able to	
CO1	Acquire knowledge of static and dynamic behavior of the bodies.
CO2	Acquire the knowledge, so that they can understand physical phenomenon with the help of various theories.
CO3	Explain the physical phenomenon with help of diagrams.
CO4	with broad vision with the skills of visualizing and developing their own ideas, and to convert those ideas in to engineering problems and solving those problems with the acquired knowledge of the Engineering mechanics
CO5	Apply the principles of mechanics to analyze structural and machine elements.
CO6	Identify the different types of beams and the types of loading. Derive expressions to determine the bending stress, deflection and shear stress in beams subjected to various types loading.

Course Content:		
Experiment-I	**Bending Test on Simply Supported Beam**	Lecture Hours: 3
Experiment -II	**Support Reactions of a Beam** To find experimentally the reactions at the supports of a simply supported beam and verify the same with analytical values	Lecture Hours: 3
Experiment -III	**Bell Crank Lever**	Lecture Hours: 3

	To verify the Principle of moments using the Bell Crank lever apparatus	
Experiment -IV	**Friction Plane** To determine the coefficient of Static Friction between two surfaces	Lecture Hours: 3
Experiment -V	**Bending Test on Cantilever Beam**	Lecture Hours: 3
Experiment -VI	**Compound Pendulum** To estimate the acceleration due to gravity using a compound pendulum	Lecture Hours: 3
Experiment -VII	**Single Gear Crab** To understand the gear arrangement and establish the law of machine	Lecture Hours: 3
Experiment -VIII	**Double Gear Crab** To compare the efficiency of Single and Double Gear Crab	Lecture Hours: 3
Experiment -IX	**Differential Pulley Block** To establish law of machine	Lecture Hours: 3
Experiment -X	**Differential Axle and Wheel** To understand the velocity ratio of the machine and to interpret the law of machine	Lecture Hours: 3

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY
(AUTONOMOUS)

CO-ENGINEERING LABORATORY

Title of the Course:	**CO-ENGINEERING LABORATORY**				
Branches for which this course is offered:	I B.Tech I Sem (ECE & EEE) I B.Tech II Sem (CIV,MEC & CSE)	L	T	P	C
		0	0	3	1.5

Course Objectives:

- understand the basics of resistor and capacitor codes
- To introduce students to the basic theory of power semiconductor devices and passive components, their practical applications in power electronics.
- To provide strong foundation for further study of power electronic circuits and systems.
- To familiarize the characteristics operations, calibrations and applications of the oscilloscope
- to analyse and interpret test results and measurements on electric circuits, in terms of theoretical models, to predict the performance of electric circuits from device characteristics and to design an electronic printed circuit board for a specific application using industry standard software
- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

Course Outcomes:

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

CO1	To acquire the knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor
CO2	Analysis of Single Phase AC Circuits, the representation of alternating quantities and determining the power in these circuits
CO3	Able to Measure the amplitude and frequency utilizing oscilloscope and analyze the fabrication processes of printed circuit boards
CO4	Apply wood working skills in real world applications. Build different parts with metal sheets in real world applications
CO5	Apply fitting operations in various applications
CO6	Apply different types of basic electric circuit connections

S. No	Title of the Experiment
1	• Passive Electronic Components • Color code for resistors • Coding for capacitors • Prototyping aids
2	• Active Electronic Components • Power sources
3	• Cathode Ray Oscilloscope (CRO) • Multi meters • DC Power Source • Signal Generator
4	• Printed Circuit Board • Soldering Practice (Soldering & De soldering)
5	**Fitting Trade -** To make a L- fit from the given M.S Flat material piece.
6	**Carpentry Trade -** To make a cross lap joint as per specification.
7	**Tin Smithy –** To make a open scoop with the given sheet metal
8	**Foundry:** To prepare a sand mould using a single piece pattern.
9	Residential house wiring using fuse, switch, indicator, lamp and energy meter
10	Tube light wiring
11	Go Down Wiring
12	Stair case wiring

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

III – SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2014 – 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	30	70	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

A2002 – Mathematics – I
A2010 – Mathematics – II

2. Course Outcomes (COs)

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

A2014.1	Apply Laplace transforms to solve ordinary differential equations.
A2014.2	Build Fourier series and Fourier transforms of a given function.
A2014.3	Apply numerical methods to solve algebraic and transcendental equations.
A2014.4	Derive interpolating polynomials using interpolation formulae
A2014.5	Solve differential and integral equations numerically.

3. Course Syllabus

UNIT I

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, 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*, 43rd Edition, Khanna Publishers, New Delhi, 2014.
2. T K V Iyengar, B Krishna Gandhi, S Ranganatham, M V S S N Prasad, *Mathematical Methods,* 8th Edition, S Chand& Company Pvt. Ltd, 2013

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*, 5th Edition, PHI learning private limited,2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2101 – 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	30	70	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

A2303 – Engineering Mechanics

2.Course Outcomes (COs)

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

A2101.1 Interpret simple stresses and strains to find out various properties of materials

A2101.2 Develop bending moment and shear force diagrams of beams subjected to different loading conditions

A2101.3 Compute flexural and shear stresses across various sections to plot the stress distribution envelops

A2101.4 Apply various theorems such as Mohr's, Double integration, Conjugate beam etc., to find slope and deflections of beams

A2101.5 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.6thEdition2019
2. R.C. Hibbeler*, Mechanics of Materials*, Pearson Education, 9th edition, 2014.

Reference Book(s)

1. R.K Rajput, *Strength of Materials*, Chand& Company Ltd6thEdition 2015.
2. B.C Punmia, Ashok Kumar Jain, N Arun Kumar, *Mechanics of Material,* Laxmi Publications*,*10thedition 2001
3. R. Subramanian, *Strength of Materials,* Oxford University Press 3rd edition 2016

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A2102 – 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	30	70	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, theodolite, total station 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:

A2102.1 Compute Linear measurement and angles using compasses, chain to prepare plans and maps

A2102.2 Determine elevations of station points along the irregular intervals to prepare contour maps and to calculate the volume of earth work

A2102.3 Measure horizontal angles by Theodolite for a traverse to find areas and elevations

A2102.4 Apply surveying principles for setting out simple curves by using different methods and compare fixed and movable hair method in tachometric surveying

A2102.5 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, conventional symbols and code of signals, surveying accessories, measurement of distances and directions linear distances direct methods- chains-tapes, ranging, tape corrections, indirect methods, EDM

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

Plane table surveying-Introduction, accessories, setting up of plane table, techniques, testing, adjustments, errors, 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, determination of volume of earth work in cutting and embankments, 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 tunnel alignment, underground surveys-connection of surface and underground surveys-levelling in tunnels.

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

4. Books and Materials

Text Book(s)

1. B.C. Punmia, *Surveying Volume 1 and 2,* Laxmi Publications Pvt. Ltd., New Delhi, 4th edition 2016.
2. S.S Bhavikatti, *Surveying theory and Practice,* Dreamtech press, Wiley distributors New, 2nd 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. K.R. Arora, *Surveying*, Standard Book House, New Delhi,3rd edition, 2017.
3. C Venkatramaiah, *Text book of surveying*, Universities press,2nd edition2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2103 – BUILDING MATERIALS 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	30	70	100

1. Course Description

Course Overview

The course deals with various building materials used in construction. It gives in-depth knowledge about traditional and modern construction materials like fine aggregate, coarse aggregate, wood, cement and insulating materials. It also deals with structural components and internal elements such as foundation, masonry and plastering etc. This course will provide the knowledge of basic interior works like painting, false ceiling etc.

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:

A2103.1	Identify suitable materials to be used for construction works
A2103.2	Make use of sustainable materials for eco-friendly construction
A2103.3	Interpret various insulating materials for thermal and sound proof construction
A2103.4	Categorize various structural components employed in civil engineering structures
A2103.5	Identify different internal construction activities for the finishing works

3. Course Syllabus

UNIT I

Introduction to building materials: Traditional & Organic Building Materials, Stone, Dressing of Stones, Modern Building Materials, Bricks-Manufacturing process, Cement–Manufacturing Process, Types and various tests, Ceramic Products – Manufacturing Process, Building Materials for Low Cost Housing, Functions of Glass in Buildings, Constituents and Classification of Glass, Manufacturing Process, Properties of Glass, Classification of Plastics, Commonly Used Plastics, Applications.

UNIT II

Building materials for sustainable construction: Introduction, Substitute for scarce materials, Ferro-cement, Gypsum boards, Timber substitutions, Industrial wastes, Agricultural wastes, cement, soil blocks for masonry, Stabilized mud construction, Adoption of pre-cast R.C. plank and joint system for roof/floor in the building.

UNIT III

Insulating materials: Thermal Insulating Materials: Thermal Insulation, Heat Transfer Fundamentals, Thermal Properties of Insulating Materials, Selection of Insulating Materials Classification of Insulation materials, Reflective Insulation Systems, Commonly Used Building Insulation Materials, National Standards. Sound Insulating Materials: Basics of Acoustics, Sound Absorption or Insulation, Green Insulation, National Standards.

UNIT IV

Structural components: Foundations, Classification of Foundations, Consideration in selection of foundation types, Masonry, English and Flemish Bonds, Brick and block walls, Cavity walls, Damp-proof courses and membranes, Mortars, Arches and openings, Windows, Glass and glazing, Doors, Stairs, Types and Applications, Cladding to external walls, Flat roofs, Dormer windows, Formwork & Scaffolding, Precast concrete frames, Portal frames, Framed structures, Panel walls, National Standards.

UNIT V

Internal construction and finishes: Internal elements, Internal walls, Construction joints, Internal walls, fire protection, separating walls, Partitions, Plasters and plastering, Domestic floors and finishes, Timber, concrete and metal stairs–Internal doors, Door sets, Fire resisting doors, Plasterboard ceilings, Suspended ceilings, Paints and painting, Components of Paints, Types of Paint, Considerations in Selecting Paints, Cement Paints, Oil Paints, Emulsion Paints, Whitewash and Colourwash, Application of Paints Distempers, Varnishes, Safety, Joinery production, Composite boarding, National Standards.

4. Books and Materials

Text Book(s)

1. S.C. Rangawala, *Engineering Materials (Material Science)*, charotar Publishing House, 4th edition, 2013.
2. B.C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, *Building Construction*, Laxmi Publications (P) ltd., 2nd Edition, 2005.

Reference Book(s)

1. M L Gambhir, Building Materials, TMH Publishers, 3rdEdition, 2014
2. S.K Duggal, *Building Material*, Routledge Publishers, 3rdEdition, 2017.
3. G C Sahu, Joygopal Jena, *Building Materials and Construction,* McGraw hill Pvt Ltd, 2015.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A2104 – MECHANICS OF FLUIDS

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

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:

A2104.1 Make use of conservation laws of mass, momentum and energy to find properties of fluids

A2104.2 Compute the force of buoyancy on submerged and floating bodies to locate metacentre

A2104.3 Apply Euler's and Bernoulli's equation to find the characteristics of fluid in motion

A2104.4 Identify various flow measuring devices to find the coefficient of discharge

A2104.5 Evaluate minor and major energy losses to solve complex pipe network systems

3. Course Syllabus

UNIT I

Introduction: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non-Newtonian fluids. Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers

Hydrostatic forces on surfaces: Total Pressure and Centre of Pressure on Horizontal Plane Surface; Vertical Plane Surface; Inclined Plane Surface and Curved Surfaces.

UNIT II

Buoyancy: Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacentre and metacentric height, analytical method for metacentric height.

Kinematics of fluid motion: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Path line; Streakline; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flow net; Vortex flow – free vortex and forced vertex flow.

UNIT III

Dynamics of fluid 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.

Flow measurements in pipes: Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube, pitot-static tube.

UNITIV

Flow through orifices and mouthpieces: Flow through Orifices: Classification of Orifices; Determination of coefficients for an Orifice Flow through large rectangular Orifice; Flow through submerged Orifice – fully sub-merged and Partially sub-merged. 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; End contractions; Velocity of approach; Cipolletti weir, Broad crested weir.

UNITV

Analysis of pipe flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

Laminar & turbulent flow in pipes: Reynolds's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe (Hazen Poiseuille equation). Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, 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
2. R K Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 10th Edition 2018.

Reference Book(s)

1. D Rama Durgaiah, Fluid Mechanics and Machinery by New Age International
2. S K Som& G Biswas, Introduction to Fluid Mechanics & Fluid Machines, Tata McGraw Hill publishers Pvt. Ltd 2nd Edition 2008.
3. M Narayana Pillai, *Principles of Fluid Mechanics and Fluid Machines,* Universities Press

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A2105 – 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

This course gives the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The students will able to assess the Geological hazard's and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.

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:

A2105.1 Identify various types of rocks by their physical properties.

A2105.2 Classify different types of rocks by their origins.

A2105.3 Judge the suitability of sites for various civil engineering structures.

A2105.4 Estimate the depth of location of rocks and water table by using different methods.

A2105.5 Make use of the geological strata knowledge in the analysis and design the civil engineering structures.

3. Course Syllabus

UNIT I

Introduction: Importance of Geology from Civil Engineering point of view, Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs, Importance of Physical geology, Petrology and Structural geology.

Weathering of rocks: Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like Granite.

Mineralogy: Definition of mineral, Importance of study of minerals, Different methods of study of minerals, Advantages of study of minerals by physical properties, Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT II

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous, Sedimentary

and Metamorphic rocks, distinguishing features, megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate. Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance In-situ and drift soils, common types of soils, their origin and occurrence in India

UNIT III

Ground water, earthquake & landslides: Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Landslides, their causes and effect, measures to be taken to prevent their occurrence, importance of study of ground water, earth quakes and landslides.

UNIT IV

Geophysical studies: Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods, Seismic methods, Radio metric methods and geothermal method, Special importance of Electrical resistivity methods, and seismic refraction methods, Improvement of competence of sites by grouting etc.

UNIT V

Geology of dams, reservoirs and tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site, Analysis of dam failures of the past, Factors contributing to the success of a reservoir, Geological factors influencing water Lightness and life of reservoirs, Purposes of tunnelling, Effects of Tunnelling on the ground Role of Geological Considerations (i.e. Tithological, structural and ground water) in tunnelling over break and lining in tunnels.

4. Books and Materials

Text Book(s)

1. N Chennkesavulu, *Engineering Geology*, McMillan Publications,3rd edition, 2005
2. Prabin Singh, *Engineering Geology*, Katson Publications, 2nd edition, 2013.

Reference Book(s)

1. D Venkata Reddy, Engineering *Geology*, Vikas Publications, 2nd edition, 2017.
2. S.K Duggal, *Engineering Geology*, Mac Graw Hill Publications, 3rd edition, 2017.
3. Subinoy Gangopadhyay, *Engineering Geology*, Oxford University press, 4th edition, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2106 – 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	2	0	0	28	1	30	70	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

A2101-Strength of Materials-I

2.Course Outcomes (COs)

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

A2106.1	Experiment with different types of materials to find the mechanical properties
A2106.2	Determine the Brinell and Rockwell hardness number to find the hardness of given specimen
A2106.3	Analyze elastic constants of spring and beam to design structural members
A2106.4	Determine toughness of materials using Charpy and Izod test
A2106.5	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

A2107 – SURVEYING 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	30	70	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, theodolite, total station, 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

A2102 – Surveying

2. Course Outcomes (COs)

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

A2107.1 Make use of conventional surveying instruments in plotting of a layout

A2107.2 Determine horizontal and vertical angles by Theodolite for a given traverse

A2107.3 Compute the difference in elevations using various levelling Instruments

A2107.4 Utilize Rankine's and two Theodolite methods to plot curves

A2107.5 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 Hight 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. Theodolite
6. Total Station

5. Books and Materials

Text Book(s)

1. B.C. Punmia, *Surveying Volume 1 and 2,* Laxmi Publications Pvt. Ltd., New Delhi, 4th edition 2016.
2. S.S Bhavikatti, *Surveying theory and Practice,* Dreamtech press, Wiley distributors New, 2nd 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. K.R. Arora, *Surveying*, Standard Book House, New Delhi,3rd edition, 2017.
3. C Venkatramaiah, *Text book of surveying*, Universities press,2nd edition2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2108 – ENGINEERING GEOLOGY 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	30	70	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 student will be able to:

A2108.1 Identify various minerals and rocks by their origin and properties

A2108.2 Apply geological features influencing rock masses and discontinuities

A2108.3 Measure strike and dip of the bedding planes

A2108.4 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.
2. Parbin Singh, Engineering and General Geology, Katson Publications, 4th edition, 2019

Reference Book(s)

1. P C Varghese. *Engineering Geology for Civil Engineers,* PHI Learning Private Limited, New Delhi, 2nd edition, 2012.
2. S.K Duggal, *Engineering Geology*, Mac Graw Hill Publications, 3rd edition, 2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2017 – QUANTITATIVE APTITUDE AND REASONING – I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	0	14	0	0	1	30	70	100

1. Course Description

Course Overview

The purpose of this course is to familiarize the students in quantitative and logical reasoning methods. The course introduces the fundamentals to enhance the quantitative and logical ability of students. The course also improves the problem-solving skills of the students. The logical and quantitative techniques are mainly useful in competitive level.

Course Pre/corequisites

This course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A2017.1	Identify the problems by applying mathematical fundamentals
A2017.2	Apply the suitable logical methods to solve the problems
A2017.3.	Solve the various problems by using quantitative mathematical fundamentals
A2017.4	Analyse the comprehensive data with logical ability

3. Course Syllabus

UNIT I

Coding and Decoding: Coding and Decoding, Arrow Method, Chinese coding, Series, Analogy, Odd man out.

Blood Relations: Introduction, Direct, Puzzle and Coded models.

UNIT II

Direction Sense: Introduction, Distance method, Facing Method and Shadow Method.

Data Arrangements: Linear Arrangement, Circular Arrangement, Multiple Arrangements.

UNIT III

Syllogisms: Introduction, Tick-Cross method, Inferential Technique, Venn-Diagram method.

Clocks: Introduction, finding angle between hands of clock, Gain/Loss of Time, finding time, Gain or loss of time.

Calendar: Calendars method- 1, Calendars method -2.

UNIT IV

Number System: Numbers, decimal fraction, surds and indices, remainder theorem, last digit, trailing of zeros and HCF and LCM.

UNIT V

Percentages: Fundamentals of Percentage, Percentage change, successive percentage.

Ratio and Proportion: Ratio, Proportion, Variations, Problems on Ages

Partnership, Profit and Loss: Basic terminology in profit and loss, Types of partnership, Problems related to partnership.

4. Books and Materials

Text Book(s)

1. R.S. Aggarwal (2017), *Quantitative Aptitude for competitive examinations,* latest edition, S Chand publishers.
2. Dinesh Khattear, *Quantitative Aptitude, vol-I*, Pearson Education.
3. Arun Sharma, *how to prepare for quantitative aptitude,* McGraw Hill Publishers.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A2031 – ENVIRONMENTAL SCIENCE

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 to create environmental awareness and consciousness among the present generation to become environmental responsible citizens. This course covers multidisciplinary nature of environmental studies, Natural Resources: Renewable and non-renewable resources; Ecosystems; Biodiversity and its conservation; Environmental Pollution; Social Issues and the Environment. Manufacture of Eco-friendly products, awareness on environment to the people; Human Population and the Environment; pollution control acts and Field Work. This course is divided into five chapters for convenience of academic teaching followed by field visits.

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

A2031.1 Solve environmental problems through higher level of personal involvement and interest

A2031.2 Apply ecological morals to keep up amicable connection among nature and human beings

A2031.3 Recognize the interconnectedness of human dependence on the earth's ecosystems

A2031.4 Apply environmental laws for the protection of environment and wildlife

A2031.5 Influence society in proper utilization of goods and services

3. Course Syllabus

UNIT I

Introduction: Environment Definition, The multidisciplinary nature of environmental studies, Scope and importance-Need for public awareness.

Natural Resources: Classification of resources: Renewable and Non-renewable resources. Forest resources: Uses and over exploitation of forests. Dams and their effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water, conflicts over water. Food resources: Problems with Chemical fertilizers and pesticides. Energy resources: Renewable energy resources: solar energy, wind energy and geothermal energy. Role of individual in conservation of natural resources

UNIT II

Ecosystems: Ecosystem Definition. Structure of an ecosystem: Producers, Consumers and Decomposers. Function of ecosystems: Food chains, food webs and energy flow in an

ecosystem. Ecological pyramids: Pyramid of number, Pyramid of biomass and Pyramid of energy. Introduction, types, characteristic features, structure and function of the following ecosystem. A) Forest ecosystem B) Dessert system C) Aquatic ecosystems (ponds, rivers, ocean, estuaries).

Biodiversity and Its Conservation: Introduction and definition. Levels of biodiversity**,** Bio geographical classification of India, Values of biodiversity (Consumptive value, productive value, Social, ethical and aesthetic value) Hot spots and Threats to biodiversity. In-situ and Ex-situ conservation of biodiversity.

UNIT III

Environmental Pollution: Definition, causes, effects and control measures of Air Pollution, Water pollution, Soil pollution, Nuclear hazards, Global warming, Acid rains and Ozone layer depletion. Role of an individual in prevention of pollution. Solid waste management and Disaster management: floods, earthquakes, cyclone and landslides.

UNIT IV

Social Issues and the Environment: Concept of sustainable development: Sustainable development goals. Threats to sustainability: Population explosion, crazy consumerism. Water conservation, Rainwater harvesting and environmental ethics. Environment Protection Act (Air, water, soil and wild life protection act)-Public awareness.

UNIT V

Human population and the Environment: population growth, variation, value education-HIV/AIDS-women and child welfare-Role of IT in environment and human health. Fieldwork-visit to a local area to document environmental assets.

- Visit to local polluted site – Urban/Rural/Industrial /Agricultural).
- Study of common plants, insects, birds.
- Study of simple ecosystem – pond, river, estuaries)

4. Books and Materials

Text Books:

1. Anubha Kaushik, C.P. Kaushik, *Environmental Studies*, 4th edition, New age international publishers, 2014.
2. Anil K DE., Environmental Chemistry, New Age International Publication, 9th Edition

Reference Books:

1. Erach Bharucha, *Textbook of Environmental Studies for Undergraduate Courses*. 1st edition, Universities press, 2005.
2. Benny joseph, *Environmental studies*, 3rd edition, McGraw Hill Education (India) Private Limited, 2018.

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COURSE STRUCTURE

IV –SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2019 – 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	30	70	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:

A2019.1 Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization.

A2019.2 Analyze the demand, production, cost and break even to know interrelationship among variables and their impact.

A2019.3 Classify the market structure to decide the fixation of suitable price.

A2019.4 Apply capital budgeting techniques to select best investment opportunity

A2019.5 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 Isocosts, 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

A2109 – 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	30	70	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

A2104 – Mechanics of Fluids

2. Course Outcomes (COs)

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

A2109.1 Apply Chezy's and Manning's equation to find geometric properties of channels

A2109.2 Analyze specific energy and flow conditions to find critical depth in various channels

A2109.3 Determine the characteristics of hydraulic jump in channels using momentum and specific energy equations

A2109.4 Evaluate force exerted by the jet of water on stationary and moving plates to understand the working principles of turbine

A2109.5 Assess the characteristics of hydraulic turbines and pumps to find the efficiency

3. Course Syllabus

UNIT I

Open Channel Flow-Uniform Flow: Introduction, Classification of flows, Types of channels; Flow analysis: The Chezy equation, Empirical formulae for the Chezy constant, Hydraulically efficient channel sections: Rectangular, Trapezoidal, Triangular and Circular channels; Velocity distribution; Energy and momentum correction factors. Application of Bernoulli's equation to open channel flow.

Open Channel Flow- Non – Uniform Flow: Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; discharge curve, Different slope conditions; Channel transitions- Reduction in width of a rectangular channel, Raised bottom in a rectangular channel, venture flume, Momentum principle applied to open channel flow; Specific force; Specific force curve.

UNIT II

Open Channel Flow- Gradually Varied Flow: Introduction, Dynamic equation; Dynamic equation for GVF in wide Rectangular channel, classification of channel bottom slopes, Surface Profiles; Characteristics of surface profiles, Back water Curves and Draw down curves; Examples of

various types of water surface profiles; Control section, Computation of surface profiles by single step method.

Open Channel Flow- Rapidly Varied Flow: Hydraulic jump; Elements and characteristics of hydraulic jump; Hydraulic jump in rectangular channels, height and length of the jump, Energy loss in a hydraulic jump, Types of hydraulic jump; applications of hydraulic jump; Location of hydraulic jump

UNIT III

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Torque and head transferred in rotodynamic machines.

Hydraulic Turbines-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; Pelton wheel: parts, Velocity triangles, work done and efficiency, working proportions, design of Pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

UNIT IV

Hydraulic Turbines – II: Main components and working, work done and efficiencies, design proportions; design of Francis turbine runner. Kaplan turbine: main components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitation: causes, effects.

Centrifugal Pumps: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies.

UNIT V

Dimensional Analysis and Similitude: Introduction, dimensions; Dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method; Buckingham – Pi theorem; model analysis; similitude-types of similarities; Dimensionless numbers; Model laws; Partially submerged objects; types of models; Scale effect.

Boundary Layer Theory& Drag and Lift: Boundary layer – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL. expression for drag and lift; Lift and Drag Coefficients; pressure drag, and friction drag; Streamlined and bluff bodies.

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
3. R K Bansal, *A text of Fluid mechanics and hydraulic machines*, Laxmi Publications (P) Ltd., New Delhi 10th Edition 2018.

Reference Book(s)

1. P. N. Modi & Seth, *Hydraulics and Hydraulic Machines*, Standard Book House Publishers, 18thEdition, 2011
2. N. Narayan Pillai, *Principles of Fluid Mechanics and Fluid Machines*, Universities Press (India), Hyderabad, 2nd Edition, 2009
3. Kothandaraman, Fluid Mechanics and Machinery - New Age Publishers

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2110 – WATER RESOURCES ENGINEERING – 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	30	70	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

A2104 – Mechanics of Fluids
A2109 – Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

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

A2110.1 Interpret rainfall data using different methods

A2110.2 Apply various methods to estimate surface and ground water hydrology components

A2110.3 Build the knowledge to connect hydrology with respect to field requirement

A2110.4 Design irrigation channels using silt theories

A2110.5 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 base flow.

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, 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 Mc Graw Hill Company, Delhi3rd Edition2008

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2111 – 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	30	70	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

A2303 – Engineering Mechanics
A2101 – Strength of Materials-I

2. Course Outcomes (COs)

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

A2111.1	Assess an inclined section to find principal stresses and strains using analytical and graphical methods
A2111.2	Design different types of shafts and springs subjected to torsion
A2111.3	Analyze failure of columns and struts for various end conditions by calculating the crushing load
A2111.4	Apply various theories of failure on the structural members for safe design
A2111.5	Design thin and thick cylinders subjected to fluid pressure

3. Course Syllabus

UNIT I

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

UNIT II

Torsion of circular shafts: Theory of pure torsion, derivation of torsion equation, assumptions made in the theory of pure torsion, polar section modulus power transmitted by shafts, combined bending and torsion, design of different types of shafts.

UNIT III

Columns and struts: Introduction ,types of columns ,short, medium and long columns, axially loaded compression members ,crushing load ,Euler's theorem for long columns, assumptions , derivation of Euler's critical load formulae for various end conditions ,equivalent length of a column, slenderness ratio , Euler's critical stress ,limitations of Euler's theory, long columns

subjected to eccentric loading , Secant formula ,empirical formulae , Rankine, Gordon formula-Straight line formula , Prof. Perry's formula

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 diameter, and volume of thin cylinders, thin spherical shells.

Introduction, 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 for thick cylinders, derivation of Lame's formulae, distribution of hoop and radial stresses across thickness, design of thick cylinders, compound cylinders, necessary difference of radii for shrinkage. Various Theories of failures like Maximum Principal stress theory, Maximum Principal strain theory, Maximum shear stress theory, Maximum strain energy theory, Maximum shear strain energy theory.

4. Books and Materials

Text Book(s)

1. RK Rajput, *Strength of Materials*, S Chand& Company Ltd, 6th edition, 2018.
2. R.K. Bansal, *Strength of Materials*, Lakshmi Publications House Pvt. Ltd., 6th edition, 2018.

Reference Book(s)

1. R Subramanian, *Strength of Materials*, Oxford University Press, 3rd edition, 2016.
2. R.C. Hibbeler*, Mechanics of Materials*, Pearson Education, 9th edition, 2014.
3. M L Gambhir, *Fundamentals of Solid Mechancis*, PHI Learning Pvt. Ltd, 3rd edition,2009.

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COURSE STRUCTURE

A2112 – STRUCTURAL ANALYSIS – 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	30	70	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

A2303 – Engineering Mechanics

A2101 – Strength of Materials-I

2. Course Outcomes (COs)

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

A2112.1	Interpret various energy theorems to find deflections in beams
A2112.2	Analyze the statically indeterminate members for various loading conditions
A2112.3	Develop shear force and bending moment diagrams for fixed and continuous beams
A2112.4	Apply Clapeyron's three moment theorem to find end and intermediate moments
A2112.5	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
2. Aslam Kassimali, *Structural Analysis*, Cengage Publishers, 6th Edition, 2016

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 HillPublishers.2nd Edition, 2008
3. S S Bhavikatti, *Structural Analysis* – Vikas Publishing House 4th Edition, 2008

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2113 – FLUID MECHANICS AND HYDRAULIC MACHINERY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	4	0	0	56	2	30	70	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

A2104 – Mechanics of Fluids
A2109 – Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

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

A2113.1	Calibrate flow measuring devices to check the rate of flow
A2113.2	Prove the validity of Bernoulli equation when applied to fluid flow patterns
A2113.3	Conduct experiments on flow measuring devices to find coefficient of discharge
A2113.4	Measure the impact forces produced by jet of water striking on flat and curved surfaces
A2113.5	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.

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G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2114 – COMPUTER AIDED DRAWING FOR CIVIL ENGINEERING

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

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

A2301-Engineering Graphics
A2103-Building Materials and Construction

2. Course Outcomes (COs)

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

A2114.1 Make use of different tools in AutoCAD to draw regular and irregular shapes

A2114.2 Modify existing drawings as per client requirements using necessary commands

A2114.3 Develop a plan, section and elevation of various structures to implement on site

A2114.4 Apply computer aided drawings to find sectional properties of structural components

A2114.5 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

A2018 – QUANTITATIVE APTITUDE AND REASONING – II

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	0	14	0	0	1	30	70	100

1. Course Description

Course Overview

The purpose of this course is to familiarize the students in quantitative methods. The course introduces the fundamentals to enhance the quantitative ability of students. The course also improves the problem-solving skills of the students. The logical and quantitative techniques are mainly useful in competitive level.

Course Pre/corequisites

This course has no specific prerequisite and corequisite.

2. Course Outcomes (COs)

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

A2018.1 Identify the problems by applying mathematical fundamentals.

A2018.2 Apply the suitable logical method to solve the problems.

A2018.3. Solve the various problems by using quantitative mathematical fundamentals.

A2018.4 Analyse the comprehensive data with logical ability.

3. Course Syllabus

UNIT I

Averages, allegation, and mixtures: Averages, Weighted average, Difference between mixture and allegation, %of mixture,3 mixtures allegation, removal, and replacement.

UNIT II

Time and work, pipes, and cisterns: Introduction, alternative approach, work and wages, chain rule, fraction of work, efficiency, leaving and join, group of persons.

Pipes and Cisterns: Introduction, filling and emptying, alternative taps.

UNIT III

Time, Speed and Distance: Introduction, late /early/usual time, average speed, relative speed, chasing, Races and games.

Problems on trains: introduction, relative speed, average speed, chasing, crossing problems.

Boats and streams: introduction, down steam and upstream, average speed, relative speed.

UNIT IV

Permutations, Combinations and Probability: Fundamentals counting principle, Definition of Permutation, Seating arrangement, Problems related to alphabets, Rank of the word, Problems related to numbers, Circular permutation, Combination.

Probability: Introduction, coins, dice, cards, Colour balls.

UNIT V

Menstruation: Introduction, 2-D and 3-D areas and volumes, Inner and Outer circle problems.

4. Books and Materials

Text Book(s)

1. R.S. Aggarwal (2017), *Quantitative Aptitude for competitive examinations,* latest edition, S. Chand publishers.
2. Dinesh Khattear, *Quantitative Aptitude, vol-I*, Pearson Education.
3. Arun Sharma, *how to prepare for quantitative aptitude,* McGraw Hill Publishers.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2032 – HUMAN VALUES AND PROFESSIONAL ETHICS

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 has a significant role to play in the betterment of our society through ethics and values. It enables the student to understand the human values and their role in personal life and professional life to transform individuals with laws and conventions, and then aspiration to live an ethical life for benefit of the society and organization.

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:

A2032.1 Apply human values and ethics in professional life.

A2032.2 Develop the moral ideals to maintain good relationships with people.

A2032.3 Solve environmental related problems by keeping health of human being into consideration.

A2032.4 Make use of the fundamental rights and human rights in life for individual dignity

A2032.5 Build the sound health system both physically and mentally by practicing yoga, karate, sports etc.

3. Course Syllabus

UNIT I

Introduction and basic concepts of society: Family, community, and other community-based organizations, dynamics and impact, human values, gender justice.

channels of youth moments for national building - NSS & NCC, philosophy, aims & objectives; emblems, flags, mottos, songs, badge etc. roles and responsibilities of various NSS functionaries. Nehru yuva Kendra (NYK), activities – socio cultural and sports.

UNIT II

Fundamental rights and fundamental duties: Human rights, consumer awareness and the legal rights of the consumer, RTI.

Youth and crime, sociological and psychological factors influencing youth crime, peer mentoring in preventing crimes, awareness about anti-ragging, cybercrime and its prevention, role of youth in peace-building and conflict resolution, role of youth in nation building.

UNIT III

Environment issues: Conservation, enrichment and sustainability, climate change, waste management, natural resource management (rain water harvesting, energy conservation, waste land development, soil conservations and afforestation). Health, hygiene & sanitation, health education, food and nutrition, safe drinking water, sanitation, swatch bharatabhiyan.

UNIT IV

Disaster management: Role of youth in disaster management. Home nursing, first aid, civil/ self-defence, civil defence services, taekwondo, Judo, karate etc.,

Gender sensitization, understanding gender – gender inequality –challenges – domestic violence, initiatives of government – schemes, law; initiates of NGOs – awareness, movement.

UNIT V

Physical education: Games and sports, Biological basis of physical activity, benefits of exercise, physical, psychological, social, respiration, blood circulation. Yoga, protocol, postures, asanas, pranayama, kriyas, bandhas and mudras.

4. Books and Materials

Text Book(s)

1. Mike Martin and Roland Scherzinger, *Ethics in Engineering,* New York, McGraw Hill, 1996.
2. A.S. Chauhan, Society *and Environment,* Jain Brothers Publications, 6th Edition, 2006

Reference Book(s)

1. Govindarajan. M, Natarajan. S, Senthil Kumar. V.S, *Engineering Ethics*, Prentice Hall of India, 2004
2. Charles D Fleddermann, Engineering *Ethics*, New Jersey Prentice Hall, 2004 (Indian Reprint).
3. John R Boatright*, Ethics and the Conduct of Business*, New Delhi, Pearson Education, 2003

COURSE STRUCTURE

V –SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

B. TECH – CIVIL ENGINEERING

V SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2117	Design and Drawing of RC Structures	PC	3	0	0	3	30	70	100
A2118	Geotechnical Engineering-I	PC	3	0	0	3	30	70	100
A2119	Water Resources Engineering-II	PC	3	0	0	3	30	70	100
A2120	Structural Analysis-II	PC	3	0	0	3	30	70	100
	Professional Elective-I	PE	3	0	0	3	30	70	100
	Open Elective-I	OE	3	0	0	3	30	70	100
A2121	Soil Mechanics Laboratory	PC	0	0	2	1	30	70	100
A2122	Computer Aided Design Laboratory	PC	0	0	2	1	30	70	100
A2123	Socially Relevant Project-II	PW	0	0	2	1	100	0	100
A2034	Gender Sensitization	MC	2	0	0	0	100*	0	100
		TOTAL	20	00	06	21	340	560	900

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2117 – 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	30	70	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:

A2117.1	Make use of Indian Standard code provisions in designing reinforced concrete structures
A2117.2	Apply limit state design for serviceability, deflection and cracking
A2117.3	Justify the various modes of failure in reinforced concrete members
A2117.4	Design various reinforced concrete members to meet different loading conditions
A2117.5	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.

UNIT II

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

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

A2118 – GEOTECHNICAL ENGINEERING – 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	30	70	100

1. Course Description

Course Overview

The course deals with the basic concepts of soil mechanics. The formation and the mineralogy of soil are clearly illustrated in this course. 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.

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:

A2118.1	Evaluate the index and engineering properties of the soil
A2118.2	Determine the stress distributions in the founded soil
A2118.3	Analyze the compressibility of soils to obtain the coefficients
A2118.4	Assess the shear strength of the soils under different drainage conditions

3. Course Syllabus

UNIT I

Introduction: Soil formation – Soil structure and clay mineralogy – Mass- volume relationship – Relative density.

Index Properties Of Soils: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods –consistency limits and indices – I.S. Classification of soils

UNIT II

Permeability: PERMEABILITY: Soil water – capillary rise – Adsorbed water – flow of water through soils – Darcy's law- Permeability – Factors affecting permeability – laboratory determination of coefficient of permeability – Permeability of layered soils.

Seepage through soils: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flow nets: Characteristics and Uses.

UNIT III

Stress distribution in soils: Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart.

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

UNIT IV

Consolidation : Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre consolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods**.**

UNIT V

Shear strength of soils: Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters –strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength

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

A2119 – WATER RESOURCES ENGINEERING – 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	30	70	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

A2103 - Mechanics of Fluids

A2109- Hydraulics and Hydraulic Machinery

A2116 – Water Resources Engineering – I

2. Course Outcomes (COs)

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

A2119.1	Apply concepts of systems analysis for planning of water resources systems
A2119.2	Perform basic economic analysis to evaluate the economic feasibility of water resources and environmental engineering projects
A2119.3	Formulate and solve stochastic and fuzzy optimization problems for decision making under uncertainty
A2119.4	Formulate and solve deterministic optimization models for design and operation of water resources systems
A2119.5	Understand different aspects of design of hydraulic structures
A2119.6	Understand various hydraulic structures involved in cross drainage works

3. Course Syllabus

UNIT I

CANAL REGULATION WORKS: Canals falls, Necessity and location of falls, Types of falls, classification of falls, cistern design, roughening devices, design of sarda type fall, Canal regulators: off-take alignment, head regulators and cross-regulators, design of cross-regulator and distributary head regulator. Drainage – types of cross drainage works, selection of suitable type of cross drainage work, classification of aqueducts and siphon aqueducts.

UNIT II

STREAM GAUGING: Necessity, Selection of gauging sites, methods of Discharge Measurement: Area-Velocity method, Slope-Area method, Tracer method, Electromagnetic induction method,

Ultrasonic method, Measurement of depth – Sounding rod, Echo-sounder, Measurement of velocity: Floats – Surface floats, Sub–surface float or Double float, Velocity rod, Pitot tube, Current meter- rating of current meter, measurement of velocity, chemical method, Measurement of stage- Staff gauge, wire gauge, water stage recorder, bubble gauge recorder, stage-discharge curve.
Rivers – Classification of rivers, Meandering, Causes of meandering, Basic factors controlling process of meandering, Aggrading type of river, Degrading type of River, River training: objectives, Classification of river training works, Types of River training works, Guide banks, Marginal embankments, Groynes or spur, levees,bank protection, pitched islands.

UNIT III

RESERVOIR PLANNING: Introduction, Investigations for reservoir planning, Selection of site for a reservoir, Zones of storage in a reservoir, Storage capacity and yield, Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve, Determination of safe yield from a reservoir of a given capacity, Sediment flow in streams: Reservoir sedimentation, Life of reservoir, Reservoir sediment control, Flood routing, Methods of flood routing-Graphical Method(Inflow – storage discharge curves method).Dams - Introduction; Classification according to use, classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam, selection of site for a dam.

UNIT IV

GRAVITY DAMS: Introduction, Forces acting on a gravity dam, Combination of loading for design; Modes of failure, stability requirements, principal and shear stresses, Stability analysis, Elementary profile of a gravity dam, Practical profile of a gravity dam, Limiting height of a gravity dam- High and low gravity dams, Design of gravity dams–single step method, Galleries, Stability analysis of non–overflow section of Gravity dam, Earth Dams: Introduction, Types of earth dams, uses of failure of earth dams, Criteria for safe design of earth dams, Section of an earth dam, Design to suit available materials, Seepage control measures, Slope protection. Seepage through earth dam –graphical method

UNIT V

SPILLWAYS: Introduction, Types of spillways, Profile of ogee spillway, Energy dissipation below spillways for relative positions of jump height curve and tail water curve, stilling basins, Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons, Spillway crest gates-Types and description only. Water Power Engineering: Development of hydro power in India, Classification of hydel plants: runoff river plants, storage plants and pumped storage plants, low, medium and high head schemes, Investigation and planning; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines selection of suitable type of turbine, Scroll casing .draft tube and tail race, assessment of available power, definition of gross head, operating head ,effective head, Flow duration curve, Power duration curve, Load duration curve, Load curve, primary power and secondary power, installed capacity, dependable capacity, firm power, secondary power, power factor, load factor, capacity factor ,utilization factor and Diversity factor.

4. Books and Materials

Text Book(s):

1. Irrigation and Water Power Engineering by Punmia & Lal, Laxmi Publications Pvt. Ltd., New Delhi

Reference Book(s):

1. Irrigation Engineering and Hydraulic Structures by S. K. Garg; Khanna Publishers, Delhi. Outlet; Gibb's module; canal escape.
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

A2120 – STRUCTURAL ANALYSIS-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	30	70	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

A2111 – Structural Analysis – I

2. Course Outcomes (COs)

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

A2120.1 Interpret structural actions in statically determinate and indeterminate structures

A2120.2 Analyze three hinged arches, continuous beams and portal frames using displacement method of analysis

A2120.3 Apply flexibility and stiffness method of analysis for two span continuous beams subjected to sinking of supports

A2120.4 Determine support reactions, shear forces and bending moments in beams and frames subjected to vertical and lateral loads

A2120.5 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.

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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2121 – 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	30	70	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 behaviour of the soil under different loading conditions for the safe design of structures.

Course Pre/corequisites

A2119– Geotechnical Engineering – I

2. Course Outcomes (COs)

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

A2121.1 Determine the index properties of the soil

A2121.2 Evaluate the engineering properties of the soil

A2121.3 Assess the sub grade strength of roads and pavements

A2121.4 Measure the co efficient of permeability for cohesive and non-cohesive soils

A2121.5 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 the rate and magnitude of settlement in soils
9. Determination of unconfined compressive strength of a soil sample
10. Determination of shear strength by Tri-axial compression test
11. Determination of shear strength by Direct shear test.
12. Determination of shear strength by Vane shear test
13. Determination of C.B.R. of undisturbed and remoulded /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

A2122 – COMPUTER AIDED DESIGN 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	30	70	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

A2117 – Design and Drawing of Reinforced Concrete Structures
A2118 – Structural Analysis-II

2. Course Outcomes (COs)

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

A2122.1	Evaluate beams with different loading conditions
A2122.2	Analyze trusses and portal frames
A2122.3	Develop building component models
A2122.4	Design footings for residential and commercial structures
A2122.5	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
A2034 – 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:

A2034.1 Develop a better understanding of important issues related to gender in contemporary India

A2034.2 Sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender

A2034.3 Acquire insight into the gendered division of labour and its relation to politics and economics

A2034.4 Equip to work and live together as equals

A2034.5 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/>

COURSE STRUCTURE

VI –SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

PROGRAMME CURRICULUM STRUCTURE UNDER R19 REGULATIONS

B. TECH – CIVIL ENGINEERING

VI SEMESTER (III YEAR)									
Code	Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A2124	Concrete Technology	PC	3	0	0	3	30	70	100
A2125	Environmental Engineering-I	PC	3	0	0	3	30	70	100
A2126	Geotechnical Engineering-II	PC	2	0	0	2	30	70	100
A2127	Estimation Costing and Valuation	PC	3	0	0	3	30	70	100
	Professional Elective – II	PE	3	0	0	3	30	70	100
	Open Elective – II	OE	3	0	0	3	30	70	100
A2128	Concrete Technology Laboratory	PC	0	0	2	1	30	70	100
A2129	Environmental Engineering Laboratory	PC	0	0	2	1	30	70	100
A2020	Professional English Communication Skills	HS	0	0	2	1	30	70	100
A2130	Comprehensive Online Examination-II	PC	0	0	0	1	100	0	100
A2033	Indian Constitution	MC	2	0	0	0	100*	0	100*
	TOTAL		17	00	10	21	370	630	1000

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2124– 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	30	70	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 behaviour of fresh and hardened concrete. Students will also acquire knowledge on various types of special concretes like light weight concrete, fibre reinforced concrete, self-compacting concrete etc.

Course Pre/corequisites

A2104 – Building Materials and Construction

2. Course Outcomes (COs)

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

A2124.1 Evaluate the properties and the quality of the concrete materials

A2124.2 Measure the fresh and hardened properties of concrete

A2124.3 Classify various special concretes based on their performance

A2124.4 Assess the effects of physical properties of concrete

A2124.5 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

A2125 – ENVIRONMENTAL ENGINEERING-I

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	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/corequisites

A2004 – Engineering Chemistry
A2005 – Environmental Studies

2. Course Outcomes (COs)

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

A2125.1	Distinguish the physical, chemical and biological properties of the water samples
A2125.2	Interpret various treatments for drinking water, waste water and solid waste
A2125.3	Design treatment plants by forecasting population for drinking water, waste water and solid waste
A2125.4	Select appropriate distribution layout for municipal water supply
A2125.5	Measure and propose control measures for noise and air pollution in the environment

3. Course Syllabus

UNIT – I

Introduction: Importance and necessity of protected water supply systems, objectives of protected water supply system, flow chart of public water supply system, role of environmental engineer.

Water demand and quantity studies : Estimation of water demand for a town or city, types of water demands, per capita demand, factors affecting the per capita demand, variations in the demand, design period, factors affecting the design period, population studies, population forecasting studies.

Quality and analysis of water: Characteristics of water, physical, chemical and biological analysis of Water, physical, chemical and biological. Impurities in water, water borne diseases, drinking water quality standards

UNIT – II

Water treatment: layout and general outline of water treatment units , sedimentation , principles , design factors , coagulation-flocculation clarifier design , coagulants , feeding arrangements. filtration and chlorination: filtration , theory , working of slow and rapid gravity filters , multimedia filters , design of filters , troubles in operation comparison of filters ,

disinfection , theory of chlorination, chlorine demand, other disinfection practices, miscellaneous treatment methods .

Water distribution : distribution systems , requirements, layout of water distribution systems , design procedures, Hardy cross and equivalent pipe methods 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, waste detection and prevention.

UNIT – III

Introduction to sanitation :systems of sanitation , relative merits & demerits , collection and conveyance of waste water , sewerage , classification of sewerage systems, estimation of sewage flow and storm water drainage , fluctuations , types of sewers , hydraulics of sewers and storm drains , design of sewers , materials for sewers- appurtenances in sewerage , cleaning and ventilation of sewers .

Waste water collection and characteristics: conservancy and water carriage systems , sewage and storm water estimation , time of concentration , storm water overflows combined flow , characteristics of sewage , cycles of decay , decomposition of sewage, examination of sewage , B.O.D. , C.O.D. equations.

UNIT – IV

Waste water treatment: layout and general outline of various units in a waste water treatment plant , primary treatment , design of screens , grit chambers , skimming tanks , sedimentation tanks , principles of design , 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).

Air pollution: Types of pollutants, their sources and impacts, air pollution meteorology, air pollution control, air quality standards and limits.

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, W*ater Supply Engineering,* Khanna Publications, 33rd edition, 2010.
2. G.S. Birdi, *Water Supply and Sanitary Engineering,* Dhanpat Rai & Sons Publishers,9th edition 2010.

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

A2126 – GEOTECHNICAL ENGINEERING – 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	30	70	100

1. Course Description

Course Overview

This course is an extension to Geotechnical Engineering-I which deals with applications of soil mechanics. 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, group efficiency of piles and design aspects of well foundations.

Course Pre/corequisites

A2119 – Geotechnical Engineering – I

2. Course Outcomes (COs)

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

A2126.1 Determine the depth of foundation for various soil conditions

A2126.2 Assess the failure of slopes under different conditions

A2126.3 Evaluate the earth pressures acting on retaining walls

A2126.4 Calculate the bearing capacity of soils and foundation settlements

A2126.5 Estimate load carrying capacity of pile and pile group

3. Course Syllabus

UNIT I

Soil exploration: Need , Methods of soil exploration , Boring and Sampling methods , Field tests – Penetration Tests – Plate load test ,Pressure meter , planning of Programme and preparation of soil investigation report.

UNIT II

Earth slope stability: Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

UNIT III

Earth pressure theories: Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory, Rebhann's and Culmann's graphical method, retaining walls, types of retaining walls, stability of retaining walls.

UNIT IV

Shallow foundations: Types ,choice of foundation , Location of depth , Safe Bearing Capacity – Terzaghi's, Meyerhoff's and Skempton's Methods ,allowable bearing pressure - Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis.

UNIT V

Deep foundations: Types of piles, Load carrying capacity of piles based on static pile formulae, Dynamic pile formulae, Pile load tests; Load carrying capacity of pile groups in sands and clays – Settlement of pile groups. Well foundations- Types, Different shapes of wells, components of wells, functions and design criteria, sinking of wells, Tilts and shifts.

4. Books and Materials

Text Book(s)

1. K.R. Arora, *Soil Mechanics and Foundation Engineering*, Standard Publishers and Distributors, Delhi, 4th edition, 2009.
2. C. Venkata Ramaiah, *Geo-technical Engineering,* New Age Publications, 6th edition, 2018.

Reference Book(s)

1. B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, *Soil Mechanics and Foundations*, Laxmi Publications Pvt. Ltd., New Delhi, 17th edition, 2017.
2. T.N. Ramamurthy, T.G. Sitaram, *Geo-Technical Engineering,* S Chand Publications, 4thedition, 2005.
3. Das, B.M, *Principles of Foundation Engineering*, Thomson Engineering, 6th edition, 1999.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2127 – 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	30	70	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

A2104–Building Materials and Construction

2. Course Outcomes (COs)

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

A2127.1 Develop knowledge on various Building items, their standard units and principles

A2127.2 Apply quantity of each item for RCC buildings by different methods of estimation

A2127.3 Evaluate various types of contracts, valuations, tenders and specifications

A2127.4 Apply rates and bill preparation for different building elements

A2127.5 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

A2128– 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	30	70	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 behaviour of fresh concrete, its workability and strength in hardened state, which are used in the design of structural components.

Course Pre/corequisites

A2104 – Building Materials and Construction
A2124 – Concrete Technology

2. Course Outcomes (COs)

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

A2128.1 Evaluate various properties of cement and aggregate

A2128.2 Determine compressive strength of concrete by using non-destructive tests

A2128.3 Design concrete mix as per the site conditions and specifications of materials available

A2128.4 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

A2129 – ENVIRONMENTAL ENGINEERING 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	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

A2125 – Environmental Engineering-I

2. Course Outcomes (COs)

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

A2129.1 Discuss the importance of water and its quality analysis

A2129.2 Analyze various physico-chemical parameters of water in case of quality requirements

A2129.3 Assess complete water quality for domestic supplies

A2129.4 Suggest various types of treatment methods required to purify raw water with different contaminants

A2129.5 Analyze biological parameters of water in case of quality requirements

3. Course Syllabus

Perform the following experiments for a given sample of drinking water and waste water

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides
5. Determination and estimation of total solids, organic solids and inorganic solids
6. Determination of iron
7. Determination of dissolved oxygen
8. Determination of nitrogen
9. Determination of total phosphorous
10. Determination of biological oxygen demand (B.O.D)
11. Determination of chemical oxygen demand (C.O.D)
12. Determination of optimum coagulant dose
13. Determination of chlorine demand
14. Presumptive coli form test

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

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, 1st edition 1994.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2020 – PROFESSIONAL ENGLISH COMMUNICATION SKILLS

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

With increased globalization and rapidly changing industry expectations, employers are looking for the wide cluster of skills to cater to the changing demand. The introduction of the Advanced Communication Skills is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

Course Pre/corequisites

A2001 – Functional English
A2006 – English Language Communication Skills Laboratory
A2008 – English for Professional Communication

2. Course Outcomes (COs)

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

A2020.1	Build inferences and predictions based on the information provided in the context.
A2020.2	Choose academic vocabulary appropriately both in speaking and in writing.
A2020.3	Develop effective technical writing skills
A2020.4	Construct necessary skills to deliver presentation confidently for improving in respective domains
A2020.5	Apply language structures to construct good relations

3. Course Syllabus

Communication skills:

1. Reading Comprehension –General and Technical
2. Listening Comprehension
3. Vocabulary Development
4. Common Errors.

Writing skills:

1. Technical Report writing
2. Resume Preparation
3. E-mail Writing

Presentation skills:

1. Oral presentation
2. Power Point Presentation
3. Poster presentation

Getting ready for job:

1. Debates
2. Group discussions
3. Job Interviews

INTERPERSONAL SKILLS:

1. Time Management
2. Problem Solving & Decision Making
3. Etiquettes-Telephone and email etiquette.

4. Books and Materials

Text Book(s)

1. Rizvi, M. Ashraf, *Effective Technical Communication,* Noida, McGraw-Hill Education. 2009.

Reference Book(s)

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

COURSE STRUCTURE
A2033 – 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:

A2033.1 Understand historical background of the constitution making and its importance for building a democratic India.

A2033.2 Explain the role of President and Prime Minister.

A2033.3 Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

A2033.4 Understand the value of the fundamental rights and duties for becoming good citizen of India

A2033.5 Analyze the decentralization of power between central, state and local self-government.

A2033.6 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)

PROFESSIONAL ELECTIVES

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Professional Electives

Professional Elective - 1	
Course Code	**Title of the Course**
A2151	Cost Effective Housing Techniques
A2152	Remote Sensing and GIS
A2153	Hydropower Engineering
A2154	Disaster Management and Mitigation

Professional Elective - 2	
Course Code	**Title of the Course**
A2155	Construction Planning and Project management
A2156	Earthquake Engineering
A2157	Engineering Hydrology
A2158	Air Pollution and Control

Professional Elective – 3	
Course Code	**Title of the Course**
A2159	Bridge Engineering
A2160	Pavement Analysis and Design
A2161	Industrial Waste and Waste Management
A2162	Green Buildings

Professional Elective – 4	
Course Code	**Title of the Course**
A2163	Pre-stressed Concrete
A2164	Ground Improvement techniques
A2165	Watershed Management
A2166	Environmental Impact Assessment

Professional Elective – 5/MOOCs	
Course Code	**Title of the Course**
A2167	Maintenance and Repair of Structures
A2168	Urban Transportation and Planning
A2169	Design and Drawing of Irrigation Structures
A2170	Solid Waste Management

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2151 – 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	30	70	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

A2104 – Building Material and Construction

2. Course Outcomes (COs)

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

A2151.1 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

A2151.2 Choose housing policies and programs using concepts of GIS and MIS system in slums

A2151.3 Adopt innovative construction techniques for low cost housing

A2151.4 Make use of alternative building materials to condense overall cost of construction

A2151.5 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, Neighbourhoods'- 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 HOUSINGTECHNOLOGY:

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 ANDINFRASTRUCTURE 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. Requirement's 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
A2152 – REMOTE SENSING AND GIS

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

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

A2102 – Geomatics– I
A2110 – Geomatics– II

2. Course Outcomes (COs)

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

A2152.1 Distinguish the characteristics of satellites, platforms & sensors used in acquisition of remote sensing data.

A2152.2 Apply the concepts of Electro Magnetic energy spectrum and spectral signature curves in the practical problems

A2152.3 Apply GIS in land use, disaster management, ITS and resource information system

A2152.4 Interpret data for water resource applications

A2152.5 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, relief displacement, stereoscopy, fiducially points, parallax measurement.

UNIT II

Remote sensing: Electromagnetic spectrum, energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, spectral properties of water bodies, introduction to digital data analysis.

UNIT III

Geographic information system: Terminology, GIS categories, components, fundamental operations, framework for GIS, Data collection, data input and output, manual digitizing and scanning, Raster GIS, Vector GIS, Spatial data – Layers based GIS, mapping.

UNIT IV

GIS spatial analysis: Computational, visual analysis methods, vector, attribute data storage, data manipulation and analysis, integrated analysis of the spatial and attribute data.

UNIT V

Water resources applications: Rainfall, runoff, surface water mapping, flood and drought impact assessment and monitoring, reservoir sedimentation, water resources management and monitoring, ground water targeting, artificial recharge structures

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, 2ndedition,2017.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2153 – 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	4	30	70	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

A2103 - Fluid Mechanics
A2109- Hydraulics and hydraulic machinery

2. Course Outcomes (COs)

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

A2153.1 Analyze the requirements of hydropower based on flow and power duration curves

A2153.2 Determine storage capacity of various hydropower plants

A2153.3 Interpret various water conveyance systems to draw water from reservoirs

A2153.4 Design penstocks and turbines for power generation

A2153.5 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 equipments, 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

4. Books and Materials

Text Book(s)

1. M.M. Dandekar and K.N. Sharma, “Water Power Engineering”, Vikas Publishing House, New Delhi2nd edition 2002
2. Arora, K.R., *Irrigation Water Power and Water Resources Engineering*, Standard Book Company, 2nd edition 2002.

Reference Book(s)

1. Handbook of Hydroelectric Engineering – P.S. Nigam, 1985.
2. Modern Power System Planning – Wang
3. Hydropower Resources in India – CBIP

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2154 – 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	30	70	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

A2005 – Environmental Studies

2. Course Outcomes (COs)

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

A2154.1 Classify different kind of hazards/disasters and their effects on environment

A2154.2 Analyze the causes of hazards/disasters which effects human life

A2154.3 Apply disaster management strategies through engineering applications

A2154.4 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

Soil Erosion: 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.

UNIT-V

Emerging approaches in Disaster Management: 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

A2155 – 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	30	70	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/corequisites

A2104 – Building Materials and Construction

2. Course Outcomes (COs)

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

A2155.1 Build knowledge on roles and responsibilities of a project manager

A2155.2 Plan the construction facilities to expedite project activities

A2155.3 Develop schedule of activities to complete the construction project on time

A2155.4 Analyze and implement safety practices in construction industry

A2155.5 Create tender and contract document for a construction project

3. Course Syllabus

UNIT-I

Fundamentals of construction technology: Construction activities, processes, works, estimating, schedule, productivity and mechanized construction, construction documents, records, quality, safety, codes and regulations

UNIT-II

CPM & PERT: Development of project activity networks, precedence diagram method, critical path method, program evaluation and review technique, line balance methods in scheduling, time value of money, investment analysis, cost-benefit analysis

UNIT-III

Planning of construction facilities: Earthwork construction, equipment for construction, construction finances and decision making, cement concrete construction, construction of piles, cofferdams and tunnels

UNIT-IV

Construction techniques: Introduction to Building Information Modelling (BIM), Lean construction, and integrated project delivery in construction, crashing of project, cost optimization, invoicing, preparation of RA bill, safety in construction, estimation

UNIT-V

Contracts: Contracts in construction, fundamentals of delay analysis and claims, advances in construction management, tender document, deposits by the contractor, arbitration, negotiation

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
A2156 – EARTHQUAKE ENGINEERING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	1	0	42	14	0	4	30	70	100

1. Course Description

Course Overview

This course introduces the basics of Earthquake Engineering to study the behaviour of buildings due to earthquakes by different methods. This course also enable the students to design the shear walls and also detailing of earthquake resistance building components line beams, columns etc. according to various IS design codes.

Course Pre/corequisites

A2303 – Engineering Mechanics

A2101 – Strength of Materials-I

A2111 - Structural Analysis-I

A2118 - Structural Analysis-II

2. Course Outcomes (COs)

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

A2156.1 Apply the concept of theory of vibrations to earthquake engineering to find the building response

A2156.2 Make use of response spectrum graphs to find the maximum displacements of the building due to different ground motions

A2156.3 Analyze the multi degree of freedom structures by using seismic coefficient and response spectrum methods to find the drifts of the building.

A2156.4 Examine the latest Indian Seismic code IS: 4326 and IS: 13920 provisions for ductile detailing of R.C buildings

A2156.5 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 Engineering : Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicentre 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2157– 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	30	70	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

A2103 – Mechanics of Fluids

A2109 – Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

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

A2157.1 Analyze hydro-meteorological data using rain gauges, evapometer and barometers

A2157.2 Apply groundwater flow equations to aquifer parameters for computation of runoff

A2157.3 Compute yield from surface and subsurface basin

A2157.4 Develop rainfall-runoff models

A2157.5 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 hydro chemical data - Pollution of groundwater, sources. Sea water intrusion- Ghyben-Herzberg relationship –Method of control of sea water 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 16th edition,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, 2nd edition, 2002.
3. Reghunath. H M, Hydrology, New Age International Publications, 1987.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A2158 – 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	30	70	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 behaviour in the atmosphere.

Course Pre/corequisites

A2005 – Environmental Studies

2. Course Outcomes (COs)

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

A2158.1 Classify various sources and effects of air pollution

A2158.2 Analyze plume dispersion needs to control the pollutants

A2158.3 Interpret atmospheric properties with air quality-wind rose diagrams

A2158.4 Apply various methods for the control of particulates

A2158.5 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

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.

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 ofNox and Soxemissions, 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 – 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

Reference Book(s)

1. Thod Godish. *Air Quality*, Levis Publishers, Special India Edition, New Delhi, 5th edition 2016
2. Rao C.S. *Environmental Pollution Control Engineering*, New Age International Publishers, 6th edition 2006

OPEN ELECTIVES

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
A2181	Basic Civil Engineering	3-0-0	3	CE
A2182	Building Planning and Construction	3-0-0	3	CE
A2183	Disaster Management	3-0-0	3	CE
A2184	Water Resources Conservation	3-0-0	3	CE
A2281	Fundamentals of Electrical Engineering	3-0-0	3	EEE
A2282	Renewable Energy Sources	3-0-0	3	EEE
A2283	Electrical Measuring Instruments	3-0-0	3	EEE
A2381	Optimization Techniques	3-0-0	3	ME
A2382	Mechanical Technology	3-0-0	3	ME
A2383	Introduction to Automobile Systems	3-0-0	3	ME
A2481	Basic Electronics	3-0-0	3	ECE
A2482	Introduction to Communication Systems	3-0-0	3	ECE
A2483	Fundamentals of IoT	3-0-0	3	ECE
A2581	Basic Data Structures	3-0-0	3	CSE
A2582	Fundamentals of DBMS	3-0-0	3	CSE
A2583	Basics of Software Engineering	3-0-0	3	CSE
A2584	Python for Everyone	3-0-0	3	CSE
A2585	Computer Organization and Operating Systems	3-0-0	3	CSE
A2586	Fundamentals of Artificial Intelligence and Machine Learning	3-0-0	3	CSE
A2081	Management Science	3-0-0	3	H&S
A2082	Research Methodology	3-0-0	3	H&S
A2083	Intellectual Property Rights	3-0-0	3	H&S
A2084	National Service Scheme	3-0-0	3	H&S
A2085	Yoga	3-0-0	3	H&S
A2086	Design Thinking	3-0-0	3	H&S

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A2181 – 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	30	70	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:

A2181.1 Classify various materials and components used in building construction

A2181.2 List out different domains like Structural, Transportation and Geotechnical Engineering in Civil engineering stream

A2181.3 Identify types of soils and foundations for various structures

A2181.4 Measure the linear and angular parameters using concepts of surveying

A2181.5 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, levelling-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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A2182 – BUILDING PLANNING & 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	30	70	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 abuilding & 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:

A2182.1 Plan buildings by adhering to laws laid by regulatory bodies

A2182.2 Classify different masonry types of brick and stones used in construction

A2182.3 Select appropriate floors and roofs for a proposed building

A2182.4 Identify building materials which can be employed in construction

A2182.5 Make use of damp proofing techniques to prevent ingress of water in buildings

3. Course Syllabus

UNIT-I

Residential Buildings: Different types of residential buildings- detached house, semi- detached house, row house, 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, and double or purlin roofs, trussed roofs.

UNIT-IV

Doors and Windows: Introduction, Location of doors and windows, definition of technical terms, size of doors and windows, types of doors and windows, ventilators, fixtures and fastenings.

UNIT-V

Damp proofing: Introduction, Causes and effects of dampness on buildings, materials and methods used for 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. Dr.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
A2183 – 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	30	70	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:

A2183.1 Classify different kind of hazards/disasters and their effects on environment

A2183.2 Analyze the causes of hazards/disasters which effects human life

A2183.3 Apply disaster management through engineering applications

A2183.4 Apply suitable mitigation measures to minimize the effects of hazards and disasters

3. Course Syllabus

UNIT I

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: 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.

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
A2184 – 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	30	70	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:

A2184.1 Interpret ground and surface water utilization for conservation of water resources

A2184.2 Apply the concepts of artificial ground water recharge to increase ground water level

A2184.3 Make use of the concepts of harvesting for preservation of water

A2184.4 Utilize new technologies like ion exchange and UV radiation techniques to recycle and reuse waste water

A2184.5 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 & 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

4. Books and Materials

Text Book(s)

1. Ramakrishnan S. *Ground water*, Sci -Tech Publications, 2nd edition, 2010.

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

A2281 – 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	30	70	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:

A2281.1 Apply network reduction techniques and knowledge of alternating quantities to calculate current, voltage and power for complex circuits.

A2281.2 Analyze the electrical circuits using nodal analysis, mesh analysis and network theorems.

A2281.3 Demonstrate the working principle and operation of DC machines, AC machines and single-phase transformers.

A2281.4 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.

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

Network Theorems: Thevenin's, Norton's, Superposition and Maximum Power Transfer Theorems (DC Excitation only)

UNIT IV

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.

UNIT V

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.

1-phase Transformers: Principle of Operation, Constructional Details, E.M.F. equation, Losses and efficiency, OC& SC Tests.

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

A2282 – 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	30	70	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:

A2282.1 Apply the principles of Renewable energy sources for the construction of Power generating station.

A2282.2 Analyze the various energy conversion systems and their limitations.

A2282.3 Analyze Renewable energy sources for various environmental conditions

A2282.4 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 & Applications: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors. Storage & 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 & 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

A2283 – 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	30	70	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:

A2283.1	Categorise various electrical instruments used for measuring electrical parameters.
A2283.2	Design appropriate arrangement for extension of range in measuring instruments.
A2283.3	Analyze the errors and compensations in various electrical measuring instruments
A2283.4	Measure current, voltage, power and energy in 1-phase and 3-phase circuits
A1283.5	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

Instrument transformers: Current Transformer and Potential Transformer, ratio and phase angle error, error compensation problems.

UNIT III

Potentiometers: Principle and operation of D.C. Crompton's potentiometer, standardization, Measurement of unknown resistance, current, voltage.

UNIT IV

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.

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

A2381 – 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	30	70	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:

A2381.1 Apply various Operations Research models and methods to real world problems.

A2381.2 Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.

A2381.3 Evaluate various alternatives available to find optimal solution for real world problems.

A2381.4 Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.

A1381.5 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

A2382 – 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	30	70	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:

A2382.1 Identify the types of engines and their cycles.

A2382.2 Classify the reciprocating air compressors and their working principles.

A2382.3 Discus the constructional features of domestic refrigeration and air conditioning systems.

A2382.4 Inspect the mechanism of power transmission elements of various engineering systems.

A2382.5 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

A2383 – INTRODUCTION TO AUTOMOBILE 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	30	70	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:

A2383.1 Identify the different parts of the automobile systems used in daily life.

A2383.2 Analyze brakes, steering, axles, suspension and frames of an engine for better performance.

A2383.3 Inspect the mechanism of power transmission elements, and applications of various engineering systems.

A2383.4 Compare the significance of various engines in terms of their performance.

A2383.5 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, 13thedition, 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

A2481 – BASIC ELECTRONICS

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

This course provides fundamentals of electronics and an understanding of a range of discrete semiconductor devices, including design, construction and testing of experimental electronic devices. This course makes the students, get expertise in analyzing principle of operation of p-n junction diode, special diodes, rectifiers, BJT and FET.

Course Pre/corequisites

A2003 –Engineering Physics

2. Course Outcomes (COs)

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

A2481.1 Analyze the operation and characteristics of diodes and transistors.

A2481.2 Analyze various applications of diodes and transistors.

A2481.3 Make use of Boolean algebra postulates to minimize boolean functions.

A2481.4 Construct and analyze various combinational and sequential circuits used in digital systems.

3. Course Syllabus

UNIT I

Diode: Formation, forward and reverse bias, V-I characteristics, application as a switch, V-I characteristics of Zener diode, Zener diode as a regulator.

UNIT II

Rectifiers: Construction, operation of Half wave, Full wave and Bridge rectifier.

Transistors: formation, types, configurations, applications of BJT, FET, MOSFET.

Amplifiers: Basics, different types of amplifiers and their applications in public addressing systems.

UNIT III

Number systems: Review of number systems and their conversions, Representation of negative numbers, binary codes.

UNIT IV

Boolean algebra: Theorems and properties, canonical and standard forms of SOP/POS form, digital logic gates, universal gates.

UNIT V

Combinational circuits: basic logic gates, adders, subtractors, multiplexers and comparators.

Sequential circuits: SR, JK, T, and D latches and flip-flops.

4. Books and Materials

Text Book(s)

1. J. Millman, C. Halkias, *Electronic Devices and Circuits*, TMH, 4th edition, 2010.
2. M. Morris Mano, Michael D. Ciletti, *Digital Design*, 4th edition, Pearson Education/PHI, India, 2008.

Reference Book(s)

1. R.L. Boylestad and Louis Nashelsky, *Electronic Devices and Circuits*, Pearson Publications, 9thedition, 2006.
2. J.B. Gupta, *Electronic Devices and Circuits*, 3rd Edition, S.K. Kataria& Sons, 2008.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2482 – INTRODUCTION TO 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	30	70	100

1. Course Description

Course Overview

This course provides the basic concepts of communication systems such as signals, modulation, demodulation and multiplexing. This course also provides different modulation techniques used in analog and digital communication systems. In this course, students also learn about the operation of AM and FM receivers.

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:

A2482.1 Analyze the operation of basic communication system.

A2482.2 Compute the Fourier transform, energy and power of communications signals.

A2482.3 Compare the performance of different modulation schemes used in communication systems

A2482.4 Differentiate time division and frequency division multiplexing techniques.

A2482.5 Select an appropriate modulation technique while designing a communication system.

3. Course Syllabus

UNIT I

Operations on signals: Fourier series, Fourier transform, Energy, Power, Bandwidth, Sampling.

Communication Systems: Components, Analog and digital messages, channel effect, signal to noise ratio and capacity.

UNIT II

Modulation and Detection: Definition, transmission, multiplexing, demodulation.

Amplitude Modulation: Time domain representation, spectrum of AM, single tone AM, modulation and demodulation of DSB, DSBSC, SSB, VSB.

UNIT III

Angle Modulation: Phase modulation, Frequency Modulation.

Pulse Modulation: Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM).

UNIT IV

Digital Modulation schemes: ASK, FSK, PSK, M-ary PSK, QPSK.

UNIT V

Receivers and Multiplexing: AM receiver, FM receiver, Frequency-Division Multiplexing (FDM),

Time-Division Multiplexing (TDM)

4. Books and Materials

Text Book(s)

1. Simon Haykin and Michael Moher. *Introduction to Analog and Digital Communications*, JOHN WILEY & SONS, INC., 2nd edition, 2007.
2. B.P. Lathi and Zhi Ding. *Modern Digital and Analog Communication Systems*, Oxford University Press, 4th edition, 2010.

Reference Book(s)

1. Sham Shanmugam. *Digital and Analog Communication Systems*, Wiley-India edition,2006.
2. A. Bruce Carlson, and Paul B. Crilly. *Communication Systems,An Introduction to Signalsand Noise in Electrical Communication*, McGraw-Hill International Edition,5th edition, 2010.
3. Herbert Taub and Donald L Schilling. *Principles of Communication Systems*, Tata McGraw-Hill, 3rd edition, 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2483 – 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	30	70	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:

A2483.1 Analyze IoT applications using IoT enablers and connectivity layers, components.

A2483.2 Distinguish sensors and actuators in terms of their functions and applications

A2483.3 Interface I/O devices, Sensors using Arduino UNO.

A2483.4 Develop Raspberry Pi Interfacing programs using python concepts.

A2483.5 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, Mahendra Swain. *Internet of Things with Raspberry Pi and Arduino,* 1st edition, CRC Press, 2019

Reference Book(s)

1. Vijay Madisetti, ArshdeepBahga. *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

A2581 –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	30	70	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:

A2581.1 Analyze the time and space complexities of algorithms

A2581.2 Apply various operations on linear data structures

A2581.3 Design searching and sorting techniques for a given application

A2581.4 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. **Search-** Sequential Search, Binary Search, time complexity

UNIT V

Trees and Graphs: Trees- Examples, Vocabulary and Definitions, Binary Tree Applications, Tree Traversals, Binary Search Trees. **Graph-** Vocabulary and Definitions, Applications: BFS and DFS.

4. Books and Materials

Text Book(s)

1. Debasis Samanta. *Classic Data Structures*. Second Edition, PHI, 2014.

Reference Book(s)

1. G A Vijayalakshmi 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

A2582 – FUNDAMENTAL 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	30	70	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)

A2582.1	Apply suitable data models for given application
A2582.2	Design database using integrity constraints and ACID properties
A2582.3	Construct optimized SQL queries to solve real time problems
A2582.4	Apply suitable normal form to eliminate data redundancy
A2582.5	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, 3rdedition, 2014.

Reference Book(s)

1. A. Silberschatz, H.F. Korth, S.Sudarshan ,*Database System Concepts*, McGraw Hill, 6th edition, 2012.
2. RamezElmasri, Shamkat B. Navathe, *Database Systems,* Pearson Education, 6th edition 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2583 – 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	30	70	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:

A2583.1 Apply the phases of software development life cycle in application development

A2583.2 Identify software requirements for construction

A2583.3 Design requirement engineering process for change management

A2583.4 Apply the design concepts for design models

A2583.5 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

A2584 –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	30	70	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:

A2584.1 Apply the basic constructs of Python to solve problems

A2584.2 Organize lists, tuples and dictionaries appropriately to solve complex problems

A2584.3 Build functions to increase code reusability

A2584.4 Implement modular programming for organized software development

A2584.5 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 NamdevKamthane, 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. ReemaThareja. *Python programming using problem solving approach*. Oxford, 2019.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A2585 – COMPUTER ORGANIZATION 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	30	70	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:

A2585. 1 Analyze the fundamentals of computer organization in designing a system

A2585.2 Apply the concepts of programming language to solve system problems

A2585.3 Make use of the Operating Systems design structure and its services for system programming

A2585.4 Develop Process Scheduling algorithms and Inter-Process Communication systems for resource management

A2585.5 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

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

A2586 – FUNDAMENTALS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

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

This course provides the insight of basic Artificial Intelligence concepts along with fundamentals of machine learning, deep learning and neural networks. It covers math-heavy topics, such as regression and classification illustrated by Python examples. In addition, it also focuses on AI with search techniques and machine learning types. This course helps the students to choose their career path in trending Artificial Intelligence related technologies.

Course Pre/Corequisites

The course has no specific prerequisite and co-requisites.

2. Course Outcomes (COs)

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

A2586.1 Analyze different fields in which AI is applied

A2586.2 Apply suitable search strategies in finding better solution for a given problem

A2586.3 Identify linear regression with single and multiple variables

A2586.4 Perform predictive analysis using decision trees and random forest classifier

A2586.5 Implement deep learning neural network models with Tensor Flow

3. Course Syllabus

UNIT I

Principles of Artificial Intelligence: Introduction, Fields and Applications of Artificial Intelligence, AI Tools and Learning Models, Role of Python in Artificial Intelligence

UNIT II

AI With Search Techniques: Introduction, heuristics, Uniformed and informed search strategies, Path finding with the A* Algorithm.

UNIT III

Regression: Introduction, Linear Regression with One Variable, Linear Regression with Multiple Variables, Polynomial and Support Vector Regression.

UNIT IV

Classification: Introduction, Fundamentals of Classification, Classification with Support Vector Machines, Introduction to Decision Trees, Random Forest Classifier.

UNIT V

Machine Learning with Neural Networks: Introduction, Machine Learning Types, Tensor Flow for Python, Introduction to Neural Networks, Deep Learning.

4. Books and Materials

Text Book(s)

1. Zsolt Nagy, *Artificial Intelligence and Machine Learning Fundamentals*, Packt publishing, 2018.

Reference Book(s)

1. Dheeraj Mehrotra, *Basics of Artificial Intelligence & Machine Learning*, Notion Press, 1st edition 2019.
2. Neil Wilkins, *Artificial Intelligence: An Essential Beginner's Guide to AI, Machine Learning, Neural Networks, Deep Learning*, Bravex Publications, 2019.

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COURSE STRUCTURE

A2081 – 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	30	70	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:

A2081.1 Apply the concepts, theories, and principles of management in professional life.

A2081.2 Design suitable organization structure for managing the operations in the organization.

A2081.3 Apply principles of management to the various functional areas of an organization such as Human Resource, Marketing and Production

A2081.4 Evaluate cost and time of each business project by using PERT and CPM techniques.

A2081.5 Formulate the new strategies that enhance competitive edge.

3. Course Syllabus

UNITI

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.

UNITII

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

UNITIII

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

UNITIV

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 (Simple Problems).

UNITV

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) levies, 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)

1. 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.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A2082 – 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	30	70	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:

A2082.1 Interpret the importance of literature survey to identify the research problem.

A2082.2 Develop suitable research methodologies to conduct engineering research.

A2082.3 Apply the principles of research to gather the required data from various sources

A2082.4 Evaluate the gathered data by using appropriate statistical techniques.

A2082.5 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 Design

need 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: Chisquare, student's t-test, Regression modelling, Direct and Interaction effects, ANOVA, F-test, Time Series analysis, Autocorrelation and Autoregressive modelling

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 SuvasisSaha, *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

A2083- 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	30	70	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:

A2083.1 Analyse ethical and professional issues which arise in the intellectual property law context.

A2083.2 Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.

A2083.3 Analyse the social impact of intellectual property law and policy.

A2083.4 Make use of copyrighted material so that it does not obstruct the progress of human knowledge

A2083.5 Analyze IPR policies before filing patentable inventions and discoveries.

3. Course Syllabus

UNITI

Introduction to Intellectual Property: Introduction, Types of Intellectual Property, International Organizations, Agencies and Treaties, Importance of Intellectual Property Rights.

UNITII

Trade Marks: Purpose and Function of Trade Marks, Acquisition of Trade Mark Rights, Protectable Matter, Selecting and Evaluating Trade Mark, Trade Mark Registration Processes.

UNITIII

Law of Copy Rights: Fundamentals 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 Bansl& 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
A2084 – 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	30	70	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:

A2084.1 Classify the organizational structure of NSS and its activities.

A2084.2 Identify the methods of mobilization and importance of youth Leadership.

A2084.3 Develop a sense of social and civic responsibility and provide solutions to individual and community problems

A2084.4 Recognize the need for lifelong learning capabilities with the concepts of volunteerism and its functions.

A2084.5 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 Shramadan: Indian Tradition of volunteerism, Needs & Importance of volunteerism, Motivation and Constraints of Volunteerism, sharamadan 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, by. 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
A2085 – 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	30	70	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

A2085.1 Improve physical conditioning related to flexibility through participation in yoga.

A2085.2 Develop and maintain a personal yoga practice.

A2085.3 Recognize and apply the value and benefits of an on-going yoga practice

A2085.4 Select as an appropriate for personal needs

A2085.5 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, Yogic Diet

4. Books and Materials

References:

1. Georg Feuerstein (2002) The Yoga Tradition: Its History, Literature, Philosophy and Practice. New Delhi. Bhavana Books & Prints.
2. Joshi, K.S. (1985) Yoga in daily life, Delhi: Orient paper backs
3. Taimni I.K. (1961/1999) The Science of Yoga (The Yoga Sutras of Patanjali),The Theosophical Publishing House, Adyar.

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COURSE STRUCTURE

A2086 - 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	30	70	100

2. 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 behaviours (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:

A2086.1	Appreciate various design processes for creativity and innovation
A2086.2	Develop design ideas through different techniques
A2086.3	Identify the significance of reverse engineering about products
A2086.4	Make use of design drawings to communicate ideas effectively
A2086.5	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.

3. 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