G. Pullaiah College of Engineering and Technology

(Autonomous)

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

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

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS
GPCET – R23

B.Tech Regular Four Year Degree Programme
(For the batches admitted from the academic year 2023- 2024)
(For the batches admitted from the academic year 2024- 2025)
(For the batches admitted from the academic year 2025- 2026)
&
B.Tech (Lateral Entry Scheme)
(For the batches admitted from the academic year 2024 - 2025)
(For the batches admitted from the academic year 2025 - 2026)
(For the batches admitted from the academic year 2026 - 2027)

Preliminary Definitions and Nomenclature

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Regulations: The regulations, common to all B.Tech programs offered by Institute, are designated as "GPCET Regulations – R23" 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 normally 90 working days. Odd semester commences usually in July and even semester in December of every year.

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

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

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

G. Pullaiah College of Engineering and Technology

(Autonomous)

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

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

Academic Regulations (Scheme -2023) for B. Tech (Regular-Full time)

(Effective for the students admitted into I year from the Academic Year 2023-24 onwards

1. Award of the Degree

a) Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

I. Pursues a programme of study for not less than four academic years and 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 in addition to the maximum period permitted for graduation (Eight years).

II. Registers for 163 credits and secures all 163 credits.

b) Award of B.Tech. degree with Honors if he/she fulfils the following:

I. Secures additional 15 credits fulfilling all the requisites of a B.Tech. programme i.e., 163 credits.

II. Completes the Honors simultaneously with B.Tech programme.

However, registering for Honors is optional

2. Students, who fail to fulfil all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. programme and their admission stands cancelled. This clause shall be read along with clause 1 (a) (i).

3. Courses of study

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

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

4. Program related terms

(a) Credit: A unit by which the course work is measured. It determines the number of hours of instruction required per week. One credit is equivalent to one hour of Teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit Definition:

1 Hr. Lecture (L) per week	1credit
1 Hr. Tutorial (T) per week	1credit
1 Hr. Practical (P) per week	0.5 credit
2 Hrs. Practical (Lab) per week	1credit

(b) Academic Year: Two consecutive (one odd + one even) semesters constitute one academic year.

(c) Choice Based Credit System (CBCS): The CBCS provides a choice for students to select from the prescribed courses

5. Semester/Credits:

a. A semester comprises of 90 working days and an academic year is divided into two semesters.

b. The summer term is for eight weeks during summer vacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exit after two semesters or four semesters of study.

c. Regular courses may also be completed well in advance through MOOCs satisfying prerequisites

6. Structure of the Undergraduate Programme

All courses offered for the B.Tech programmes are broadly classified as follows

S.No	Category	Breakup of Credits (Total 163)	Percentage of Total Credits	AICTE Recomendation (%)
1	Humanities and Social Science including Management (HM)	13	8%	8-9%
2	Basic Sciences (BS)	20	13%	12-16%
3	Engineering Sciences (ES)	23.5	14%	10-18%
4	Professional Core (PC)	54.5	34%	30-36%
5	Electives – Professional (PE) & Open (OE); Domain Specific Skill Enhancement Courses (SEC)	36	21%	19-23%
6	Internships & Project Work (PR)	16	10%	8-11%
7	Mandatory Course (MC)	Non Credit	Non Credit	

7. Course Classification:

All courses offered for the B.Tech programmes are broadly classified as follows:

S.No	Broad Classification	Course Category	Description
1	Foundation Courses	Foundation Courses	Includes Mathematics, Physics and Chemistry; Fundamental Engineering courses; Humanities, Social Sciences and Management courses
S.No	**Broad**	**Course Category**	**Description**

	Classification		
2	Core Courses	Professional Core Courses (PC)	Includes subjects related to the parent discipline / department / branch of engineering
3	Elective Courses	Professional Elective Courses (PE)	Includes elective subjects related to the parent discipline/department/ branch of Engineering
		Open Elective Courses (OE)	Elective subjects which include interdisciplinary subjects or subjects in an area outside the parent discipline/ department/ branch of Engineering
		Domain specific Skill Enhancement Courses (SEC)	Interdisciplinary / Job-oriented / Domain courses which are relevant to the industry
4	Project & Internships	Project	B.Tech. Project or Major Project
		Internships	Summer Internships – Community based and Industry Internships; Industry oriented Full Semester Internship
5	Audit Courses	Mandatory non-credit courses	Covering subjects for developing desired attitude among the learners

8. Programme Pattern

- Total duration of the B. Tech (Regular) Programme is four academic years.
- Each academic year of study is divided into two semesters.
- There shall be mandatory Student Induction Program for freshers, with three-week duration before the commencement of first semester. The induction program includes Creative Arts, Universal Human Values, Physical activities, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations etc.,
- Health / Wellness / Yoga / Sports and NSS / Scouts & Guides / Community Service Activities are mandatory as credit courses for all the under graduate programmes.
- Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-credit mandatory courses for all the B.Tech Programmes.
- Design Thinking for Innovation & Tinkering Labs are mandatory credit courses for all the B.Tech Programmes.
- There shall be Five Professional Elective courses and Four Open Elective courses.
- Professional Elective Courses, include the elective courses relevant to the chosen specialization/branch. Proper choice of professional elective courses help the studentsspecializing in emerging areas within the chosen field of study.
- A total of four Open Electives are offered in the curriculum. A student can complete the requirement for B.Tech. Degree with a Minor within the 163 credits by opting for the courses offered through various verticals / tracks under Open Electives.
- While choosing the electives, students shall ensure that they do not opt for the courses with syllabus contents similar to courses already pursued.
- A pool of interdisciplinary / job-oriented / domain skill courses which are relevant to the industry are integrated into the curriculum of all B.Tech Programmes. There shall be five skill enhancement courses offered during III to VII semesters. Among the five skill courses, four

courses shall focus on the basic and advanced skills related to the domain/interdisciplinary courses and the other shall be a soft skills course.

- Students shall undergo mandatory summer internships, for a minimum of eight weeks duration at the end of second and third year of the programme. The internship at the end of second year shall be community oriented and industry internship at the end of third year.
- There shall also be mandatory full internship in the final semester of the programme along with the project work.
- B.Tech Degree with Honors is introduced for the students having good academic record.
- The College shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various B.Tech Programmes and will help students in learning basic and advanced concepts through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.
- The college shall assign a faculty advisor / mentor to a group of students from same department to provide guidance in courses registration / career growth / placements / opportunities for higher studies / GATE / other competitive exams etc.
- 25% of course work for the theory courses in every semester shall preferably be conducted in the blended mode of learning.

9. Evaluation Process

The performance of a student in each semester shall be evaluated course wise with a maximum of 100 marks for theory and 100 marks for practical course. Summer Internships shall be evaluated for 100 marks, Full Internship & Project work in final semester shall be evaluated for 100 marks, mandatory courses with no credits shall be evaluated for 30 mid semester marks.

A student has to secure not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the mid semester and end examination marks taken together for the theory, practical, design, drawing subject or project etc. In case of a mandatory course, he/she should secure 40% of the total marks.

(a) Theory Courses

Assessment Method	**Marks**
Continuous Internal Assessment	30
End Examination	70
Total	**100**

For theory course, the distribution shall be 30 marks for Continuous Internal Assessment and 70 marks for the End Examination.

For practical course, the distribution shall be 30 marks for Continuous Internal Assessment and 70 marks for the End Examination.

If any course contains two different branch subjects, the syllabus shall be in two parts with 3 units each (Part-A and Part-B) and external examination question paper shall be set with two parts each for 35 marks.

If any course contains both theory and practical components, they will be evaluated separately as theory course and practical course.

Continuous Internal Assessment

- For theory courses, during the semester, there shall be two sessional examinations. Each sessional examination shall be evaluated for 30 marks of which 05 marks for objective paper (20 minutes duration), 20 marks for subjective paper (90 minutes duration) and 05 marks for assignment.
- The Objective paper will be conducted for 10 marks which will be condensed to 05 marks. Similarly the Subjective paper will be conducted for 30 marks which will be condensed to 20 marks.
- There shall be 3 questions in Subjective paper and all questions are compulsory.
- In each of the questions from 1 to 3, there shall be either / or type questions of 10 marks each. Student shall answer any one of them.
- First sessional examination shall be conducted for I, II units of syllabus with one either or type question from each unit and third either or type question from both the units. The second midterm examination shall be conducted for III, IV and V units with one either or type question from each unit.
- If a student is absent for the sessional examination, no re-exam shall be conducted and the sessional examination marks for that examination shall be considered as zero.
- Final sessional marks shall be arrived at by considering the marks secured by the student in both the sessional examinations with 80% weight age given to the better sessional exam and 20% to the other.
- Assignments shall be in the form of problems, mini projects, design problems, slip tests, etc., depending on the course content.
- One Assignment before First Sessional examination and other before Second Sessional examination shall be conducted.
- In the case of Design/Drawing subjects the weightage shall be 20 marks for Sessional examinations and remaining 10 marks shall be for Day to Day class work

End Examination Evaluation:

The question paper for the End examination of theory courses shall have the following pattern:

- There shall be 6 questions and all questions are compulsory.
- Question No. 1 shall contain 10 (2 marks each) compulsory short answer questions for a total of 20 marks with 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.
- The questions from 2 to 6 shall be set by covering one unit of the syllabus for each question.
- The question paper for End examination of theory courses consisting of two parts of different course, for Example: Basic Electrical & Electronics Engineering shall have the following pattern: Question paper shall be in two parts viz., Part A and Part B with equal weight age of 35 marks each. In each part, question 1 shall contain 5 (1 mark each) compulsory short answer questions for a total of 5 marks.

  In each part, questions from 2 to 4, there shall be either / or type questions of 10 marks each. Student shall answer any one of them. The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.
- The end examination question paper for courses like Engineering Graphics, shall consists of 5 either or type questions of 14 marks each. There shall be no objective type questions in the end examination.

(b) Practical Courses

Assessment Method	Marks
Continuous Internal Assessment	**30**
End Examination	**70**
Total	**100**

- For practical courses, there shall be a continuous assessment during the semester for 30 marks and end examination shall be for 70 marks.
- Day-to-day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the day to day work / record, and 15 marks for the internal test.
- The end examination shall be evaluated for 70 marks, conducted by the concerned laboratory teacher and a senior expert/external examiner in the subject
  Procedure: 20 Marks
  Experimental work & Results: 30 marks
  Viva voce: 20 marks.
- In a practical course consisting of two parts (Eg: Basic Electrical & Electronics Engineering Lab), the end examination shall be conducted for 70 marks as a single laboratory in 3 hours. Internal assessment shall be as above for 30 marks in each part and final internal assessment marks shall be arrived by considering the average of marks obtained in two parts.

There shall be no end examination for mandatory courses with zero credits. However, attendance 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 assessment. In case, the student fails in the mandatory courses with zero credits, a re-examination shall be conducted for failed candidates for 30 marks

The laboratory records and test papers shall be preserved in the institution for a minimum of 3 years and shall be produced to the Committees of the University / NBA / NAAC etc as and when the same is requested for.

(c) Skill Oriented Courses

There shall be five skill-oriented courses offered during III to VII semesters.

Out of the five skill courses two shall be skill-oriented courses from the same domain. Of the remaining three skill courses, one shall be a soft skill course and the remaining two shall be skill advanced courses from the same domain/Interdisciplinary/Job oriented.

The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by industries / Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency.

The Head of the Department shall identify a faculty member as coordinator for the course. A committee consisting of the Head of the Department, coordinator and a senior Faculty member nominated by the Head of the Department shall evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades. Marks/grades shall be assigned to the students by the above committee based on their performance.

If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the Institution.

For the Skill oriented courses offered by the institution the Continuous assessment and end examination shall be as similar to that of Theory course or practical course based on the nature of Skill oriented course.

(d) Massive Open Online Courses (MOOCs):

A Student has to pursue and complete one course compulsorily through MOOCs approved by the Institution. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for award of B.Tech degree. A student is not permitted to register and pursue core courses through MOOCs.

A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The Head of the Department shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing for continuous assessment and end examination (for the specified equivalent credit course only) conducted by the college. Necessary amendments in rules and regulations regarding adoption of MOOC courses would be proposed from time to time.

10 Credit Transfer Policy

- ❖ Adoption of MOOCs is mandatory, to enable Blended model of teaching-learning as also envisaged in the NEP 2020. As per University Grants Commission (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016, the institution shall allow up to a maximum of 20% of the total courses (not exceeding two courses in a semester) being offered in a particular programme i.e., maximum of 32 credits through MOOCs platform.
- ❖ The institution shall offer credit mobility for MOOCs and give the equivalent credit weight age to the students for the credits earned through online learning courses.
- ❖ Student registration for the MOOCs shall be only through the respective department of the institution and it is mandatory for the student to share necessary information with the department.
- ❖ Credit transfer policy will be applicable to the Professional & Open Elective / Skill Oriented courses only.
- ❖ The concerned department shall identify the courses permitted for credit transfer.
- ❖ The institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer.
- ❖ The institution shall designate a faculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
- ❖ The institution shall ensure no overlap of MOOC exams with that of the end examination schedule. In case of delay in results, the institution will re-issue the marks sheet for such students.

- Student pursuing courses under MOOCs shall acquire the required credits only after successful completion of the course and submitting a certificate issued by the competent authority along with the percentage of marks and grades.
- The department shall submit the following to the examination section of the institution:
- List of students who have passed MOOC courses in the current semester along with the certificate of completion.
- The institution shall resolve any issues that may arise in the implementation of this policy from time to time and shall review its credit transfer policy in the light of periodic changes brought by UGC, SWAYAM, NPTEL and state government.
- Note: Students shall be permitted to register for MOOCs offered through online platforms approved by the institution from time to time.

11 Academic Bank of Credits (ABC)

The institution shall implement Academic Bank of Credits (ABC) to promote flexibility in curriculum as per NEP 2020 to

- Provide option of mobility for learners across the institutions / universities of their choice
- Provide option to gain the credits through MOOCs from approved digital platforms.
- Facilitate award of certificate/diploma/degree in line with the accumulated credits in ABC
- Execute Multiple Entry and Exit system with credit count, credit transfer and credit acceptance from students' account.

12 Mandatory Internships

(a) Summer Internships: Two summer internships either onsite or virtual each with a minimum of 08 weeks duration, done at the end of second and third years, respectively are mandatory. It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Power projects, software MNCs or any industries in the areas of concerned specialization of the Undergraduate program. One of the two summer internships at the end of second year (Community Service Project) shall be society oriented and shall be completed in collaboration with government organizations/NGOs & others. The other internship at the end of third year is Industry Internship and shall be completed in collaboration with Industries. The student shall register for the internship as per course structure after commencement of academic year. The guidelines issued by the APSCHE / University /Institution shall be followed for carrying out and evaluation of Community Service Project and Industry Internship.

Evaluation of the summer internships shall be through the departmental committee. A student will be required to submit a summer internship report to the concerned department and appear for an oral presentation before the departmental committee comprising of Head of the Department, supervisor of the internship and a senior faculty member of the department. A certificate of successful completion from industry shall be included in the report. The report and the oral presentation shall carry 50% weightage each. It shall be evaluated for 100 marks. A student shall secure minimum 40% of marks for successful completion. In case, if a student fails, he/she shall reappear as and when semester supplementary examinations are conducted.

(b) Full Semester Internship and Project work: In the final semester, the student should mandatorily register and undergo internship (onsite/virtual) and in parallel he/she should work on a project with well-defined objectives. At the end of the semester the candidate shall submit an internship completion certificate and a project report. A student shall also be permitted to submit project report on the work carried out during the internship.

The project report shall be evaluated with an external examiner. The total marks for project work shall be 100 and distribution shall be 30 marks for internal assessment and 70 marks for external evaluation. At the end of the semester, all projects shall be showcased at the department forthe benefit of all students and staff. The project work is to be evaluated for 30 marks (including seminar and presentation) by the departmental Project Review Committee consisting of supervisor, a senior faculty and HOD. The external evaluation of Project Work is a Viva-Voce Examination conducted in the presence of internal examiner and external examiner appointed by the Head of the Department and approved by the Principal and shall be evaluated for 60 marks.

The college shall facilitate and monitor the student internship programs. Completion of internships is mandatory, if any student fails to complete internship, he/she will not be eligible for the award of degree. In such cases, the student shall repeat and complete the internship.

13 Guidelines for Minor

- ❖ To promote interdisciplinary knowledge among the students, the students admitted into B.Tech. in a major stream / programme are eligible to obtain degree in Minor in another stream.
- ❖ The Minor program requires the completion of 12 credits in Minor stream chosen.
- ❖ Two courses for 06 credits related to a Minor are to be pursued compulsorily for the minor degree, but may be waived for students who have done similar/equivalent courses. If waived for a student, then the student must take an extra elective course in its place. It is recommended that students should complete the compulsory courses (or equivalents) before registering forthe electives.
- ❖ Electives (minimum of 2 courses) to complete a total of 12 credits.

Note: A total of 04 Open Electives are offered in the curriculum. A student can complete the requirement for Minor by opting for the courses offered through various verticals/tracks under Open Electives.

14 Guidelines for Honors

The objective of introducing B.Tech. (Hons.) is to facilitate the students to choose additionally the specialized courses of their choice and build their competence in a specialized area in the UG level. B.Tech (Hons.) is a best choice for academically excellent students having good academic record and interest towards higher studies and research.

- ❖ Honors is introduced in the curriculum of all B. Tech. programs offering a major degree and is applicable to all B. Tech students.
- ❖ A student shall earn additional 15 credits for award of B.Tech.(Honors) degree from same branch/department/discipline registered for major degree. This is in addition to the credits essential for obtaining the Undergraduate degree in Major Discipline (i.e., 163 credits).
- ❖ A student is permitted to register for Honors in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to the Honors from V Semester onwards.
- ❖ The institution shall arrange separate class work and timetable of the courses offered under Honors program.

- ❖ Courses that are used to fulfill the student’s primary major shall not be double counted towards the Honors. Courses with content substantially equivalent to courses in the student's primary Major shall not be counted towards the Honors.
- ❖ Students can complete the courses offered under Honors either in the institution or in online platforms like SWAYAM with a minimum duration of 12 weeks for a 3-credit course and 8 weeks duration for a 2-credit course satisfying the criteria for credit mobility. If the courses under Honors are offered in conventional mode, then the teaching and evaluation procedure shall be similar to regular B. Tech courses.
- ❖ The attendance for the registered courses under Honors and regular courses offered for Major degree in a semester are to be considered separately.
- ❖ A student shall maintain 75% attendance in all registered courses under Honors to be eligible for attending end examination.
- ❖ A student registered for Honors shall pass in all courses that constitute the requirement for the Honors degree program. No class/division (i.e., second class, first class and distinction, etc.) shall be awarded for Honors degree programme.
- ❖ If a student drops or is terminated from the Honors program, the additional credits so far earned cannot be converted into open or core electives; they will remain extra. However, on request such students shall receive a separate grade sheet mentioning the additional courses completed by them.
- ❖ The Honors will be mentioned in the Provisional / Degree certificate as Bachelor of Technology (Honors) in XYZ. For example, B.Tech. (Honors) in Mechanical Engineering.

(b) Enrolment into Honors:

Students of a Department/Discipline are eligible to opt for Honors program

- ❖ Offered by the same Department/Discipline
- ❖ The enrolment of student into Honors is based on the CGPA obtained in the major degree program. CGPA shall be taken up to III semester in case of regular entry students and only III semester in case of lateral entry students. Students having 7.0 CGPA without any backlog subjects will be permitted to register for Honors.
- ❖ If a student is detained due to lack of attendance either in Major or in Honors, registration shall be cancelled.
- ❖ Transfer of credits from Honors to regular B. Tech degree and vice-versa shall not be permitted.
- ❖ Honors is to be completed simultaneously with a Major degree program.

(c) Registration for Honors:

- ❖ The eligible and interested students shall apply through the HOD of his/her parent department. The whole process should be completed within Two weeks before the start of every semester. Selected students shall be permitted to register the courses under Honors.
- ❖ The selected students shall submit their willingness to the principal through his/her parent department offering Honors. The parent department shall maintain the record of student pursuing the Honors.
- ❖ The students enrolled in the Honors courses will be monitored continuously.
- ❖ An advisor/mentor from parent department shall be assigned to a group of students to monitor the progress.
- ❖ There is no fee for registration of subjects for Honors program offered in offline at the institution

15 Attendance Requirements:

- ❖ A student shall be eligible to appear for the end examinations if he/she acquires a minimum of 40% attendance in each subject and 75% of attendance in aggregate of all the subjects.
- ❖ Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the Principal.
- ❖ Shortage of Attendance below 65% in aggregate shall in NO CASE be condoned.
- ❖ A stipulated fee shall be payable towards condonation of shortage of attendance to the Institution.
- ❖ Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that semester 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 from the date of commencement of class work.
- ❖ If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for readmission into the same semester.
- ❖ If the learning is carried out in blended mode (both offline & online), then the total attendance of the student shall be calculated considering the offline and online attendance of the student.
- ❖ For induction programme attendance shall be maintained as per AICTE norms.

16 Promotion Rules:

The following academic requirements must be satisfied in addition to the attendance requirements mentioned in section 15.

- ❖ A student shall be promoted from first year to second year if he/she fulfils the minimum attendance requirement as per the norms.
- ❖ A student will be promoted from II to III year if he/she fulfils the academic requirement of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) up to in the courses that have been studied up to III semester.
- ❖ A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the courses that have been studied up to V semester. And in case a student is detained for want of credits for a particular academic year by (ii) & (iii) 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 respectively as the case may be.
- ❖ When a student is detained due to lack of credits/shortage of attendance he/she may be re-admitted when the semester is offered after fulfilment of academic regulations. In such case, he/she shall be in the academic regulations into which he/she is readmitted.

17 Promotion Criteria

For Promotion to	**Minimum Credits required**	
	For Four Year Regular B.Tech Students	**For Lateral Entry Students**
V Semester	Students should earn 40% of the total credits up to and including III semester before they register for IV semester	---

	regular exams	
VII Semester	Students should earn 40% of the credits up to and including V semester before they register for VI semester regular exams	Students should earn 40% of the total credits of III, IV and V semesters before they register for VI semester regular exams

18 Grading:

The student's performance shall be measured on a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:
After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marksobtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	**Grade**		**Grade points Assigned**
90 & above	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	Pass	5
< 40	F	Fail	0
Absent	Ab	Absent	0

- ❖ A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.
- ❖ For non-credit 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/Percentage.

Computation of Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

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

$$\mathbf{SGPA = \Sigma(Ci \times Gi)/\Sigma Ci}$$

Where, Ci is the number of credits of the ith subject and Gi is the grade point scored by the student in the ith course.
The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all \ the courses undergone by a student over all the semesters of a program, i.e.,

$$\mathbf{CGPA = \Sigma(Ci \times Si)/\Sigma Ci}$$

Where "Si" is the SGPA of the ith semester and Ci is the total number of credits up to that semester.

Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
While computing the SGPA the courses in which the student is awarded Zero grade points will also be included.

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

Letter Grade: It is an index of the performance of students in a said course.

Grades are denoted by the letters S, A, B, C, D and F.

19 Requirement for clearing any course

- In the theory and practical courses the students have to obtain a minimum of 35% marks in the end examinations and also minimum 40% of marks in the sum of the continuous internal assessment and end examination taken together, otherwise they will be awarded grade-F in that course. F is considered as a Fail grade indicating that the student has to reappear for the end supplementary examination in that course and obtain a non fail grade for clearing that course.
- To become eligible for the award of degree a student must obtain a minimum CGPA of 4.0

20 Regular and Supplementary Examinations

At the end of every semester Regular Examinations of that semester shall be conducted. During the Odd semester regular examinations of odd semester and supplementary examinations of even semester shall be scheduled. During the even semester, Regular examinations of even semester and supplementary examinations of Odd semester shall be scheduled. Students with backlog subjects shall have to write more than one examination per day.

21 Award of Class:

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

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

CGPA to Percentage conversion Formula (CGPA – 0.5) x 10

22 With–holding of Results

If the candidate has any dues not paid to the institution or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld in such cases.

22 Multiple Entry / Exit Option

(a) Exit Policy:

The students can choose to exit the four-year programme at the end of first / second / third year.

- ❖ **UG Certificate (in Field of study/discipline)** - Programme duration: First year (first two semesters) of the undergraduate programme, 40 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6- credit job-specific internship / apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce
- ❖ **UG Diploma (in Field of study/discipline)** - Programme duration: First two years (first four semesters) of the undergraduate programme, 80 credits followed by an additional exit 10-credit bridge course(s) lasting two months, including at least 6 - credit job-specific internship / apprenticeship that would help the candidates acquire job-ready competencies required to enter the workforce.
- ❖ **Bachelor of Science (in Field of study/discipline)** i.e., B.Sc. Engineering in (Field of study/discipline) - Programme duration: First three years (first six semesters) of the undergraduate programme, 123 credits.

(b) Entry Policy:

Modalities on multiple entry by the student into the B.Tech. programme will be provided in due course of time.

Note: The Institution/University shall resolve any issues that may arise in the implementation of Multiple Entry and Exit policies from time to time and shall review the policies in the light of periodic changes brought by UGC, AICTE and State government.

23 Gap Year Concept:

Gap year concept for Student Entrepreneur in Residence is introduced and outstanding students who wish to pursue entrepreneurship / become entrepreneur are allowed to take a break of one year at any time after II year to pursue full-time entrepreneurship programme/to establish startups.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 constituted by the Principal shall evaluate the proposal submitted by the student and the committee shall decide whether to permit the student(s) to avail the Gap Year or not

24 Transitory Regulations

Candidates who have been detained for want of attendance/lack of credits or avail temporary withdrawal or avail gap year are eligible for readmission into the respective semester as and when the semester is offered and such students shall be governed by the curriculum and academic regulations in force at the time of re-joining

Candidates who are permitted to avail Gap Year shall be eligible for re-joining into the succeeding year of their B. Tech from the date of commencement of class work and they will be governed by the academic regulations in force at the time of readmission

25 Minimum Instruction Days:

The minimum instruction days including exams for each semester shall be 90.

26 Medium of Instruction:

The medium of instruction of the entire B.Tech programme (including examinations and project reports) will be in English only

27 Student Transfers:

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh and the Universities from time to time.

28 Award of Degree

After having admitted into the program, B.Tech degree shall be conferred on a student who has satisfied the following conditions.

- ❖ The student joining with Intermediate qualification must have, after admission into the Regular B.Tech program of the college, pursued a regular course of study for not less than four academic years and not more than eight academic years.
- ❖ The student is required to complete the B.Tech Programme of study satisfying the attendance and academic / credit requirements in all the eight semesters of the course within a period of eight academic years (excluding Gap year) from the year of admission, failing which he / she shall be declared ineligible to pursue B.Tech degree programme.
- ❖ The student joining under lateral entry scheme with diploma qualification must have, after admission into III Semester B.Tech, pursued a regular course of study for not less than three academic years and not more than six academic years.
- ❖ The student joining under lateral entry scheme is required to complete the B.Tech Programme of study satisfying the attendance and academic / credit requirements in all the six semesters of the course within a period of six academic years (excluding Gap year) from the year of admission, failing which he / she shall be declared ineligible to pursue B.Tech degree programme.
- ❖ Completing the programme shall mean not only satisfying the attendance and academic / credit requirements but also passing of all the courses and earning the credits prescribed in the curriculum with the respective stipulated period.
- ❖ A student is required to complete the B.Tech Programme of study satisfying the attendance and academic / credit requirements in all the eight semesters of the course within a period of eight (six in case of lateral entry) academic years (excluding Gap year) from the year of admission, failing which he / she shall be declared ineligible to pursue B.Tech degree programme.
- ❖ The student must have satisfied the minimum academic requirements in the respectivebranch of engineering in each semester.
- ❖ Students must register for all the courses and earn the credits specified
- ❖ Students who fail to fulfil all the academic requirements for the award of degree within the specified period from the year of their admission shall forfeit their seat in B.Tech and their admission stands cancelled.
- ❖ The student shall successfully complete non credit courses and mandatory Courses.
- ❖ The student shall have no dues to the institution, library, hostels etc
- ❖ The student shall have no disciplinary action pending against him/her.

- ❖ The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Anantapuramu on recommendations by the Academic council of the college basing on the eligibility

29 With holding of Results

The result of a candidate shall be withheld if:

- ❖ He/she has not cleared any dues to the Institution/ Hostel /University
- ❖ A case of disciplinary action against him/her is pending disposal.

30 Exam Hall Culture

- ❖ Students are not permitted to use mobile phones in the examination halls.
- ❖ Any attempt by any student to influence the examiners, faculty and staff or Controller of Examinations for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice case and the student can be debarred from the college.
- ❖ When a student absents himself/herself, he/she is treated as to have appeared and obtained zero marks in that course(s) and Grading is done accordingly.
- ❖ When a student's answer book is confiscated for any kind of attempted or suspected malpractice, the decision of the examination committee is final.

31 Amendment of Regulations

The college may, from time to time, revise, amend or change the regulations, scheme of examinations and syllabi.

32 Ragging

Ragging of any kind is strictly prohibited. A Student who indulges in ragging shall be punished as per the provisions of the Ragging Act.

33 Rules of Discipline

- ❖ Use of mobile phones with camera on the campus is strictly prohibited.
- ❖ Students shall behave and conduct themselves in a dignified and courteous manner on the campus/Hostels.
- ❖ Students shall not bring outsiders to the institution or hostels.
- ❖ Students shall not steal, deface, damage or cause any loss to the institution property.
- ❖ Students shall not collect money either by request or coercion from others within the campus or hostels.
- ❖ 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.
- ❖ Use of vehicles by the students inside the campus is prohibited.
- ❖ Any conduct which leads to lowering the esteem of the institution is prohibited.
- ❖ 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
- ❖ Dress Code

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

  Girls : All the girl students shall wear churidhar with dupatta / saree

34 General Instructions:

The academic regulations should be read as a whole for purpose of any interpretation.

Where the words “he”, “him”, “his”, occur in the regulations, they also include “she”, “her”, “hers”, respectively.

The Institution may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on rolls with effect from the dates notified by the institution.

In the case of any doubt or ambiguity in the interpretation of the guidelines given, the decision of the Head of the institution is final.

Punishment for Malpractice Cases

S. No	Nature of Malpractice/Improper conduct	Punishment
1.	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, 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 canbe used as an aid in the course of the examination)	For Possession of mobile phone: Expulsion from the examination hall and cancellation of the performance in that course only. For possession of any material relevant to the exam: Expulsion from the examination hall and cancellation of the performance in 50% of the subjects.(In case of fraction, the integer part of the number). The subjects for cancellation will be selected in cyclic order starting with the subject in which the candidate is found to resort to malpractice
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 thatcourse 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 thatcourse 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 thatcourse 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 forfeiture 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 orany of his relations, or indulges in any other act of misconduct or mischief which result in damage to ordestruction 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 meansor 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 thereof 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 class work and all end examinations. The continuation of the program 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 thatcourse 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.No. 7 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 shallbe 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 semsester /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 to award suitable punishment.	

ACADEMIC REGULATIONS (Scheme 2023) FOR B.TECH. (LATERAL ENTRY SCHEME)

(Effective for the students admitted into II year through Lateral Entry Scheme
from the Academic Year 2024-25 onwards)

1. Award of the Degree

Award of the B.Tech. Degree / B.Tech. Degree with a Minor if he/she fulfils the following:

- ❖ Pursues a programme of study for not less than three academic years and not more than six 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 in addition to the maximum period permitted for graduation (Six years).
- ❖ Registers for 123 credits and secures all 123 credits.

Award of B.Tech. degree with Honors if he/she fulfils the following:

- ❖ Student secures additional 15 credits fulfilling all the requisites of a B.Tech. program i.e., 123 credits.
- ❖ Registering for Honors is optional.
- ❖ Honors is to be completed simultaneously with B.Tech. programme.

2. Students, who fail to fulfil the requirement for the award of the degree within six consecutive academic years from the year of admission, shall forfeit their seat.

3. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the requirements mentioned in item no.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 continuous assessment and end examination taken together.
- ❖ A student shall be promoted from III year to IV year if he/she fulfils the academic requirements of securing 40% of the credits (any decimal fraction should be rounded off to lower digit) in the subjects that have been studied up to 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.

4. Programme Pattern

The entire programme 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 the student may be re-admitted when the semester is offered after fulfilment of academic regulations, and they will be governed by the academic regulations in force at the time of readmission.

All other regulations as applicable for B. Tech. Four-year degree programme (Regular) will hold good for B. Tech. (Lateral Entry Scheme).

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

PROGRAMME CURRICULUM STRUCTURE UNDER R23 REGULATIONS

B. TECH – CIVIL ENGINEERING

INDUCTION PROGRAM

S.no	Course	Category	Periods per Week			Credits
			L	T	P	
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0	0	6	0
2	Career Counselling	MC	2	0	2	0
3	Orientation to all branches -- career options, tools, etc.	MC	3	0	0	0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2	0	3	0
5	Proficiency Modules & Productivity Tools	ES	2	1	2	0
6	Assessment on basic aptitude and mathematical skills	MC	2	0	3	0
7	Remedial Training in Foundation Courses	MC	2	1	2	0
8	Human Values & Professional Ethics	MC	3	0	0	0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2	1	2	0
10	Concepts of Programming	ES	2	0	2	0

B. TECH – CIVIL ENGINEERING

I SEMESTER (I YEAR)									
S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
1	Linear Algebra & Calculus	BS&H	3	0	0	3	30	70	100
2	Engineering Physics	BS&H	3	0	0	3	30	70	100
3	Basic Electrical & Electronics Engineering	ES	3	0	0	3	30	70	100
4	Engineering Graphics	ES	1	0	4	3	30	70	100
5	Introduction to Programming	ES	3	0	0	3	30	70	100
6	IT Workshop	ES	0	0	2	1	30	70	100
7	Engineering Physics Lab	BS&H	0	0	2	1	30	70	100
8	Electrical & Electronics Engineering Workshop	ES	0	0	3	1.5	30	70	100
9	Computer Programming Lab	ES	0	0	3	1.5	30	70	100
10	NSS/NCC/Scouts & Guides/Community Service	BS&H	.	.	1	0.5	---	---	---
		TOTAL	13	00	15	20.5			

II SEMESTER (I YEAR)									
S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
1	Communicative English	BS&H	2	0	0	2	30	70	100
2	Engineering Chemistry	BS&H	3	0	0	3	30	70	100
3	Differential Equations & Vector Calculus	BS&H	3	0	0	3	30	70	100
4	Basic Civil & Mechanical Engineering	ES	3	0	0	3	30	70	100
5	Engineering Mechanics	PC	3	0	0	3	30	70	100
6	Communicative English Lab	BS&H	0	0	2	1	30	70	100
7	Chemistry Lab	BS&H	0	0	2	1	30	70	100
8	Engineering Workshop	ES	0	0	3	1.5	30	70	100
9	Engineering Mechanics & Building Practices Lab	PC	0	0	3	1.5	30	70	100
10	Health and wellness, Yoga and Sports	BS&H	.	.	1	0.5	---	---	---
		TOTAL	14	00	11	19.5			

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40013	Numerical and Statistical Methods	BS	3	0	0	3	30	70	100
A40018	Universal Human Values– Understanding Harmony & Ethical Human Conduct	HSMC	2	1	0	3	30	70	100
A40103	Surveying	ES	3	0	0	3	30	70	100
A40104	Strength of Materials	PC	3	0	0	3	30	70	100
A40105	Fluid Mechanics	PC	3	0	0	3	30	70	100
A40106	Surveying Laboratory	PC	0	0	3	1.5	30	70	100
A40107	Strength of Materials Laboratory	PC	0	0	3	1.5	30	70	100
A40108	Building Planning and Drawing	SC	0	1	2	2	30	70	100
A40031	Environmental Science (Audit course)	MC	2	0	0	0	100*	0	100*
TOTAL			16	2	8	20	240	560	800

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40022	Managerial Economics and Financial Analysis	BS&H	2	0	0	2	30	70	100
A40109	Engineering Geology	PC	3	0	0	3	30	70	100
A40110	Concrete Technology	PC	3	0	0	3	30	70	100
A40111	Structural Analysis	PC	3	0	0	3	30	70	100
A40112	Hydraulics and Hydraulic Machinery	PC	3	0	0	3	30	70	100
A40113	Concrete Technology Laboratory	PC	0	0	3	1.5	30	70	100
A40114	Engineering Geology Laboratory	PC	0	0	3	1.5	30	70	100
A40021	Soft Skills	SC	0	1	2	2	30	70	100
A40023	Design Thinking & Innovation	ES	1	0	2	2	30	70	100
TOTAL			15	1	10	21	270	630	900
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation									

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

V SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40115	Water Resources Engineering	PC	3	0	0	3	30	70	100
A40116	Design of Reinforced Concrete Structures	PC	3	0	0	3	30	70	100
A40117	Soil Mechanics	PC	3	0	0	3	30	70	100
A40118a A40118b A40118c	**Professional Elective-I** 1. Advanced Structural Analysis 2. Air Pollution and Control 3. Environmental Impact Assessment	PE-I	3	0	0	3	30	70	100
	Open Elective-I	OE-I	3	0	0	3	30	70	100
A40119	Soil Mechanics Lab	PC	0	0	3	1.5	30	70	100
A40120	Fluid Mechanics Hydraulic Machines Lab	PC	0	0	3	1.5	30	70	100
A40121	Estimation, Specifications Costing and Valuation	SC	0	1	2	2	30	70	100
A40032	Tinkering Lab	BS&H	0	0	2	1	30	70	100
A40122	Evaluation of Community Service Internship	PW	-	-	-	2	-	-	100
A40536	Introduction to Quantum Technologies and Applications	SEC	3	0	0	3	30	70	100
TOTAL			15	1	10	26	300	700	1100

VI SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40123	Design of Steel Structures	PC	3	0	0	3	30	70	100
A40124	Highway Engineering	PC	3	0	0	3	30	70	100
A40125	Environmental Engineering	PC	3	0	0	3	30	70	100
A40126a A40126b A40126c	**Professional Elective-II** 1. Design of Earthquake Resistant Structures 2. Open Channel Flow 3. Foundation Engineering	PE-II	3	0	0	3	30	70	100
A40127a A40127b A40127c	**Professional Elective-III** 1. Cost effective Housing Techniques 2. Watershed Management 3. Prestressed Concrete	PE-III	3	0	0	3	30	70	100
	Open Elective-II	OE-II	3	0	0	3	30	70	100
A40128	Highway Engineering Lab	PC	0	0	3	1.5	30	70	100
A40129	Environmental Engineering Lab	PC	0	0	3	1.5	30	70	100
A40130	Building Information Modelling	SC	0	1	2	2	30	70	100
A40033	Technical paper writing & IPR	MC	2	0	0	-	100*	-	100*
TOTAL			20	1	8	23	270	630	900

VII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40131	Finite Element Methods	PC	3	0	0	3	30	70	100
A40034 A40035 A40036	**Management Course-II** 1. Business Ethics and Corporate Governance 2. E-Business 3. Management Science	BS&H	2	0	0	2	30	70	100
A40132a A40132b A40132c	**Professional Elective-IV** 1. Geo-synthetics and Reinforced Earth Structures 2. Railways, Airports, Docks and Harbour Engineering 3. Pre-Engineered Buildings	PE-IV	3	0	0	3	30	70	100
A40133a A40133b A40133c	**Professional Elective-V** 1. Ground Improvement Techniques 2. Subsurface Investigation and Instrumentation 3. Transportation Economics	PE-V	3	0	0	3	30	70	100
	Open Elective-III	OE-III	3	0	0	3	30	70	100
	Open Elective-IV	OE-IV	3	0	0	3	30	70	100
A40134	Skill oriented course Skills in Civil Engineering software (STAADPRO/CAD/TEKL)	SC	0	1	2	2	30	70	100
A40037	Gender Sensitization	MC	2	0	0	-	100*	-	100*
A40135	Evaluation of Industry Internship	PW	-	-	-	2	-	-	100
TOTAL			19	1	2	21	210	490	800

VIII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40136a	Internship	PW	0	0	0	4	100	0	100
A40136b	Project	PW	-	-	-	8	30	70	100
TOTAL						12	130	70	200

PROFESSIONAL ELECTIVES

Course Code	Title of the Course	L-T-P	Credits
Professional Elective-I			
A40118a	Advanced Structural Analysis	**3-0-0**	**3**
A40118b	Air Pollution and Control	**3-0-0**	**3**
A40118c	Environmental Impact Assessment	**3-0-0**	**3**
Professional Elective-II			
A40126a	Design of Earthquake Resistant Structures	**3-0-0**	**3**
A40126b	Open Channel Flow	**3-0-0**	**3**
A40126c	Foundation Engineering	**3-0-0**	**3**
Professional Elective-III			
A40127a	Cost effective Housing Techniques	**3-0-0**	**3**
A40127b	Watershed Management	**3-0-0**	**3**
A40127c	Prestressed Concrete	**3-0-0**	**3**
Professional Elective-IV			
A40132a	Geo-synthetics and Reinforced Earth Structures	**3-0-0**	**3**
A40132b	Railways, Airports, Docks and Harbour Engineering	**3-0-0**	**3**
A40132c	Pre-Engineered Buildings	**3-0-0**	**3**
Professional Elective-V			
A40133a	Ground Improvement Techniques	**3-0-0**	**3**
A40133b	Subsurface Investigation and Instrumentation	**3-0-0**	**3**
A40133c	Transportation Economics	**3-0-0**	**3**

OPEN ELECTIVES

Course Code	Title of the Course	L-T-P	Credits	Offered by
Open Elective - I				
A40271	Electrical Safety Practices and Standards	3-0-0	3	EEE
A40371	Sustainable Energy Technologies	3-0-0	3	ME
A40471	Electronic Circuits	3-0-0	3	ECE
A40571	Programming in Java	3-0-0	3	CSE
A40572	Artificial Intelligence - Concepts and Techniques	3-0-0	3	CSE
A40071	Mathematics for Machine Learning and AI	3-0-0	3	H&S
A40072	Materials Characterization Techniques	3-0-0	3	H&S
A40073	Chemistry of Energy Systems	3-0-0	3	H&S
A40074	English for Competitive Examinations	3-0-0	3	H&S
A40075	Entrepreneurship and New Venture Creation	3-0-0	3	H&S
A40090	Mathematics for Machine Learning	3-0-0	3	H&S
A40091	Entrepreneurship	3-0-0	3	H&S
A40573	Quantum Technologies & Applications	3-0-0	3	CSE
Open Elective - II				
A40272	Renewable Energy Sources	3-0-0	3	EEE
A40372	Automation and Robotics	3-0-0	3	ME
A40472	Digital Electronics	3-0-0	3	ECE
A40574	Introduction to Operating Systems	3-0-0	3	CSE
A40575	Introduction to Machine Learning	3-0-0	3	CSE
A40076	Optimization Techniques	3-0-0	3	H&S
A40077	Physics Of Electronic Materials and Devices	3-0-0	3	H&S
A40078	Chemistry Of Polymers and Applications	3-0-0	3	H&S
A40079	Academic Writing and Public Speaking	3-0-0	3	H&S
A40080	Mathematical foundation of quantum technologies	3-0-0	3	H&S
Open Elective - III				
A40273	Smart Grid Technologies	3-0-0	3	EEE
A40373	3D Printing Technologies	3-0-0	3	ME
A40473	Introduction to Microprocessors and Microcontrollers	3-0-0	3	ECE
A40576	Fundamentals of Data Base Management Systems	3-0-0	3	CSE
A40577	Cyber Security	3-0-0	3	CSE
A40081	Wavelet transforms and its applications	3-0-0	3	H&S
A40082	Smart Materials and Devices	3-0-0	3	H&S
A40083	Green Chemistry and Catalysis for Sustainable Environment	3-0-0	3	H&S
A40084	Employability Skills	3-0-0	3	H&S
A40085	Introduction to Quantum Mechanics	3-0-0	3	H&S
Open Elective - IV				
A40274	Introduction to Electric Vehicles	3-0-0	3	EEE
A40374	Quality Management	3-0-0	3	ME
A40474	Transducers and Sensors	3-0-0	3	ECE
A40578	Computer Networks and Applications	3-0-0	3	CSE
A40579	Introduction to Internet of Things	3-0-0	3	CSE
A40086	Financial Mathematics	3-0-0	3	H&S
A40087	Sensors And Actuators for Engineering Applications	3-0-0	3	H&S
A40088	Chemistry of Nanomaterials and Applications	3-0-0	3	H&S
A40089	Literary Vibes	3-0-0	3	H&S
A40580	Quantum Computing	3-0-0	3	CSE

COURSE STRUCTURE
I - SEMESTER

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

B.TECH – CIVIL ENGINEERING

I SEMESTER (I Year)

I SEMESTER (I YEAR)									
S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
1	Linear Algebra & Calculus	BS&H	3	0	0	3	30	70	100
2	Engineering Physics	BS&H	3	0	0	3	30	70	100
3	Basic Electrical & Electronics Engineering	ES	3	0	0	3	30	70	100
4	Engineering Graphics	ES	1	0	4	3	30	70	100
5	Introduction to Programming	ES	3	0	0	3	30	70	100
6	IT Workshop	ES	0	0	2	1	30	70	100
7	Engineering Physics Lab	BS&H	0	0	2	1	30	70	100
8	Electrical & Electronics Engineering Workshop	ES	0	0	3	1.5	30	70	100
9	Computer Programming Lab	ES	0	0	3	1.5	30	70	100
10	NSS/NCC/Scouts & Guides/Community Service	BS&H	.	.	1	0.5	---	---	---
		TOTAL	13	00	15	20.5			

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

LINEAR ALGEBRA & CALCULUS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	30	70	100

1. Course Description

Course Overview

Engineering mathematics is a branch of applied mathematics concerning mathematical methods and techniques that are typically used in engineering and industry. Along with fields like engineering physics and engineering geology, both of which may belong in the wider category engineering science, engineering mathematics is an interdisciplinary subject motivated by engineers' needs both for practical, theoretical and other considerations outside their specialization, and to deal with constraints to be effective in their work.

Course Pre/co-requisites

Bridge Course

2. Course Outcomes (COs)

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

CO1: Develop and use of matrix algebra techniques that are needed by engineers for practicalapplications.

CO2: Utilize mean value theorems to real life problems.

CO3: Familiarize with functions of several variables which is useful in optimization.

CO4: Learn important tools of calculus in higher dimensions.

CO5: Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.

3. . Course Syllabus

UNIT-I **8hrs**

Matrices

Rank of a matrix by echelon form, normal form Cauchy –Binet Formulae (without proof) Inverse of Non- singular matrices by Gauss-Jordan method, System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations by Gauss elimination method,jacobi and Gauss Seidel Iteration Methods.

UNIT II **8hrs**

Eigenvalues, Eigenvectors and Orthogonal Transformation

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonicalforms by Orthogonal Transformation.

UNIT III

Calculus **11hrs**

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders(with out proof) problems and applications on the above thereom.

UNIT IV **11hrs**

Partial differentiation and Applications (Multi variable calculus)

Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, Taylor's and Maclaurin's series expansion of functions of two variable, jacobians, Functional dependence, maxima and minima of functionsof two variables, method of Lagrange multipliers.

UNIT V **11hrs**

Multiple Integrals (Multi variable Calculus)

Double integrals, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

4. Books and Materials

Text Book(s):

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Book(s):

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha ScienceInternational Ltd., 2021 5th Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9thedition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications,2014, Third Edition (Reprint 2021)

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

ENGINEERING PHYSICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	30	70	100

1. Course Description

Course Overview

The laws of physics play a key role in the development of science, engineering and technology. Sound knowledge of physical principles is of paramount importance in understanding new discoveries, recent trends and latest developments in the field of engineering. To keep in pace with the recent scientific advancements in the areas of emerging technologies, the syllabi of Engineering physics has been thoroughly revised keeping in view of the basic needs of all engineering branches by including the topics like physical optics, properties of dielectric and magnetic materials, determination of crystal structures, fundamentals of Quantum Mechanics semiconductors and superconductors are introduced.

Course Pre/co-requisites

Bridge Course

2. Course Outcomes (COs)

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

CO 1 Interpret the properties of light waves and its interaction of energy with the matter

CO 2 Apply the concepts of crystallography for the determination of crystal structures

CO 3 Identify the suitable dielectric and magnetic material for the Engineering

CO 4 Apply the fundamentals of Quantum Mechanics to one dimensional motion of particles

CO 5 Determine the type of semiconductor

CO 6 Interpret the difference normal conductor and Super conductor

3. . Course Syllabus

UNIT-I **16 hrs**

Wave Optics

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton’s Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

Polarization: Introduction -Types of polarization -Polarization by reflection, refraction and Double refraction - Nicol’s Prism -Half wave andQuarter wave plates.

UNIT II **10 hrs**

Crystallography and X-ray diffraction

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X-ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT III

Dielectric and Magnetic Materials 8 hrs

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro & Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT IV

Quantum Mechanics and Free Electron Theory **8 hrs**

Quantum Mechanics: Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well**.**

Free Electron Theory: Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT V

Semiconductors & Superconductors **6 hrs**

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications.

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

4. Books and Materials

Text Book(s):

1.P.K.Palaniswamy, "Engineering Physics" ScitechPublications,2011.

2.B.K.Pandey and S.Chaturvedi, "Engineering Physics",Cengage Learning, 2012.

3.K.Thyagarajan, "Applied Physics", Mc Graw Hill Education(India) Private Limited,2020.

Reference Book(s):

1. ShatendraSharma,Jyotsna Sharma, "Engineering Physics" Pearson Education,2018.

2. M.N. Avadhanulu, P.G.Kshirsagar& TVS Arun Murthy "A Text book of Engineering Physics"-

S.Chand Publications,11th Edition 2019.

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

ENGINEERING PHYSICS 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	32	1	30	70	100

1. Course Description

Course Overview

This course imparts practical and conceptual knowledge of Physics applicable to the domain of civil and mechanical engineering. The laboratory work of the course is aimed to ensure that the student comprehends the concepts of Physics through demonstrable and executable experiments. This course will enable the student to determine the thickness of paper, radius of curvature of plano-convex lens, wavelength of different colors of white light, dispersive power of grating, self -Inductance of the coil, numerical aperture and acceptance angle of an optical fiber, resistivity and energy gap of a semiconductor, study of magnetic field along the axis of a current carrying coil, diffraction of light through single slit and measurement of resistance by varying temperature.

Course Pre/co-requisites:

Engineering Physics

2. Course Outcomes (COs)

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

CO 1	Operate optical instruments like Travelling microscope and spectrometer
CO 2	Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
CO 3	Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
CO 4	Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
CO 5	Evaluate the acceptance angle of an optical fiber and numerical aperture
CO 6	Determine the resistivity of the given semiconductor using four probe method, the band gap of a semiconductor

3. Course Syllabus

(Any 12 of the following)

1. Determine the thickness of the paper using wedge shape method
2. Determination of the radius of curvature of the lens by Newton's ring method
3. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
4. Diffraction due to single slit

5. Determination of Dispersive power of a diffraction grating by using spectrometer.
6. Magnetic field along the axis of a circular coil carrying current
7. Study the variation of B versus H by magnetizing the magnetic material (B-H curve)
8. Determination of energy gap of a semiconductor using p-n junction diode.
9. Determination of temperature coefficients of a thermistor.
10. LASER: Determination of wavelength of laser source by using diffraction grating
11. LASER: Determination of Particle size (hair) by using laser source
12. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
13. Sonometer: Verification of laws of stretched string.
14. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.
15. Determination of Numerical Aperture and Acceptance angle of an optical fiber.

4. Laboratory Equipment/Software/Tools Required

1. Spectrometer
2. Travelling Microscope
3. Stewart-Gee's Apparatus
4. Single slit
5. Melde's Apparatus
6. B-H Curve
7. Torsional pendulum
8. Sonometer
9. Energy gap kit
10. Thermistor

5. Books and Materials

Text Book(s):

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

Reference Book(s)

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

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

ENGINEERING GRAPHICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	4	16	0	64	3	30	70	100

1. Course Description:

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

Course Pre/co-requisites:

This course has no Pre/co-requisites

2. Course Outcomes: (COs)

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

CO1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.

CO2: Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.

CO3: Understand and draw projection of solids in various positions in first quadrant.

CO4: Explain principles behind development of surfaces.

CO5: Prepare isometric and perspective sections of simple solids.

3. Course Syllabus:

UNIT -I :

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales

UNIT II:

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes.

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT III:

Projections of Solids: Types of solids: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT IV:

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT V:

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (Not for end examination).

4. Books and Materials

Text Book(s) :

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference Book(s):

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

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

INTRODUCTION TO PROGRAMMING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	30	70	100

1. Course Objectives:

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- To encourage collaborative learning and teamwork in coding projects

2. Course Outcomes:

A student after completion of the course will be able to

CO1: Understand basics of computers, the concept of algorithm and algorithmic thinking.

CO2: Analyse a problem and develop an algorithm to solve it.

CO3: Implement various algorithms using the C programming language

CO4: Understand more advanced features of C language.

CO5: Develop problem-solving skills and the ability to debug and optimize the code.

3. Course Syllabus

UNIT I Introduction to Programming and Problem Solving

History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program-Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables, and Constants, Basic Input and Output, Operations, Type Conversion, and Casting.

Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT II Control Structures

Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue.

UNIT III Arrays and Strings

Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

UNIT IV Pointers & User Defined Data types

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT V Functions & File Handling

Introduction to Functions, Function Declaration and Definition, Function call Return Types andArguments, modifying parameters inside functions using pointers, arrays as parameters. Scopeand Lifetime of Variables, Basics of File Handling

Note: The syllabus is designed with C Language as the fundamental language of implementation**.**

4. Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

5. Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg,Prasad,CENGAGE, 3rd edition

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

COMPUTER PROGRAMMING LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	48	1.5	30	70	100

1. Course Objectives:

The course aims to give students hands – on experience and train them on the concepts of the C- programming language.

2. Course Outcomes:

CO1: Read, understand, and trace the execution of programs written in C language.

CO2: Select the right control structure for solving the problem.

CO3: Develop C programs which utilize memory efficiently using programming constructs like pointers.

CO4: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

3. Course Syllabus

UNIT I

WEEK 1

Objective: Getting familiar with the programming environment on the computer and writingthe first program.

Suggested Experiments/Activities:
Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment
- i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- ii) Exposure to Turbo C, gcc
- iii) Writing simple programs using printf(), scanf()

WEEK 2
Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:
Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.
Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3 numbers
ii) Conversion of Fahrenheit to Celsius and vice versa
iii) Simple interest calculation

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

UNIT II

WEEK 4

Objective: Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:

Tutorial4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity

i) Evaluate the following expressions.
   a. A+B*C+(D*E) + F*G
   b. A/B*C-B+A*D/3
   c. A+++B---A
   d. J= (i++) + (++i)
ii) Find the maximum of three numbers using conditional operator
iii) Take marks of 5 subjects in integers, and find the total, average in float

WEEK 5

Objective: Explore the full scope of different variants of "if construct" namely if-else, null-else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".

Suggested Experiments/Activities:

Tutorial 5: Branching and logical expressions:

Lab 5: Problems involving if-then-else structures.

i) Write a C program to find the max and min of four numbers using if-else.

ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK 6

Objective: Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when eachof these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterative problems e.g., the sum of series

i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Compute sine and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers.

UNIT III

WEEK 7:

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1 D Arrays: searching.

Lab 7:1D Array manipulation, linear search

i) Find the min and max of a 1-D integer array.
ii) Perform linear search on1D array.
iii) The reverse of a 1D integer array
iv) Find 2's complement of the given binary number.
v) Eliminate duplicate elements in an array.

WEEK 8:

Objective: Explore the difference between other arrays and character arrays that can be usedas Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab 8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices

ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

UNIT IV

WEEK 9:

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gainexperience processing command-line arguments received by C

Suggested Experiments/Activities:
Tutorial 9: Pointers, structures and dynamic memory allocation
Lab 9: Pointers and structures, memory dereference.

i) Write a C program to find the sum of a 1D array using malloc()
ii) Write a C program to find the total, average of n students using structures
iii) Enter n students data using calloc() and display failed students list
iv) Read student name and marks from the command line and display the student details alongwith the total.
v) Write a C program to implement realloc()

WEEK 10:
Objective: Experiment with C Structures, Unions, bit fields and self-referential structures(Singly linked lists) and nested structures

Suggested Experiments/Activities:
Tutorial 10: Bitfields, Self-Referential Structures, Linked lists
Lab10 : Bitfields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the samewithout using bit- fields

i) Create and display a singly linked list using self-referential structure.
ii) Demonstrate the differences between structures and unions using a C program.
iii) Write a C program to shift/rotate using bitfields.
iv) Write a C program to copy one structure variable to another structure of the same type.

UNIT V

WEEK 11:
Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:
Tutorial 11: Functions, call by value, scope and extent,

Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

i) Write a C function to calculate NCR value.
ii) Write a C function to find the length of a string.
iii) Write a C function to transpose of a matrix.
iv) Write a C function to demonstrate numerical integration of differential equations using Euler'smethod

WEEK 12:

Objective: Explore howrecursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab 12: Recursive functions

i) Write a recursive function to generate Fibonacci series.
ii) Write a recursive function to find the lcm of two numbers.
iii) Write a recursive function to find the factorial of a number.
iv) Write a C Program to implement Ackermann function using recursion.
v) Write a recursive function to find the sum of series.

WEEK 13:

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

i) Write a C program to swap two numbers using call by reference.
ii) Demonstrate Dangling pointer problem using a C program.
iii) Write a C program to copy one string into another using pointer.
iv) Write a C program to find no of lowercase, uppercase, digits and othercharacters using pointers.

WEEK14:

Objective: To understand data files and file handling with various file I/O functions. Explore thedifferences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

i) Write a C program to write and read text into a file.
ii) Write a C program to write and read text into a binary file using fread() andfwrite()
iii) Copy the contents of one file to another file.

iv) Write a C program to merge two files into the third file using command-linearguments.
v) Find no. of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

4. Textbooks:

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum' s Outline of Programming with C, McGraw Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

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

IT WORKSHOP

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	32	1	30	70	100

Course Objectives:

- To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables
- To teach basic command line interface commands on Linux
- . To teach the usage of Internet for productivity and self-paced life-long learning
- To introduce Compression, Multimedia and Antivirus tools and Office Tools such as
- Word processors, Spread sheets and Presentation tools.

Course Outcomes:
CO1: Perform Hardware troubleshooting.
CO2: Understand Hardware components and inter dependencies.
CO3: Safeguard computer systems from viruses/worms.
CO4: Document/ Presentation preparation.
CO5: Perform calculations using spreadsheets

PC Hardware
Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web
Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using La TeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both La TeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2 : Calculating GPA - .Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function,

LOOKUP/VLOOKUP
Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Power point
Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

AI Tools – ChatGPT
Task 1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.
Ex: Prompt: "You are a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas
Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Code Generation: Test the model's ability to generate code by giving it partial code snippets and asking it to complete them. You can also ask the model to explain programming concepts or help you debug code.
Ex:Prompt: "Complete the following Python code to swap the values of two variables: \npython\na = 5\nb = 10\ntemp = a\na = b\nb = temp\n"

Task 4: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.
Ex:Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Task 5: Summarization: Provide a long piece of text, such as an article or a blog post, and ask the model to summarize it. Compare the model's summary with the original text to assess its ability to condense information effectively.
Ex: Prompt: "Summarize the article titled ‘Ramayanam' in 3-4 sentences."

Task 6: Futuristic Predictions: Have fun by asking the model to predict future technological advancements, societal changes, or even hypothetical scenarios. Compare its responses with your own ideas.
Ex:Prompt: "Predict how artificial intelligence will transform everyday life in the next 20 years."

Task 7: Technical Explanations: Challenge the model with technical questions from different domains. Ask it to explain scientific concepts, mathematical theorems, or complex algorithms in simple terms. Ex:Prompt: "Explain the concept of neural networks in machine learning, including their layers and the process of backpropagation."

Reference Books:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dream tech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dream tech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfins on and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan– CISCO Press, Pearson Education.

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

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

(Common to All branches of Engineering)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	30	70	100

1. Course Description

Course Overview

This is the fundamental course for engineering students. This course is intended to enhance the technical skills in understanding of the operation and design of basic components like resistor, inductor and capacitor voltage and current sources and finally a complex DC circuits. It is also important to learn about basic principles of operations DC and AC electrical machines with their applications. It is also important to learn about basic principles of Energy Resources and their operations, tariff calculations and equipment safety measures.

Course Pre/co requisites.

1. Basic Mathematics
2. Fundamentals of Physics

PART A: BASIC ELECTRICAL ENGINEERING

2. Course Outcomes (COs)

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

CO1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.

CO2: Understand the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.

CO3: Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.

CO4: Analyse different electrical circuits, performance of machines and measuring instruments. CO5: Evaluate different circuit configurations, Machine performance and Power systems operation

3. Course Syllabus

UNIT I DC & AC Circuits

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems)

UNIT II Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT III Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of “unit” used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

4. Books and Materials

Text Book(s)

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition

2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013

3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Book(s)

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Mc Graw Hill, 2019, Fourth Edition

2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020

3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017

4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018,

Second Edition.

Web Resources:

1. https://nptel.ac.in/courses/108105053 2. https://nptel.ac.in/courses/108108076

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

PART B: BASIC ELECTRONICS ENGINEERING

1. Course Description

Course Overview

This course covers fundamental topics that are common to a wide variety of electronic engineering devices and systems. The topics include an introduction to semiconductor devices and their applications. The course creates the background in the physics of the compound semiconductor-based electronic devices and also prepares students to learn about oscillators, op-amps and digital electronics.

Course Pre/co requisites.

1. Basic Mathematics
2. Fundamentals of Physics

2 Course Outcomes (COs)

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

CO1: Apply the concept of science and mathematics to understand the working of diodes, transistors, and their applications.
CO2: Explain the characteristics of diodes and transistors.
CO3: Familiarize with the number systems, codes, Boolean algebra and logic gates.
C04: Understand the working mechanism of different combinational, sequential circuits and their role in the digital systems.

3. Course Syllabus

UNIT I SEMICONDUCTOR DEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT III DIGITAL ELECTRONICS

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

4. Books and Materials

Textbooks:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009

Reference Books:

1. R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

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

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

(Common to All branches of 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	48	1.5	30	70	100

1. Course Description

Course Overview

This course is designed to provide students with fundamental concepts of Electrical Circuits and Electrical Machines for lab experience. Verification of Thevenin's, Super Position theorems and open and short circuit parameters and determination of efficiency of DC & AC Machines.

This course is designed to provide students with fundamental concepts of Electronic Devices for lab experience. Analysis of V-I characteristics of diodes, BJT and FET.Study of operation of rectifiers with & without filters.

Course Pre/co requisites.

1. Basic Mathematics
2. Fundamentals of Physics

PART A: BASIC ELECTRICAL ENGINEERING

2. Course Outcomes (COs)

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

CO1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.

CO2: Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.

CO3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.

CO4: Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.

CO5: Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.

- Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
   - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.

   Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Note: Minimum Six Experiments to be performed.

PART B: ELECTRONICS ENGINEERING LAB

Course Outcomes (COs)

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

CO1: Identify & testing of various electronic components.
CO2: Understand the usage of electronic measuring instruments.
CO3: Plot and discuss the characteristics of various electron devices.
CO4: Explain the operation of a digital circuit.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.

2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs. 8. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

References:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software

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

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	1	0	0	16	0.5	-	-	100

1. Course Description

Course Overview

The objective of introducing this course is to impart discipline, character, fraternity, teamwork,social consciousness among the students and engaging them in selfless service.

Course Pre/co-requisites

Bridge Course

2. Course Outcomes (COs)

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

CO1: Understand the importance of discipline, character and service motto.

CO2: Solve some societal issues by applying acquired knowledge, facts, and techniques.
CO3: Explore human relationships by analyzing social problems.
CO4: Determine to extend their help for the fellow beings and downtrodden people.
CO5: Develop leadership skills and civic responsibilities.

3. Course Syllabus

UNIT I Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, careerguidance.

Activities:

i) Conducting –ice breaking sessions-expectations from the course-knowing personaltalents and skills
ii) Conducting orientations programs for the students –future plans-activities-releasingroad map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societalissues etc.
iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

UNIT II

Nature & Carectivities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT III Community ServiceActivities:

i) Conducting One Day Special Camp in a village contacting village-area leaders- Survey in the village, identification of problems- helping them to solve via media-authorities-experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes- Sexual Abuse, Adolescent Health and PopulationEducation.
v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme* Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)

2. *Red Book - National Cadet Corps* – Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defence, New Delhi

3. Davis M. L. and Cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M., Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. *Social Problems in India*, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totaling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

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

COURSE STRUCTURE
II - SEMESTER

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

B.TECH – CIVIL ENGINEERING

II SEMESTER (I Year)

II SEMESTER (I YEAR)									
S.NO	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
1	Communicative English	BS&H	2	0	0	2	30	70	100
2	Engineering Chemistry	BS&H	3	0	0	3	30	70	100
3	Differential Equations & Vector Calculus	BS&H	3	0	0	3	30	70	100
4	Basic Civil & Mechanical Engineering	ES	3	0	0	3	30	70	100
5	Engineering Mechanics	PC	3	0	0	3	30	70	100
6	Communicative English Lab	BS&H	0	0	2	1	30	70	100
7	Chemistry Lab	BS&H	0	0	2	1	30	70	100
8	Engineering Workshop	ES	0	0	3	1.5	30	70	100
9	Engineering Mechanics & Building Practices Lab	PC	0	0	3	1.5	30	70	100
10	Health and wellness, Yoga and Sports	BS&H	.	.	1	0.5	---	---	---
		TOTAL	14	00	11	19.5			

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

COMMUNICATIVE ENGLISH

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	32	0	0	2	30	70	100

Course Description

Course Objectives:

The main objective of introducing this course, *Communicative English,* is to facilitate effective listening, Reading, Speaking and Writing skills among the students. It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary. This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

Course Pre/co requisites:

The course has no specific pre/co-requisites

Course Outcomes (COs)

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

CO1 Remember the concepts which the student has learnt previously and identifying their connection

CO2 Understand the structure of the sentence.

CO3 Apply grammatically correct structures in oral and written communication.

CO4 Analyze complex technical ideas with precision to interpret facts in a given text.

CO5 Write summaries and essays based on global comprehension of the texts.

CO6 Write Official letters, Resume and E- mails.

UNIT I

Lesson: HUMAN VALUES: Gift of Magi **(Short Story)**

Listening: Identifying the topic, the context and specific pieces of information by listening to people talk about their past.

Speaking: Asking and answering general questions on familiar topics such as home,family, work, studies and interests; introducing oneself and others. Introducing self, talking about oneself, exchanging personal information, remembering childhood and askingabout someone's childhood

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Writing: Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

Grammar: Parts of Speech, Basic Sentence Structures-forming questions

Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II

Lesson: NATURE: The Brook by Alfred Tennyson (Poem)

Listening: Answering a series of questions about main ideas and supporting ideas afterlistening to a description of a transportation system.

Speaking: Discussion in pairs/small groups on specific topics followed by short structuretalks- talking about transportation and transportation problems, evaluating city services, asking for and giving information.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to linkthe ideas in a paragraph together.

Writing: Structure of a paragraph - Paragraph writing (specific topics) **Grammar:** Cohesive devices - linkers, use of articles and zero article; prepositions.

Vocabulary: Homonyms, Homophones, Homographs.

UNIT III

Lesson: BIOGRAPHY: Elon Musk

Listening: Listening for global comprehension and summarizing (Listening to people talk about capsule hotels.)

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed. Describing positive and negative features; making comparisons; talking about lifestyle changes.

Reading: Reading a text in detail by making basic inferences -recognizing and interpretingspecific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Note-making, paraphrasing

Grammar: Verbs - tenses; subject-verb agreement; Compound words, Collocations

Vocabulary: Compound words, Collocations

UNIT IV

Lesson: INSPIRATION: The Toys of Peace by Saki

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. Talking about food,; expressing likes and dislikes; describing a favourite snack; giving step-by-step instructions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters, Resumes

Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice

Vocabulary: Words often confused, Jargons

UNIT V

Lesson: MOTIVATION: The Power of Intrapersonal Communication (An Essay)

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. (Listening to travel advice.)

Speaking: Formal oral presentations on topics from academic contexts. Describing vacation plans; giving travel advice; planning a vacation

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts –identifying and correcting common errors in grammar andusage (articles, prepositions, tenses, subject verb agreement)

Vocabulary: Technical Jargons

Textbooks:

1. Pathfinder: Communicative English for Undergraduate Students, 1st Edition,Orient Black Swan, 2023 (Units 1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)
3. Interchange fifth edition by Cambridge University Press, 2021

Reference Books:

1. Dubey, Sham Ji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge,2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge UniversityPress, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building aSuperior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

www.bbc.co.uk/learningenglish

https://dictionary.cambridge.org/grammar/british-grammar/

www.eslpod.com/index.html

https://www.learngrammar.net/

https://english4today.com/english-grammar-online-with-quizzes/

https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

https://www.youtube.com/c/DailyVideoVocabulary/videos

https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

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

COMMUNICATIVE ENGLISH LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	32	1	30	70	100

Course Description

Course Overview

The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning. The students will get trained in basic communication skills and also make them ready to face job interviews

Course Pre/co-requisites

Bridge Course

Course Outcomes (COs)

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

CO1: Understand the different aspects of the English language proficiency with emphasis on LSRW skills.

CO2: Apply communication skills through various language learning activities.

CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.

CO4: Evaluate and exhibit professionalism in participating in debates and group discussions.

CO5: Create effective Course Objectives

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

- Walden Infotech

- Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. *Technical Communication*. Oxford Press.2018.
2. Taylor Grant: *English Conversation Practice*, Tata McGraw-Hill Education India, 2016
3. Hewing's, Martin. Cambridge *Academic English* (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. *A Course in Phonetics and Spoken English*, (2nd Ed), Kindle, 2013

Web Resources:

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

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

ENGINEERING CHEMISTRY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	30	70	100

1. Course Description

Course Overview

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

Course Pre/co-requisites

Bridge Course

2. Course Outcomes (COs)

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

CO1: Compare the quality of drinking water with BIS and WHO standards. Illustrate problems associated with hard water and demonstrate industrial water treatment process.

CO2: Demonstrate the corrosion prevention method and apply Nernst equation for calculating electrode and cell potentials.

CO3: Analyze the classification of fuels along with their characteristics and calorific value involving solid fuels, liquid and gaseous fuels.

CO4: Explain different types of polymers and their applications, demonstrate the mechanism of conduction and conducting polymers.

CO5: Summarize the underlying chemistry of engineering materials involving Cement, lubricants.

CO6: Summarize the applications of SEM, TEM and X-Ray diffraction in surface characterization.

UNIT I **Water Technology:**

Soft and hardwater, Estimation of hardness of water by EDTA Method, Estimation of dissolvedOxygen - Boiler troubles **–**Priming, foaming**,** scale and sludge, Caustic embrittlement, Industrial water treatment – Specifications for drinking water, Bureau of Indian Standards(BIS)and World health organization(WHO) standards, Ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

UNIT II Electrochemistry and Applications

Electrodes –electrochemical cell, Nernst equation, cell potential calculations.
Primary cells – Zinc-air battery, Secondary cells – Nickel-Cadmium (NiCad),and lithium ion batteries- working principle of the batteries including cell reactions; Fuel cells-Basic Concepts,the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion**,** cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

UNIT III Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth polymerization. Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of polystyrene. PVC Nylon 6,6 and Bakelite. Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol rubbers.

Fuels **–** Types of fuels, calorific value of fuels, numerical problems based on calorific value;Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum,Octane and Cetane number-alternative fuels- propane, methanol, ethanol and bio fuel-biodiesel.

UNIT IV Modern Engineering Materials

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforcedcomposites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials andApplications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification andApplications.

Building materials- Portland Cement, constituents, Setting and Hardening of cement.

UNIT V Surface Chemistry and Nanomaterials

Introduction to surface chemistry, colloids, nanometals and nanometal oxides, micelle formation, synthesis of colloids (Bragg's Method), chemical and biological methods of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, adsorption isotherm (Freundlich and Longmuir), BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors, etc.

Textbooks:

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. 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 AND TECHNOLOGY, KURNOOL (AUTONOMOUS)

ENGINEERING CHEMISTRY LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	2	0	0	32	1	30	70	100

1. Course Description

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 Pre/co-requisites

Bridge Course

Course Outcomes (COs)

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer Bakelite materials.

CO3: Determine the physical properties like surface tension, adsorption and viscosity

CO4: Estimate the Iron and Calcium in cement

CO5: Calculate the hardness of water and calculation of dissolved oxygen percentages

CO6: Determination of percentage of Iron in Cement sample by colorimetry.

List of Experiments

1. Determination of Hardness of a groundwater sample.
2. Estimation of Dissolved Oxygen by Winkler's method
3. Determination of Strength of an acid in Pb-Acid battery
4. Preparation of a polymer (Bakelite)
5. Determination of percentage of Iron in Cement sample by colorimetry
6. Estimation of Calcium in port land Cement
7. Preparation of nanomaterials by precipitation method.
8. Adsorption of acetic acid by charcoal
9. Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter

Reference:

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

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

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

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	30	70	100

1. Course Description

Course Overview

Engineering mathematics is a branch of applied mathematics concerning mathematical methods and techniques that are typically used in engineering and industry. Along with fields like engineering physics and engineering geology, both of which may belong in the wider category engineering science, engineering mathematics is an interdisciplinary subject motivated by engineers' needs both for practical, theoretical and other considerations outside their specialization, and to deal with constraints to be effective in their work

Course Pre/co-requisites

Bridge Course

2.Course Outcomes (COs)

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

CO1: Solve the differential equations related to various engineering fields.

CO2: Identify solution methods for partial differential equations that model physical processes.
CO3: Interpret the physical meaning of different operators such as gradient, curl and divergence.
CO4: Estimate the work done against a field, circulation and flux using vector calculus.

3. Course Syllabus

UNIT I: Differential equations of first order and first degree

Linear differential equations – Bernoulli’s equations- Exact equations and equations reducibleto exact form. Applications: Newton’s Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT II: Linear differential equations of higher order (Constant Coefficients)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III: Partial Differential Equations

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange’s method. Homogeneous Linear Partial differential equations with constant coefficients.

UNIT IV: Vector differentiation

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector ideties.

UNIT V: Vector Integration

LWithoutegral-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) and related problems.

Textbooks:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, Dennis G. Zill and Warren S. Wright, Jones andBartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017

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

PART A: 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	48	0	0	3	30	70	100

1. Course Description

Course Overview

- Get familiarized with the scope and importance of Civil Engineering sub-divisions.
   Introduce the preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in nation’s economy.
- Get familiarized with the importance of quality, conveyance and storage of water.
- Introduction to basic civil engineering materials and construction techniques.

. **Course Pre/co-requisites**

Bridge Course

2.Course Outcomes (COs)

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

CO1: Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.

CO2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.

CO3: Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.

CO4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.

CO5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement - Aggregate - Bricks- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

UNIT II

Surveying: Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.

UNIT III

Transportation Engineering Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.

Water Resources and Environmental Engineering: Introduction, Sources of water - Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Textbooks:

1. Basic Civil Engineering, M.S.Palanisamy, , Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, Satheesh Gopi, Pearson Publications, 2009, First Edition.

Reference Books:

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

PART B: BASIC MECHANICAL ENGINEERING

1. Course Description

Course Overview

The students after completing the course are expected to

- Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
- Explain different engineering materials and different manufacturing processes.
- Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

2.Course Outcomes (COs)

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

CO1: Understand the different manufacturing processes.

CO2: Explain the basics of thermal engineering and its applications.

CO3: Describe the working of different mechanical power transmission systems and power plants.

CO4: Describe the basics of robotics and its applications.

UNIT I

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT II

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT III

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

Textbooks:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference Books:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

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

ENGINEERING MECHANICS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	48	0	0	3	30	70	100

1. Course Objectives:

- To get familiarized with different types of force systems.
- To draw accurate free body diagrams representing forces and moments acting on a body to analyze the equilibrium of system of forces.
- To teach the basic principles of center of gravity, centroid and moment of inertia and determine them for different simple and composite bodies.
- To apply the Work-Energy method to particle motion.
- To understand the kinematics and kinetics of translational and rotational motion of rigid bodies.

2.Course Outcomes: On Completion of the course, the student should be able to

CO1: Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.
CO2: Analyze different force systems such as concurrent, coplanar and spatial systems and calculate their resultant forces and moments.
CO3: Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.
CO4: Apply the principles of work-energy and impulse-momentum to solve the problems of rectilinear and curvilinear motion of a particle.
CO5: Solve the problems involving the translational and rotational motion of rigid bodies.

3. Course Syllabus

UNIT I

Introduction to Engineering Mechanics – Basic Concepts. Scope and Applications Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems. Friction: Introduction, limiting friction and impending motion, Coulomb's laws of dry friction, coefficient of friction, Cone of Static friction.

UNIT II

Equilibrium of Systems of Forces: Free Body Diagrams, Lami's Theorm, Equations of Equilibrium of Coplanar Systems, Graphical method for the equilibrium, Triangle law of forces, converse of the law of polygon of forces condition of equilibrium, Equations of Equilibrium for Spatial System of forces, Numerical examples on spatial system of forces using vector approach, Analysis of plane trusses. Principle of virtual work with simple examples

UNIT III

Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures Centre of **Gravity:** Centre of gravity of simple body (from basic principles), Centre ofgravity of composite bodies, Pappus theorems. Area Moments of Inertia: Definition – Polar Moment of Inertia, Transfer

Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. Mass Moment of Inertia: Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, Mass Moment of Inertia of composite bodies.

UNIT IV

Rectilinear and Curvilinear motion of a particle: Kinematics and Kinetics –D'Alembert's Principle - Work Energy method and applications to particle motion- Impulse Momentum method.

UNIT V

Rigid body Motion: Kinematics and Kinetics of translation, Rotation about fixed axis and plane motion, Work Energy method and Impulse Momentum method.

4. Textbooks:

1. S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.
2. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022

Reference Books:

1. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education.
2. Engineering Mechanics, Statics and Dynamics, I.H. Shames., 4th Edition, PHI, 2002.
3. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L. G. Kraige., 6th Edition, John Wiley, 2008.
4. Engineering Mechanics: Principles of Statics and Dynamics, R.C. Hibbler., Pearson Press, 2006.
5. Introduction to Statics and Dynamics, Andy Ruina and Rudra Pratap., Oxford University Press, 2011.

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

ENGINEERING MECHANICS & BUILDING PRACTICES LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	48	1.5	30	70	100

1. Course Objectives:

The students completing the course are expected to:

- Verify the Law of Parallelogram and Triangle of Forces.
- Determine the coefficients of friction of Static and Rolling friction and Centre of gravity of different plane Lamina.
- Understand the layout of a building, concepts of Non-Destructive Testing and different Alternative materials

2. Course Outcomes:

At the end of the course, Student will be able. to

CO1: Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller

CO2: Verify Law of Parallelogram of forces and Law of Moment using force polygon and bell crank lever.

CO3: Determine the Centre of gravity different configurations and study of safety practices in construction Industry.

CO4: Understand the Quality Testing and Assessment Procedures and principles of Non-Destructive Testing.

3. Course Syllabus

Students have to perform any 10 of the following Experiments: List of Experiments:

1. To study various types of tools used in construction.
2. Forces in Pin Jointed Trusses
3. Experimental Proof of Lami's Theorem
4. Verification of Law of Parallelogram of Forces.
5. Determination of Center of Gravity of different shaped Plane Lamina.

6. Determination of coefficient of Static and Rolling Friction.
7. Verification of Law of Moment using Rotation Disc Apparatus and Bell Crank Lever
8. Layout plan of a building
9. Study of Alternative Materials like M-sand, Fly ash, Sea Sand etc.
10. Conducting Green audit of a building or Industry or Organization
11. Field-Visit to understand the Quality Testing and Assessment Procedures- report.
12. Safety Practices in Construction industry
13. Demonstration and principles of Non-Destructive Testing - using Rebound Hammer & USPV
14. Study of Plumbing, Wiring, Carpentry, Welding etc. in buildings.

4. Reference Books:

1 S. Timoshenko, D. H. Young, J.V. Rao, S. Pati., Engineering Mechanics, 5th Edition, McGraw Hill Education.

2. Hibbeler R.C., Engineering Mechanics: Statics and Dynamics, 14th Edition, Pearson Education, Inc., New Delhi, 2022

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

ENGINEERING WORKSHOP

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	48	1.5	30	70	100

1. Course Description:

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

Course Pre/co-requisites:

This course has no Pre/co-requisites

2. Course Outcomes: (COs)

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

CO1: Identify workshop tools and their operational capabilities.

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

3. Course Syllabus:

1. **Demonstration:** Safety practices and precautions to be observed in workshop.

2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints. a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint

3. **Sheet Metal Working:** Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets. a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-

wheeler tyre

5. **Electrical Wiring:** Familiarity with different types of basic electrical circuits and make the following connections. a) Parallel and series b) Two-way switch c) Godown lighting d) Tube light e) Three phase motor f) Soldering of wires

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop:** Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

4. Laboratory Equipment/Software/Tools Required:

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

5. Books and Materials

Text Book(s) :

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Book(s) :

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; Atul Prakashan, 2021-22

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

HEALTH AND WELLNESS, YOGA AND SPORTS

(Common to All Branches of Engineering)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	1	0	0	16	0.5	-	-	100

Course Description

Course Overview

The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

Course Pre/co-requisites

Bridge Course

Course Outcomes (COs)

Course Outcomes: After completion of the course the student will be able to

CO1: Understand the importance of yoga and sports for Physical fitness and sound health.

CO2: Demonstrate an understanding of health-related fitness components.

CO3: Compare and contrast various activities that help enhance their health.

CO4: Assess current personal fitness levels.

CO5: Develop Positive Personality.

3. Course Syllabus

UNIT I

Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity

Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

UNIT II

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc. Practicing general and specific warm up, aerobics.

ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks, 2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics, Inc.2014

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

COURSE STRUCTURE

III - SEMESTER

B.TECH – CIVIL ENGINEERING
III SEMESTER (II Year)

III SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40013	Numerical and Statistical Methods	BS	3	0	0	3	30	70	100
A40018	Universal Human Values–Understanding Harmony & Ethical Human Conduct	HSMC	2	1	0	3	30	70	100
A40103	Surveying	ES	3	0	0	3	30	70	100
A40104	Strength of Materials	PC	3	0	0	3	30	70	100
A40105	Fluid Mechanics	PC	3	0	0	3	30	70	100
A40106	Surveying Laboratory	PC	0	0	3	1.5	30	70	100
A40107	Strength of Materials Laboratory	PC	0	0	3	1.5	30	70	100
A40108	Building Planning and Drawing	SC	0	1	2	2	30	70	100
A40031	Environmental Science (Audit course)	MC	2	0	0	0	100*	0	100*
TOTAL			16	2	8	20	240	560	800

COURSE STRUCTURE

A40013 - NUMERICAL AND STATISTICAL 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. The topics covered in the course include algebraic and transcendental equations, interpolation, differential equations and estimation and testing of hypothesis. The mathematical skills developed through this course form a necessary base to analyze and design problems encountered in engineering specialization.

Course Pre/corequisites:

A40002 – Linear Algebra and Calculus

A40009 – Differential equations and Vector calculus

2. Course Outcomes (COs)

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

A40013.1 - Apply numerical methods to solve algebraic and transcendental equations

A40013.2 - Derive interpolating polynomials using interpolation formulae

A40013.3 - Solve differential and integral equations numerically

A40013.4 - To identify real life problems into Mathematical Models.

A40013.5 - To apply the probability theory and testing of hypothesis in the field of civil engineering Applications.

3. Course Syllabus

UNIT I

Solution of Algebraic & Transcendental Equations: Introduction-Bisection Method-Iterative method, Regula-falsi method and Newton Raphson method System of Algebraic equations: Gauss Elimination, Jacoby and Gauss Siedal method.

UNIT II

Interpolation: Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Curve fitting: Fitting of straight line, second-degree and Exponential curve by method of least squares.

UNIT III

Solution of Initial value problems to Ordinary differential equations: Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's and modified Euler's methods-Runge-Kutta methods (second and fourth order).

UNIT IV

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

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

UNIT V

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

4. Books and Materials

Text Book(s)

1. S S Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited.
2. B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2017, 44th Edition
3. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.India

Reference Book(s)

1. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2018, 10th Edition.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Alpha Science International Ltd., 2021, 5th Edition (9th reprint).
3. Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, PNIE
4. H. K Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand Publications,2014, Third Edition (Reprint 2021)

Online Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc17_ma14/preview
2. https://onlinecourses.nptel.ac.in/noc24_ma05/preview
3. http://nptel.ac.in/courses/111105090

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40018 – UNIVERSAL HUMAN VALUES – Understanding Harmony & Ethical Human Conduct

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

1. Course Description

Course Overview

To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Course Pre/corequisite

The course has no specific prerequisite and corequisite

2. Course Outcomes (COs)

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

A40018.1 Define the terms like Natural Acceptance, Happiness and Prosperity
A40018.2 Identify one's self, and one's surroundings (family, society nature)
A40018.3 Apply what they have learnt to their own self in different day-to-day settings in real life
A40018.4 Relate human values with human relationship and human society
A40018.5 Justify the need for universal human values and harmonious existence

3. Course Syllabus

UNIT I

Introduction to Value Education:

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.

UNIT II

Harmony in the Human Being:

Understanding Human being as the Co-existence of the self and the body, distinguishing between the Needs of the self and the body, the body as an Instrument of the self, Understanding Harmony in the self-Harmony of the self with the body, Programme to ensure self-regulation and Health.

UNIT III

Harmony in the Family and Society:

Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to- Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

UNIT IV

Harmony in the Nature/Existence:

Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.

UNIT V

Implications of the Holistic Understanding – a Look at Professional Ethics:

Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for

Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

4. Books and References

Textbook and Teachers Manual

a. The Textbook

R R Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

b. The Teacher's Manual

R R Gaur, R Asthana, G P Bagaria,*Teachers' Manual for A Foundation Course in Human Values and Professional Ethics,* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books

1. *JeevanVidya: EkParichaya,* A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E. F Schumacher.
6. *Slow is Beautiful* - Cecile Andrews
7. *Economy of Permanence* - J C Kumarappa
8. *Bharat Mein Angreji Raj* – PanditSunderlal
9. *Rediscovering India* - by Dharampal
10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi
11. *India Wins Freedom* - Maulana Abdul Kalam Azad
12. *Vivekananda* - Romain Rolland (English)
13. *Gandhi* - Romain Rolland (English)

Online Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf
7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf
8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
   https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40103 – 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

The primary objective of the course is to Know the principle and methods of surveying, measuring of horizontal and vertical-distances and angles. Identification of source of errors and rectification methods & to Know surveying principles to determine areas and volumes & to perform Setting out curves with the use modern surveying equipment for accurate results & know the basics of Photogrammetry Surveying.

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:

A40103.1 Apply the principle and methods of surveying and measuring of horizontal and vertical-distances and angles.

A40103.2 Identify the source of errors and rectification methods

A40103.3 Apply surveying principles to determine areas and volumes

A40103.4 Setting out curves and using modern surveying equipment’s

A40103.5 Apply the basics of Photogrammetry Surveying in field

3. Course Syllabus

UNIT I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Surveying accessories. Introduction to Compass, leveling and Plane table surveying.

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections. **Prismatic Compass**- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – systems and W.C.B and Q.B systems of locating bearings.

UNIT II

Leveling- Types of levels, methods of levelling, and Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes -Determination of volume of earth work in cutting and embankments for level section, capacity of reservoirs.

UNIT III

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontalangle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical leveling when base is accessible and inaccessible.

Traversing: Types of traverses, Methods of traversing

UNIT IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves Introduction to Tacheometric Surveying.

Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System. Introduction to Drone survey and LiDAR Survey (Light Detection and Ranging).

UNIT V

Photogrammetry Surveying: Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo-plotting instruments, mosaics, map substitutes**.**

4. Books and Materials

Text Book(s)

1. Surveying (Vol – 1 & 2) by Duggal S K, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.

2.Textbook of Surveying by *C Venkat Ramaiah, Universities Press 1st Edition, 2011.*

Reference Book(s)

1. Surveying (Vol – 1), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi, 18th edition 2024.
2. Surveying (Vol – 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi 17th 2022.
3. Surveying (Vol – 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi 16th 2023.
4. Plane Surveying and Higher Surveying‖ by Chandra A M, New age International Pvt. Ltd., Publishers, New Delhi, 3rd Edition, 2015.
5. Surveying and Levelling by N.Basak Tata McGraw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2014.
6. Surveying (Vol 1, 2 & 3), by Arora K R, Standard Book House, Delhi. Edition: 12th, 2015.

COURSE STRUCTURE

A40104 – STRENGTH OF MATERIALS

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 impart a general understanding on the fundamental concepts of strength of materials and principles of elasticity and plasticity. The course addresses the concepts of shear force and bending moment on various types of beams and loading conditions. It imparts the concepts of stresses developed in the cross section and calculation of section modulus of different sections. The course also deals with torsion of circular shafts and to derive equations for torsion across the cross sections when subjected to twisting moment.

Course Pre/corequisites

A40303 - Engineering Mechanics

2. Course Outcomes (COs)

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

A40104.1 Understand the basic materials behavior under the influence of different external loading conditions and the support conditions.

A40104.2 To Draw the diagrams indicating the variation of the key performance features like axial forces, bending moment and shear forces in structural members.

A40104.3 Acquire knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams

A40104.4 Analyze the deflections due to various loading conditions

A40104.5 Assess stresses across section of the columns using Euler's formulae

3. Course Syllabus

UNIT I

Simple Stresses and Strains: Elasticity and plasticity — Types of stresses and strains — Hooke's law — Factor of safety, Poisson's ratio - Relationship between Elastic constants — Bars of varying section — stresses in composite bars.

UNIT II

Shear Force and Bending Moment: Definition of beam — Types of beams — Concept of shear force and bending moment — Point of contra flexure — Relation between S.F., B.M and rate of loading at a section of a beam; S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

UNIT III

Flexural and Shear Stresses:

Flexural Stresses: Theory of simple bending — Assumptions — Derivation of bending equation, Neutral axis — Determination of bending stresses — section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections

Shear Stresses: Derivation of formula — Shear stress distribution across various beam sections like rectangular, circular, I, T Angle sections.

UNIT IV

Deflection of Beams: Double integration and Macaulay's methods — Determination of slope and deflection for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed loads, uniformly varying loads, partial uniformly distributed loads, couple and combination of these loads.

UNIT V

Columns and Struts: Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula

Torsion of circular shafts — Theory of pure torsion, Derivation of torsion equation, assumptions made in theory of torsion, Torsional moment of resistance, Polar section modulus, power transmitted by shafts

4. Books and Materials

Text Book(s)

1. Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2. Strength of Materials by B. S. Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010
3. Strength of Materials by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition ,2024

Reference Book(s)

1. Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, 2017, 3rd Edition
2. Strength of Materials - Fundamentals and Applications, T.D.Gunneswara Rao and Mudimby Andal, Cambridge University Press, 2018, 1st Edition
3. Mechanics of Materials, Beer and Johnston, McGraw Hill India Pvt. Ltd., 2020, 8th Edition (SI Units).
4. Mechanics of Solids — E P Popov, Prentice Hall, 2nd Edition, 2015.
5. A Textbook of Strength of Materials, by R. K. Rajput, 7e (Mechanics of Solids) SI Units S. Chand & Co, New Delhi 7th edition 2022.
6. Strength of Materials by S.S.Ratan Tata McGraw-Hill Publications 3rd Edition, 2016.

COURSE STRUCTURE

A40105 – FLUID MECHANICS

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

1. Course Description

Course Overview

The course deals with the basics of statics, kinematics and dynamics of fluids and various measuring techniques. It deals with the basic properties of fluids and physical laws that govern the flow of fluids. It enables the students to measure quantities of fluid flowing in pipes, tanks and channels. It also deals with analysis of pipe flow and various flow measuring devices to find discharge and velocity of flowing fluids. The course strengthens the students with fundamentals useful in application-intensive courses dealing with hydraulics and hydraulic machinery and hydrology in future courses.

Course Pre/corequisites

A40303 - Engineering Mechanics

2. Course Outcomes (COs)

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

A40105.1 To understand the principles of fluid statics, kinematics and dynamics.

A40105.2 To apply the laws of fluid statics and concepts of buoyancy.

A40105.3 To understand the fundamentals of fluid kinematics and differentiate types of fluid flows

A40105.4 To apply the principle of conservation of energy for flow measurement

A40105.5 To analyze the losses in pipes and discharge through pipe network

3. Course Syllabus

UNIT I

Basic concepts and definitions: Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; Variation of viscosity with temperature, Newton law of viscosity; Vapor pressure, Boiling point, Surface tension, Capillarity, Bulk modulus of elasticity, Compressibility.

UNIT II

Fluid statics: Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. Pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies

UNIT III

Fluid kinematics: Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one-, two- and three-dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -Dimensional continuity equations in Cartesian coordinates.

UNIT IV

Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – Derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number

UNIT V

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 – Pipes in Parallel and Series.

4. Books and Materials

Text Book(s)

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, Edition, 2022.
2. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018

Reference Book(s)

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
3. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition, 2022.
4. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
5. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty Tata McGraw Hill, 3rd edition 2011

Online Learning Resources:

https://archive.nptel.ac.in/courses/112/105/112105269/
https://nptel.ac.in/courses/112104118
https://nptel.ac.in/courses/105103192

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40106 – SURVEYING LAB

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

1. Course Description

Course Overview

To Know about various linear and angular measuring instruments and to take Measurements inthe linear and angular view, To Determine the area and volume by interpreting the data obtained from surveying activities by modern equipment such as total station, and Drafting field notes from survey data.

Course Pre/corequisites

A40103 – Surveying

2. Course Outcomes (COs)

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

A40106.1 Apply various linear and angular measuring instruments on field

A40106.2 Measure the linear and angular measurements

A40106.3 Calculate the area and volume by interpreting the data obtained from surveying activities

A40106.4 Handle modern equipment such as total station

A40106.5 Prepare field notes from survey data

3. List of Experiments

1. Chain survey of road profile with offsets in case of road widening.
2. Determination of distance between two inaccessible points by using compass.
3. Plane table survey: finding the area of a given boundary by the method of radiation
4. Fly levelling: Height of the instrument method (differential leveling)
5. Fly levelling: rise and fall method.
6. Theodolite survey: determining the horizontal and vertical angles by the method of repetition method
7. Theodolite survey: finding the distance between two in accessible points.
8. Theodolite survey: finding the height of far object.
9. Determination of area perimeter using total station.
10. Determination of distance between two inaccessible point by using total station.
11. Setting out a curve
12. Determining the levels of contours

4. Books and Materials

Text Book(s)

1. Surveying (Vol – 1 & 2) by Duggal S K, Tata McGraw Hill Publishing Co. Ltd. New Delhi, 5th edition, 2019.

2.Textbook of Surveying by *C Venkatramaiah , Universities Press 1st Edition, 2011.*

Reference Book(s)

1. Surveying (Vol – 1), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi, 18th edition 2024.
2. Surveying (Vol – 2), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi 17th 2022.
3. Surveying (Vol – 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi 16th 2023.
4. Plane Surveying and Higher Surveying‖ by Chandra A M, New age International Pvt. Ltd.,Publishers, New Delhi, 3rd Edition, 2015.
5. Surveying and Levelling by N.Basak Tata McGraw Hill Publishing Co. Ltd. New Delhi, 4th edition, 2014.
6. Surveying (Vol 1, 2 & 3), by Arora K R, Standard Book House, Delhi. Edition: 12th, 2015.

COURSE STRUCTURE

A40107 – STRENGTH OF MATERIALS LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

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

Course Pre/corequisites

A40104 – Strength of Materials

2. Course Outcomes (COs)

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

A40107.1 Conduct tensile strength test and draw stress strain diagrams for ductile materials

A40107.2 Perform bending test and determine load deflection curve of steel/wood

A40107.3 Able to conduct torsion test and determine torsion parameters

A40107.4 Perform hardness, impact and shear strength tests and calculate hardness numbers, impact and shear strengths

A40107.5 Able to conduct tests on closely coiled and open coiled springs and calculate deflections

3. Course Syllabus

1. Tension test
2. Bending test on (steel/wood) cantilever beam
3. Bending test on simply supported beam
4. Torsion test
5. Hardness test
6. Compression test on open coiled springs
7. Tension test on closely coiled springs
8. Compression test on wood/concrete
9. Izod/Charpy Impact test on metals
10. Shear test on metals
11. Use of electrical strain gauges
12. Continuous beams – deflection 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. Strength of Materials by R. K. Bansal, Lakshmi Publications, 16th Edition, 2022.
2. Strength of Materials by B. S. Basavarajaiah and P. Mahadevappa, Universities Press 3rd Edition, 2010
3. Strength of Materials by J.K. Gupta and S.K. Gupta, Cengage publications 2nd edition ,2024

Reference Book(s)

1. Advanced Mechanics of Solids, L.S Srinath, McGraw Hill Education, 2017, 3rd Edition
2. Strength of Materials - Fundamentals and Applications, T.D.Gunneswara Rao and Mudimby Andal, Cambridge University Press, 2018, 1st Edition

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40108 – BUILDING PLANNING AND DRAWING

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

Initiating the different building bye-laws and regulations and imparting the planning aspects of residential buildings and public buildings, and computing exercises on various signs and bonds and units of building, with recent skills and methods of planning.

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:

A40108.1 Plan various buildings as per the building by-laws.

A40108.2 Distinguish the relation between the plan, elevation and cross section and identify the form and functions among the buildings.

A40108.3 Draw signs and bonds

A40108.4 Draw different building units

A40108.5 Learn the skills of drawing building elements and plan the buildings as per requirements.

3. List of Experiments

1. Detailing & Drawing of Sign Conventions.
2. Detailing & Drawing of English Bond.
3. Detailing & Drawing of Flemish Bond.
4. Detailing & Drawing of Doors.
5. Detailing & Drawing of Windows.
6. Detailing & Drawing of Ventilators &Roofs.
7. Drawing of Line Diagram of Residential Buildings by using Building Bye- Laws.
8. Drawing of Plan, Elevation & Section from line diagram for a single Storey Building.
9. Drawing of Plan, Elevation & Section for Hospital Building.
10. Drawing of Plan, Elevation & Section for Industrial Building.

4. Books and Materials

Text Book(s)

1.Planning, designing and Scheduling, Gurcharan Singh and Jagdish Singh

2.Building planning and drawing by M. Chakraborti.

3.Building drawing, M G Shah, C M Kale and S Y Patki, Tata McGraw Hill, New Delhi.

Reference Book(s)

1. National Building Code 2016 (Volume- I & II).
2. Principles of Building Drawing, M G Shah and C M Kale, Trinity Publications, New Delhi.
3. Civil Engineering drawing and House planning, B. P. Verma, Khanna publishers, New Delhi.
4. Civil Engineering Building practice, Suraj Singh: CBS Publications, New Delhi, and Chennai
5. Building Materials and Construction, G. C Saha and Joy Gopal Jana, McGrawHill Education (P)India Ltd. New Delhi.

COURSE STRUCTURE
A40031 - ENVIRONMENTAL 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	0	100	0	100

1. Course Description

Course Overview

The course is designed to create environmental awareness and consciousness among present generation to become environmental responsible citizens. This course covers multidisciplinary nature of environmental studies, natural resources, renewable and non-renewable resources, ecosystem, bio-diversity and its conservation, environmental pollution and social issues. The course is divided into five chapters for the convenience of academic teaching followed by field visits.

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:

A40031.1 To make the students to get awareness on environment

A40031.2 To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life

A40031.3 To save earth from the inventions by the engineers

A40031.4 Apply environmental laws for the protection of environment and wildlife

A40031.5 Influence society in proper utilization of goods and

3. Course Syllabus

UNIT I

Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation: Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as amega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III

Environmental Pollution: Definition, Cause, effects and control measures of:

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT IV

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programs. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc.

4. Books and Materials

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.

4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice Hall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited.

COURSE STRUCTURE

IV - SEMESTER

B.TECH – CIVIL ENGINEERING
IV SEMESTER (II Year)

IV SEMESTER (II YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40022	Managerial Economics and Financial Analysis	BS &H	2	0	0	2	30	70	100
A40109	Engineering Geology	PC	3	0	0	3	30	70	100
A40110	Concrete Technology	PC	3	0	0	3	30	70	100
A40111	Structural Analysis	PC	3	0	0	3	30	70	100
A40112	Hydraulics and Hydraulic Machinery	PC	3	0	0	3	30	70	100
A40113	Concrete Technology Laboratory	PC	0	0	3	1.5	30	70	100
A40114	Engineering Geology Laboratory	PC	0	0	3	1.5	30	70	100
A40021	Soft Skills	SC	0	1	2	2	30	70	100
A40109	Design Thinking & Innovation	ES	1	0	2	2	30	70	100
TOTAL			15	1	10	21	270	630	900
Mandatory Community Service Project Internship of 08 weeks duration duringsummer vacation									

COURSE STRUCTURE

A40022 – Managerial Economics and Financial Analysis

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	2	30	70	100

1. Course Description

Course Overview

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

A40022.1 Define the concepts related to Managerial Economics, financial accounting and management

A40022.2 Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets

A40022.3 Apply the Concept of Production cost and revenues for effective Business decision

A40022.4 Analyse how to invest their capital and maximize returns

A40022.5 Evaluate the capital budgeting techniques

3. Course Syllabus

UNIT I

Managerial Economics: Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT II

Production and Cost Analysis: Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

UNIT III

Business Organizations and Markets: Introduction – Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT IV

Capital Budgeting: Introduction – Nature, meaning, significance. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT V

Financial Accounting and Analysis: Introduction – Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

4. Books and Materials

Text Book(s)

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Book(s)

1. Ahuja Hl Managerial Economics S Chand.
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International.
3. Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
4. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage.

Online Learning Resources:

https://www.slideshare.net/123ps/managerial-economics-ppt
https://www.slideshare.net/rossanz/production-and-cost-45827016
https://www.slideshare.net/darkyla/business-organizations-19917607
https://www.slideshare.net/balarajbl/market-and-classification-of-market
https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
https://www.slideshare.net/ashu1983/financial-accounting

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40109 – 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

1. To know the importance of Engineering Geology to the Civil Engineering.
2. To enable the students, understand what minerals and rocks are and their formation and identification.
3. To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.
4. To enable the student, realize its importance and applications of Engineering Geology in Civil Engineering constructions.
5. Concepts of Groundwater and its geophysical methods.

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:

A40109.1	Understand the significance of geological agents on Earth surface and its significance in Civil Engineering.
A40109.2	Identify and understand the properties of Minerals and Rocks.
A40109.3	Understand the concepts of Groundwater and its geophysical methods.
A40109.4	Classify and measure the Earthquake prone areas, Landslides and subsidence to practice the hazard zonation.
A40109.5	Investigate the project site for mega/mini civil engineering projects and site selection for mega engineering projects like Dams, Reservoirs and Tunnels.

3. Course Syllabus

UNIT I

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies, Weathering of rocks, Geological agents, weathering process of Rock, Rivers and geological work of rivers.

UNIT II

Mineralogy And Petrology: Definitions of mineral and rock-Different methods of study of mineral and rock. Physical properties of minerals and rocks for megascopic study for the following minerals and rocks. Common rock forming minerals: Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite and Bauxite.
Classification, structures, textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT III

Structural Geology: Strike, Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT IV

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes and Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT V

Geology of Dams, Reservoirs and Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Geology consideration for successful constructions of reservoirs, Life of Reservoirs. Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

4. Books and Materials

Text Book{s}

1. Engineering Geology by N. ChennaKesavulu, Laxmi Publications. 2ndEdn 2014.
2. Engineering & General Geology by Parbin Singh Katson educational series 8th Edn 2023

Reference Book(s)

1. Engineering Geology by Subinoy Gangopadhay Oxford University press 1st edition, 2012.
2. Engineering Geology by D. Venkat Reddy, Vikas Publishing, 2nd Edition, 2017,
3. Geology for Engineers and Environmental Society' Alan E Kehew, 3rd edition., 2013 Pearson publications.
4. 'Environmental Geology' (2013) K.S.Valdiya, 2nd ed., McGraw Hill Publications.

COURSE STRUCTURE
A40110 – 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

Learn materials and their properties used in the production of concrete

Learn the behavior of concrete at fresh stage

Learn the behavior of concrete at hardened stage

Learn the influence of elasticity, creep and shrinkage on concrete

Learn the mix design methodology and special concretes

Course Pre/corequisites

A40101 - Basic Civil and Mechanical Engineering

2. Course Outcomes (COs)

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

A40110.1	Familiarize the basic ingredients of concrete and their role in the production of concrete and its behavior in the field
A40110.2	Test the fresh concrete properties and the hardened concrete properties & design the concrete mix by BIS method
A40110.3	Evaluate the ingredients of concrete through lab test results. realize the importance of quality of concrete
A40110.4	Understand the behavior of concrete in various environments
A40110.5	Familiarize the basic concepts of special concrete and their production and applications

3. Course Syllabus

UNIT I:

CEMENTS: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substances – Soundness – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Maximum aggregate size- Quality of mixing water

Unit-II:

FRESH CONCRETE: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete.

UNIT III

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gel/space ratio – Nature of strength of concrete –Maturity concept – Strength in tension &compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete:

Compression test – Tension test – Factors affecting strength – Flexure test –Splitting test – Non-destructive testing methods – Codal provisions for NDT.

UNIT IV

ELASTICITY, CREEP & SHRINKAGE: Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

UNIT V

MIX DESIGN AND SPECIAL CONCRETES: Ready mixed concrete, Fiber reinforced concrete – Different types of fibers – Factors affecting properties of FRC, High performance concrete – Self consolidating concrete, Self-healing concrete. Factors in the choice of mix proportions –Quality control of concrete-Statistical methods- Acceptance Criteria-Concepts Proportioning of concrete mixes by ACI method and IS Code method

4. Books and Materials

Text Book{s}

1. Properties of Concrete by A.M. Neville – PEARSON – 4th edition
2. Concrete Technology by M.L. Gambhir. – Tata Mc.Graw Hill Publishers, New Delhi 5th edition 2013.
3. Concrete Technology by Job Thomas, Cengagae Publications, 1st edition, 2015

Reference Book(s)

1. Concrete Microstructure, Properties of Materials by P.K. Mehta and Moterio. McGraw Hill 4th edition 2014
2. Concrete Technology, J.J. Brooks and A. M. Neville, Pearson, 2019, 2nd Edition.
3. Concrete Technology by M. S. Shetty. – S. Chand & Co.; 2004
4. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi

COURSE STRUCTURE

A40111 – STRUCTURAL ANALYSIS

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

1. Course Description

Course Overview

This course deals with the analysis of indeterminate structures, fixed and continuous beams. It enables the student to find out end moments of continuous beams and single bay portal frames by using 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

A40104 - Strength of Materials

2. Course Outcomes (COs)

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

A40111.1 Apply energy theorems to analyze trusses

A40111.2 Analyze indeterminate structures by using Castigliano's–II theorem

A40111.3 Analyze fixed and continuous beams

A40111.4 Analyze continuous and fixed beams using Slope deflection method

A40111.5 Analyze continuous and fixed beams using Moment distribution method

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.

UNIT II

ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with up to two degrees of internal and external indeterminacies – Castigliano's–II theorem.

UNIT III

FIXED BEAMS & CONTINUOUS 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 effect of sinking of support, effect of rotation of a support.

UNIT IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations- application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway.

UNIT V

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method- application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway.

4. Books and Materials

Text Book(s)

1. Analysis of Structures – Vol-I & II by V N Vazirani & M M Ratwani, Khanna Publications, 9th Edition, 2022.
2. Basic Structural Analysis by C S Reddy, Tata McGraw Hill Publishers, 3rd Edition, 2017

Reference Book(s)

1. Structural analysis by Aslam Kassimali Cengage publications 6th edition 2020.
2. Structural analysis Vol.I and II by Dr.R.Vaidyanathan and Dr.P Perumal– Laxmi publications. 3rd 2016
3. Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
4. Structural Analysis – D.S.Prakasarao -Univeristy press.
5. Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, New Delhi.

COURSE STRUCTURE
A40112 – HYDRAULICS AND HYRAULIC 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

The primary objective of the course is to study laminar and turbulent flows, elucidating their respective characteristics. Teaching the fundamentals of uniform flows in open channels and explaining the principles governing non-uniform flows in open channels and to Providing insights into the design aspects of turbines to get knowledge on the design methodologies employed in pump systems

Course Pre/corequisites

A40105 – Fluid Mechanics

2. Course Outcomes (COs)

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

A40112.1 Understand the characteristics of laminar and turbulent flows

A40112.2 Apply the knowledge of fluid mechanics to address the uniform flow problems in open channels

A40112.3 Solve non-uniform flow problems and hydraulic jump phenomenon in open channel flows

A40112.4 Evaluate the performance of impact of jets on plates and design Pelton wheel, Francis and Kaplan turbine

A40112.5 Understand the principles, losses and its efficiencies of centrifugal pumps

3. Course Syllabus

UNIT I

Laminar & Turbulent flow in pipes: Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke 's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody 's diagram – Introduction to boundary layer theory

UNIT II

Uniform flow in Open Channels: Open Channel Flow - Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels

UNIT III

Non-Uniform flow in Open Channels: Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification -Energy dissipation

UNIT IV

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - Velocity triangles at inlet and outlet - Work done and efficiency

Hydraulic Turbines: Classification of turbines; Pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects

UNIT V

Pumps: Working principles of a centrifugal pump, work done by 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.

4. Books and Materials

Text Book(s)

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House 22nd, 2019.
2. K. Subrahmanyam, Theory and Applications of Fluid Mechanics, Tata McGraw Hill, 2nd edition 2018.

Reference Book(s)

1. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi 11th edition, 2024.
2. Fluid Mechanics by Frank M. White, Henry Xue, Tata McGraw Hill, 9th edition, 2022.
3. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.
4. Introduction to Fluid Mechanics & Fluid Machines by S K Som, Gautam Biswas, S Chakraborty 3rd edition 2011

COURSE STRUCTURE
A40113– CONCRETE TECHNOLOGY 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

To test basic properties of ingredients of concrete fresh and hardened concrete properties

Course Pre/corequisites

A40110 - Concrete Technology

2. Course Outcomes (COs)

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

A40113.1 Outline importance of testing cement and its properties

A40113.2 Assess different properties of Aggregates

A40113.3 Assess fresh concrete properties and their relevance to hardened concrete

A40113.4 Assess hardened concrete properties

A40113.5 To find the workability of concrete using various methods

3. Course Syllabus

1. Tests on Cement

Normal Consistency and Fineness of cement.

Initial setting time and Final setting time of cement.

Specific gravity and soundness of cement.

Compressive strength of cement.

2. Tests on Fine Aggregates

Grading and fineness modulus of Fine aggregate by sieve analysis.

Specific gravity of fine aggregate

Water absorption and bulking of sand.

3. Tests on Coarse Aggregates

Grading of Coarse aggregate by sieve analysis.

Specific gravity of coarse aggregate

Water absorption of Coarse aggregates

4. Tests on fresh Concrete

Workability of concrete by compaction factor method

Workability of concrete by slump test

Workability of concrete by Vee-bee test.

5. Tests on Hardened Concrete

Compressive strength of cement concrete and Modulus of rupture

Young’s Modulus and Poisson’s Ratio

Split tensile strength of concrete.

Non-Destructive testing on concrete (for demonstration)

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

COURSE STRUCTURE

A40114– ENGINEERING GEOLOGY LABORATORY

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

- To identify the Megascopic types of Ore minerals & Rock forming minerals.
- To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection

Course Pre/corequisites

A40109 - Engineering Geology

2. Course Outcomes (COs)

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

A40114.1 Identify megascopic minerals and their properties

A40114.2 Identify megascopic rocks and their properties

A40114.3 Identify the site parameters such as contour, slope & aspect for topography

A40114.4 Know the occurrence of materials using the strike & dip problems

A40114.5 Interpret and draw sections for geological maps showing tilted beds and faults

3. List of Experiments

1. Physical properties of minerals: Megascopic identification of

   a) Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…

   b) Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…

2. Megascopic description and identification of rocks.

   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.

   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.

   c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite &Biotiteschist, Marble, Khondalite, etc.

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, and Geomorphology & Structural Geology.

4. Lab Examination Pattern:

1. Description and identification of FOUR minerals

2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Question on Interpretation of a Geological map along with a geological section.
4. TWO Questions on Simple strike and Dip problems.
5. Bore hole problems.
6. Project report on geology.

5. REFERENCES:

1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age International Publishers, 2nd Edition.
2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3rd edition, 2009.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40021 – SOFT SKILLS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	2	30	70	100

1. Course Description

Course Overview

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills
- To enhance healthy relationship and understanding within and outside an organization
- To function effectively with heterogeneous teams

2. Course Outcomes (COs)

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

A40021.1 List out various elements of soft skills (L1, L2)
A40021.2 Describe methods for building professional image (L1, L2)
A40021.3 Apply critical thinking skills in problem solving (L3)
A40021.4 Analyse the needs of an individual and team for well-being (L4)
A40021.5 Assess the situation and take necessary decisions (L5)
A40021.6 Create a productive workplace atmosphere using social and work-life skills ensuring personal and emotional well-being (L6)

3. Course Syllabus

UNIT I

Soft Skills & Communication Skills

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills -Significance, process, types - Barriers of communication - Improving techniques.

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self-expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches convincing-negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation.

UNIT II

Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open mindedness – Creative Thinking - Positive thinking - Reflection

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues –placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT III

Problem Solving & Decision-Making Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles

Activities: Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision. Case Study & Group Discussion

UNIT IV

Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations. Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT V

Corporate Etiquette

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette - Corporate grooming tips -Overcoming challenges

Activities:

Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. - Conducting mock job interviews - Case Study - Business Etiquette Games

NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

Prescribed Books:

1. Mitra Barun K, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018

Reference Books

1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018.
2. Alex K, Soft Skills S.Chand& Co, 2012 (Revised edition)
3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013
4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018
5. Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher : Vayu Education of India, 2014

Online Learning Resources:
1. https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q
2. https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ
3. https://youtu.be/-Y-R9hDl7lU
4. https://youtu.be/gkLsn4ddmTs
5. https://youtu.be/2bf9K2rRWwo
6. https://youtu.be/FchfE3c2jzc
7. https://www.businesstrainingworks.com/training-resource/five-free-businessetiquette-training-games/
8. https://onlinecourses.nptel.ac.in/noc24_hs15/preview
9. https://onlinecourses.nptel.ac.in/noc21_hs76/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40023 – DESIGN THINKING & INNOVATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
1	0	2	42	0	0	2	30	70	100

1. Course Description

Course Overview

The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.

2. Course Outcomes (COs)

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

A40023.1 Define the concepts related to design thinking

A40023.2 Explain the fundamentals of Design Thinking and innovation

A40023.3 Apply the design thinking techniques for solving problems in various sectors

A40023.4 Analyze to work in a multidisciplinary environment

A40023.5 Evaluate the value of creativity

3. Course Syllabus

UNIT I

Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry

UNIT II

Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development

UNIT III

Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation

UNIT IV

Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies

Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT V

Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business Cases- Developing & testing prototypes.

Activity: How to market our own product, About maintenance, Reliability and plan for startup.

4. Books and Materials

Text Book(s)

1. Tim Brown, Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

Reference Book(s)

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough. H, The Era of Open Innovation – 2013

COMMUNITY SERVICE PROJECT

……Experiential learning through community engagement

Introduction

- Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development.
- Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.
- Community Service Project is meant to link the community with the college for mutual benefit. The community will benefit with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific

objectives are;

- To sensitize the students to the living conditions of the people who are around them,
- To help students to realize the stark realities of society.
- To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability
- To make students aware of their inner strength and help them to find new /out of box solutions to social problems.
- To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
- To help students to initiate developmental activities in the community in coordination with public and government authorities.
- To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

- Every student should put in 6 weeks for the Community Service Project during the summer vacation.
- Each class/section should be assigned with a mentor.
- Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, housewives, etc
- A logbook must be maintained by each of the students, where the activities undertaken/involved to be recorded.
- The logbook has to be countersigned by the concerned mentor/faculty in charge
- An evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
- The final evaluation to be reflected in the grade memo of the student.
- The Community Service Project should be different from the regular programs of NSS/NCC/Green Corps/Red Ribbon Club, etc.

- Minor project reports should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
- Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training.

Procedure

- A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, to enable them to commute from their residence and return back by evening or so.
- The Community Service Project is a twofold one –
    - First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
    - Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
        - Agriculture
        - Health
        - Marketing and Cooperation
        - Animal Husbandry
        - Horticulture
        - Fisheries
        - Sericulture
        - Revenue and Survey
        - Natural Disaster Management
        - Irrigation
        - Law & Order
        - Excise and Prohibition
        - Mines and Geology
        - Energy
        - Internet
        - Free Electricity
        - Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes

- Positive impact on students’ academic learning
- Improves students’ ability to apply what they have learned in “the real world”
- Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development.
- Improved ability to understand complexity and ambiguity

Personal Outcomes

- Greater sense of personal efficacy, personal identity, spiritual growth, and moral development
- Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills.

Social Outcomes

- Reduced stereotypes and greater inter-cultural understanding
- Improved social responsibility and citizenship skills
- Greater involvement in community service after graduation

Career Development

- Connections with professionals and community members for learning and career opportunities
- Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity.

Relationship with the Institution

- Stronger relationships with faculty
- Greater satisfaction with college
- Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

- Satisfaction with the quality of student learning
- New avenues for research and publication via new relationships between faculty and community
- Providing networking opportunities with engaged faculty in other disciplines or institutions
- A stronger commitment to one's research.

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

- Improved institutional commitment.
- Improved student retention
- Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

- Satisfaction with student participation
- Valuable human resources needed to achieve community goals.
- New energy, enthusiasm and perspectives applied to community work.
- Enhanced community-university relations

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE

PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey

31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling lvel- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs

Programs for School Children

1. Reading Skill Program (Reading Competition)
2. Preparation of Study Materials for the next class.
3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Program on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Program on Socially relevant themes.

Programs for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Women's Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programs on Environment
10. Health and Hygiene

11. Hand wash programmes

12. Commemoration and Celebration of important days

Programs for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programs

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programs in consonance with the Govt. Departments like –
    - i. Agriculture
    - ii. Health
    - iii. Marketing and Cooperation
    - iv. Animal Husbandry
    - v. Horticulture
    - vi. Fisheries
    - vii. Sericulture
    - viii. Revenue and Survey
    - ix. Natural Disaster Management
    - x. Irrigation
    - xi. Law & Order
    - xii. Excise and Prohibition
    - xiii. Mines and Geology
    - xiv. Energy

Role of Students:

- Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.
- For conducting special camps like Health related, they will be coordinating with the Governmental agencies.
- As and when required the College faculty themselves act as Resource Persons.
- Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.
- And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.

- An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. Preliminary Survey (One Week)

- A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.
- A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.
- The Governmental agencies, like revenue administration, corporation and municipal authorities and village secreteriats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)

- Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

- Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

- During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook needs to be maintained by the student's batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them.

COURSE STRUCTURE

V - SEMESTER

V SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40115	Water Resources Engineering	PC	3	0	0	3	30	70	100
A40116	Design of Reinforced Concrete Structures	PC	3	0	0	3	30	70	100
A40117	Soil Mechanics	PC	3	0	0	3	30	70	100
A40118a A40118b A40118c	**Professional Elective-I** 1. Advanced Structural Analysis 2. Air Pollution and Control 3. Environmental Impact Assessment	PE-I	3	0	0	3	30	70	100
	Open Elective-I	OE-I	3	0	0	3	30	70	100
A40119	Soil Mechanics Lab	PC	0	0	3	1.5	30	70	100
A40120	Fluid Mechanics Hydraulic Machines Lab	PC	0	0	3	1.5	30	70	100
A40121	Estimation, Specifications Costing and Valuation	SC	0	1	2	2	30	70	100
A40032	Tinkering Lab	BS&H	0	0	2	1	30	70	100
A40122	Evaluation of Community Service Internship	PW	-	-	-	2	-	-	100
A40536	Introduction to Quantum Technologies and Applications	SEC	3	0	0	3	30	70	100
TOTAL			15	1	10	26	300	700	1100

COURSE STRUCTURE
A40115 – WATER RESOURCES ENGINEERING

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

1. Course Description

Course Overview

Understand the fundamental concepts of hydrology, including precipitation, evaporation, infiltration, and runoff, and their significance in water resource management. Analyze hydrographs, unit hydrographs, and groundwater characteristics for estimating water availability and flood management. Evaluate the necessity, importance, and methods of irrigation, along with soil-water plant relationships and irrigation efficiencies. Apply silt theories and principles of canal design to ensure efficient water conveyance and management in irrigation systems. Assess the principles of diversion head works, water logging, canal lining, and the stability of hydraulic structures on permeable foundations.

Course Pre/corequisites

1. Fluid Mechanics

2. Course Outcomes (COs)

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

A40115.1 Explain the hydrologic cycle, precipitation types, and measurement techniques for rainfall, evaporation, infiltration, and runoff computation.

A40115.2 Analyze hydrographs, unit hydrographs, and groundwater flow parameters for flood estimation and water resource planning.

A40115.3 Evaluate irrigation requirements, soil-water-plant relationships, duty, delta, and irrigation efficiencies for sustainable agricultural productivity.

A40115.4 Apply silt theories and design principles of irrigation canals to ensure effective water conveyance and prevent water logging.

A40115.5 Assess the stability of diversion head works, including weirs and barrages, using Bligh‘s and Khosla‘s theories for hydraulic structure design.

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. Evaporation- Factors Affecting Evaporation, Measurement of Evaporation; Infiltration- Factors Affecting Infiltration, 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.

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

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; Bligh‘s Creep Theory; Khosla‘s Theory; Determination of Uplift Pressure, Impervious Floors Using Bligh‘s and Khosla‘s Theory; Exit Gradient.

4. Books and Materials

Text Book(s)

1. Irrigation and Water Power Engineering By Punmia & Lal, Laxmi Publications Pvt. Ltd., New Delhi 17th Edition 2021
2. Engineering Hydrology By K. Subramanya, The Tata McGraw Hill Company, Delhi 5th Edition 2020

Reference Book(s)

1. Irrigation Engineering and Hydraulic Structures By S. K. Garg; Khanna Publishers, Delhi 36th Edition
2. Engineering Hydrology By Jayarami Reddy, Laxmi Publications Pvt. Ltd., New Delhi 3rd Edition 2016
3. Irrigation and Water Resources & Water Power By P.N.Modi, Standard Book House 6th Edition 2020.

5. Online Learning Resources

https://nptel.ac.in/courses/105101214

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40116 – DESIGN 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

Understand the fundamental methods of concrete structure design, including elastic, ultimate load, and limit state methods, Analyze and design reinforced concrete beams, slabs, staircases, columns, and footings using the Limit State Method as per IS codes, Evaluate the behavior of reinforced concrete members in terms of flexure, shear, torsion, bond, and anchorage, Apply design principles to ensure serviceability and safety of concrete structures under various loading conditions, Develop skills to use design aids and professional software for the analysis and design of RC structures.

Course Pre/corequisites

1. Strength of Materials

2. Course Outcomes (COs)

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

A40116.1 Explain the different methods of concrete structure design and their advantages.

A40116.2 Analyze and design singly and doubly reinforced beams, flanged beams, slabs, and staircases using the Limit State Method.

A40116.3 Evaluate the behavior of RC members under shear, torsion, and combined loading conditions.

A40116.4 Design short columns and footings considering axial and eccentric loading conditions

A40116.5 Utilize IS code provisions and design aids for efficient structural design.

3. Course Syllabus

UNIT I
METHODS of DESIGN of CONCRETE STRUCTURES
Concept of Elastic Method, Ultimate Load Method and Limit State Method – Working Stress Method As Detailed in IS Code - Design of Singly Reinforced Beam By Working Stress Method - Limit State Philosophy As Detailed in IS Code - Advantages of Limit State Method Over Other Methods - Analysis and Design of Singly and Doubly Reinforced Rectangular Beams By Limit State Method.

UNIT II
LIMIT STATE METHOD - FLANGED BEAM, SHEAR &TORSION:
Analysis and Design of Flanged Beams – Use of Design Aids for Flexure - Behaviour of RC Members in Bond and Anchorage - Design Requirements As Per Current Code - Behaviour of RC Beams in Shear and torsion - Design of RC Members for Combined Bending, Shear and torsion - Serviceability.

UNIT III

LIMIT STATE DESIGN of SLABS

Analysis and Design of Cantilever, One Way, Two Way and Continuous Slabs Subjected to Uniformly Distributed Load for Various Boundary Conditions- –Introduction to Flat Slab.

UNIT IV
LIMIT STATE DESIGN of COLUMNS
Types of Columns – Design of Short Rectangular and Circular Columns for Axial, Uniaxial and Biaxial Bending.
LIMIT STATE DESIGN of FOOTING
Design of Wall Footing – Design of Axially and Eccentrically Loaded Rectangular Footings – Design of Combined Rectangular Footing for Two Columns Only.

UNIT V

LIMIT STATE of SERVICEABILITY and MISCELLANEOUS (Aspects of Deflection, Cracking aspects) Types of Staircases – Design of Dog-Legged Staircase.

4. Books and Materials

Text Book(s)

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Limit State Design, Laxmi Publications Pvt. Ltd., New Delhi
2. P. C. Varghese, Limit State—Designed of Reinforced Concrete, Prentice Hall of India, New Delhi

Reference Book(s)

1. N. Krishnaraju, —Structural Design and Drawing, Universities Press Pvtltd, Hyderabad.4rd edition 2020.
2. N.C. Sinha and S.K. Roy,—Fundamentals of Reinforced Concrete, S. Chand Publishers
3. N.Subramanian, —Design of Reinforced Concrete Structures, Oxford University Press Irrigation Engineering and Hydraulic Structures By S. K. Garg; Khanna Publishers, Delhi 36th Edition

5. Online Learning Resources

https://archive.nptel.ac.in/courses/105/105/105105105/

Codes/Tables: IS 456-2000 and relevant sheets (Pertaining to columns) of SP 16 Code books to be permitted into the examinations Hall.

NOTE: Assignment on preparation of drawing sheets detailing various RC Elements

All the designs to be taught in Limit State Method Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One-way, Two way and continuous slabs

Exam Pattern:

The end examination paper should consist of Part A and Part B.

Part A consists of two questions in Design and Drawing out of which one question is to be answered.

Part-B should consist of five questions on design out of which three are to be answered. Weightage for Part - A is 40% and Part-B is 60%.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40117 – SOIL MECHANICS

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

1. Course Description

Course Overview

Understand the classification and compaction characteristics of different soil types and their engineering significance, Analyze the concepts of effective stress, permeability, and seepage in soils and their impact on soil behavior, Apply stress distribution theories and settlement computations to evaluate soil response under loads, Evaluate shear strength properties of soil using various testing methods and their applications in geotechnical engineering, Assess the stability of slopes using different analytical methods and suggest suitable slope protection measures.

Course Pre/corequisites

1. Fluid Mechanics

2. Course Outcomes (COs)

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

A40117.1 Classify soils based on their physical and index properties as per BIS and Unified classification systems.

A40117.2 Analyze soil permeability and seepage problems using Darcy‘s law and flow net concepts.

A40117.3 Apply stress distribution theories and settlement analysis to predict soil behavior under loading.

A40117.4 Evaluate shear strength of soils using experimental methods and interpret test results.

A40117.5 Assess slope stability and recommend suitable protection measures.

3. Course Syllabus

UNIT I

SOIL CLASSIFICATION and COMPACTION

Formation of Soil - Soil Description – Particle – Size Shape and Colour – Composition of Gravel, Sand, Silt, Clay Particles – Particle Behavior – Soil Structure – Phase Relationship – Index Properties – Significance – BIS Classification System – Unified Classification System – Compaction of Soils – Theory, Laboratory and Field Tests – Field Compaction Methods – Factors Influencing Compaction of Soils.

UNIT II

EFFECTIVE STRESS and PERMEABILITY

Soil - Water – Static Pressure in Water - Effective Stress Concepts in Soils – Capillary Phenomena– Permeability Interaction – Hydraulic Conductivity – Darcy‘s Law – Determination of Hydraulic Conductivity – Laboratory Determination (Constant Head and Falling Head Methods) and Field Measurement Pumping Out in Unconfined and Confined Aquifer – Factors Influencing Permeability of Soils – Seepage - Two-Dimensional Flow – Laplace‘s Equation – Introduction to Flow Nets – Simple Problems. (Sheet Pile and Weir).

UNIT III

STRESS DISTRIBUTION and SETTLEMENT

Stress Distribution in Homogeneous and Isotropic Medium – Boussinesq Theory – (Point Land, Line Land and UDL) Use of New Marks Influence Chart –Components of Settlement –– Immediate and Consolidation Settlement – Terzaghi‘s One Dimensional Consolidation Theory – Computation of Rate of Settlement. - √T and Log T Methods– E-Log P Relationship.

UNIT IV

SHEAR STRENGTH

Shear Strength of Cohesive and Cohesion Less Soils – Mohr-Coulomb Failure Theory – Measurement of Shear Strength - Direct Shear, Tri-axial Compression, UCC and Vane Shear Tests – Pore Pressure Parameters – Liquefaction.

UNIT V

SLOPE STABILITY

Stability Analysis - Infinite Slopes and Finite Slopes – total Stress Analysis for Saturated Clay – Friction Circle Method – Use of Stability Number – Method of Slices – Fellenious and Bishop's Method - Slope Protection Measures.

4. Books and Materials

Text Book(s)

1. Soil Mechanics and Foundation Engg by K.R.Arora, Standard Publishers and Distributors Delhi 7th edition 2009
2. Geotechnical Engineering by C.Venkataramiah, New Age International Pvt. Ltd, (2002).

Reference Book(s)

1. Soil Mechanics and Foundation by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., New Delhi 17th edition 2017
2. Geotechnical Engineering by Iqbal H.Khan, PHI Publishers, 4th edition.
3. Basic and Applied Soil Mechanics by Gopal Ranjan& ASR Rao, New age International Pvt.Ltd, New Delhi 3rd edition 2016.

5. Online Learning Resources

https://nptel.ac.in/courses/105101201

https://nptel.ac.in/courses/105105185

COURSE STRUCTURE
A40119 – 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

To Perform field and laboratory tests to determine in-situ density and compaction characteristics of soils, Evaluate the engineering properties of soil, including permeability, shear strength, and consolidation, Analyze the strength and deformation characteristics of soils through shear and compression tests, interpret test results and relate engineering properties of soils to real-world geotechnical problems and design considerations.

Course Pre/corequisites

Soil Mechanics

2. Course Outcomes (COs)

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

A40119.1 Determine index properties of soil, including specific gravity, grain size distribution, and consistency limits

A40119.2 Conduct field and laboratory compaction tests to evaluate the moisture-density relationship of soil.

A40119.3 Evaluate permeability and consolidation characteristics of soil using appropriate laboratory techniques

A40119.4 Analyze the shear strength and compressibility of soil through direct shear, unconfined compression, and tri-axial tests

A40119.5 Integrate test results and engineering judgment to interpret soil behavior and make informed decisions in geotechnical engineering applications.

3. Course Syllabus

1. Determination of Index Properties

a. Specific Gravity of Soil

b. Grain Size Distribution – Sieve Analysis

c. Grain Size Distribution - Hydrometer Analysis

d. Liquid Limit and Plastic Limit Tests

e. Shrinkage Limit and Differential Free Swell Tests

2. Determination of In-Situ Density and Compaction Characteristics

a. Field Density Test (Sand Replacement Method)

b. Determination of Moisture–Density Relationship Using Standard Proctor Compaction Test.

3. Determination of Engineering Properties

a. Permeability Determination (Constant Head Method)

b. Permeability Determination (Falling Head Methods)

c. Determination of Co-Efficient of Consolidation

d. Direct Shear Test in Cohesion Less Soil

e. Unconfined Compression Test in Cohesive Soil

f. Laboratory Vane Shear Test in Cohesive Soil

g. Tri-Axial Compression Test in Cohesion Less Soil

h. California Bearing Ratio Test

Note: Any 10 of the above Experiments.

4. Text Book(s)

1. Lambe T.W., —Soil Testing for Engineers, John Wiley and Sons, New York, 1951. Digitized 2008.
2. IS Code of Practice (2720) Relevant Parts, as amended from time to time, Bureau of Indian Standards, New Delhi.

Reference Book(s)

1. Saibaba Reddy, E. Ramasastri, K. —Measurement of Engineering Properties of Soils, New age International (P) limited publishers, New Delhi, 2008.
2. G.Venkatappa Rao and Goutham. K. Potable, —Geosynthetics Testing – A laboratory Manual, Sai Master Geoenvironmental Services Pvt. Ltd., 1st Edition 2008.
3. Braja M.Das., —Soil Mechanics: Laboratory Manual, Oxford University Press, eighth edition, 2012

COURSE STRUCTURE

A40120– FLUID MECHANICS & HYDRAULIC MACHINES LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

Understand the principles of fluid mechanics and validate fundamental concepts through experiments, determine discharge coefficients for various flow measurement devices and analyze flow behavior, evaluate energy losses in pipes, open channels, and hydraulic jumps to improve flow efficiency, Analyze the impact of jet forces on vanes and their applications in hydraulic machinery, assess the performance characteristics of hydraulic turbines and pumps under different operating conditions.

Course Pre/corequisites

Fluid Mechanics

2. Course Outcomes (COs)

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

A40120.1 Verify Bernoulli's equation and apply it to real-life fluid flow problems.

A40120.2 Determine the coefficient of discharge for orifices, notches, and flow meters.

A40120.3 Evaluate head losses due to friction and minor losses in pipe flow systems.

A40120.4 Analyze the impact of jets on vanes and its significance in hydraulic machinery.

A40120.5 Assess the performance of turbines and pumps under different conditions and recommend optimal operating parameters.

3. Course Syllabus

1. Verification of Bernoulli 's Equation
2. Determination of Coefficient of Discharge for a Small Orifice by a Constant Head Method
3. Calibration of Venturi meter/ Orifice Meter
4. Calibration of Triangular / Rectangular/Trapezoidal Notch
5. Determination of Minor Losses in Pipe Flow
6. Determination of Friction Factor of a Pipeline
7. Determination of Energy Loss in Hydraulic Jump
8. Determination of Manning 's and Chezy's Constants for Open Channel Flow.
9. Impact of Jet On Vanes
10. Performance Characteristics of Pelton Wheel Turbine
11. Performance Characteristics of Francis Turbine
12. Performance Characteristics of Kaplan Turbine
13. Performance Characteristics of a Single Stage / Multistage Centrifugal Pump

Note: Minimum 10 out of the above are to be conducted.

4. BOOKS and MATERIALS

Text Book(s)

1. Desmukh T. S., A lab manual on Fluid Mechanics and Hydraulic Machines, Laxmi Publications
2. Dr. S.K. Panigrahi, Ms. L. Mohanty, Fluid Mechanics and Hydraulic Machines Laboratory Manual, S.K.KATARIA & SONS ,Educational Publisher

Reference Book(s)

1. Dr. N. Kumara Swamy, Fluid Mechanics and Machinery Laboratory Manual, Chartor Publications
2. D. Sathish, Fluid Mechanics and Machinery Lab Manual, BP International Publications

5. Online Learning Resources:

https://archive.nptel.ac.in/courses/112/106/112106311/

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40121– ESTIMATION, SPECIFICATIONS, COSTING AND VALUATION

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	1	2	0	14	28	2	30	70	100

1. Course Description

Course Overview

Understand the various methods and types of estimates used in civil engineering projects, Develop detailed estimates for single and multi-storey buildings using standard estimation methods, analyze rate analysis, abstract estimation, and bill preparation as per standard procedures, Prepare detailed specifications and tender documents for construction works, Evaluate the valuation, cost escalation, and value analysis of buildings.

Course Pre/corequisites

Building Planning and Drawing

2. Course Outcomes (COs)

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

A40121.1 Apply estimation techniques to prepare detailed estimates for various construction projects

A40121.2 Develop abstract estimates and rate analysis for different civil engineering works.

A40121.3 Analyze the preparation of measurement books and bill preparation as per AP State Government procedures

A40121.4 Create detailed specifications and tender documents for construction projects

A40121.5 Assess building valuation, cost escalation, and value analysis techniques.

3. Course Syllabus

1. Activity Based on Learning Methods and Types of Estimates
2. Preparation of Detailed Estimate for A Single-Storied Residential Building Using Wall to Wall Method
3. Preparation of Detailed Estimate for A Single Storied Residential Building Using Centre Line Method for Earthwork, Foundations, Super Structure, Fittings Including Sanitary and Electrical Fittings &Paintings.
4. Preparation of Detailed Estimate for A Two Storied Residential Building Using Centre Line Method for Earthwork, Foundations, Super Structure, Fittings Including Sanitary and Electrical Fittings &Paintings.
5. Activity Based Learning of Estimate Data and Rate Analysis
6. Preparation of Abstract Estimate for The Detailed Estimate in Exercise No.3
7. Preparation of Abstract Estimate for The Detailed Estimate in Exercise No.4
8. Writing of Measurement Book and Bill Preparation as Per AP State Govt Procedure for Detailed Estimate in No. 3 and Abstract Estimate of No. 6
9. Writing of Detailed Specifications for Various Items of Estimate and Preparing a Model Tender Document for The Work Listed in No. 3 and 6
10. Activity Based Learning for Valuation of Buildings, Cost Escalation Procedures and Value Analysis for Any One Work

4. BOOKS and MATERIALS

Text Book(s)

1. B.N. Dutta - Estimating and Costing in Civil Engineering, CBS Publishers & Distributors, 28th Revised Edition (2020).
2. Rangwala - Estimating, Costing and Valuation, Charotar Publishing House, 2023.
3. D.D. Kohli& R.C. Kohli - A Textbook of Estimating and Costing (Civil), S. Chand Publishing, 2011.

Reference Book(s)

1. M. Chakraborti - Estimating, Costing, Specification &Valuation in Civil Engineering, 29th Edition (2021).
2. Gurcharan Singh - Estimating, Costing and Valuation, Standard Publishers, 2018.
3. V.N. Vazirani& S.P. Chandola - Civil Engineering Estimating & Costing, Khanna Publishers, 4th Edition (2001).

5. Online Learning Resources:

https://onlinecourses.swayam2.ac.in/nou20_cs11/preview https://www.coursera.org/learn/construction-cost-estimating

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40032 – TINKERING LAB

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 aim of tinkering lab for engineering students is to provide a hands-on learning environment where students can explore, experiment, and innovate by building and testing prototypes. These labs are designed to demonstrate practical skills that complement theoretical knowledge.

Course Pre/corequisites

There are no pre requisites for this course

2. Course Outcomes (COs)

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

A40032-1 Experiment, innovate and solve real world challenges

A40032-2 Control an LED using Mobile App

A40032-3 Build and demonstrate automatic street light

A40032-4 Demonstrate all the steps in design thinking to redesign a motor bike

A40032-5 Design and 3D print a rocket.

3. Course Syllabus

1) Make your own parallel and series circuits using breadboard for any application of your choice.
2) Demonstrate a traffic light circuit using breadboard.
3) Build and demonstrate automatic Street Light using LDR.
4) Simulate the Arduino LED blinking activity in Tinker cad.
5) Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
6) Interfacing IR Sensor and Servo Motor with Arduino.
7) Blink LED using ESP32.
8) LDR Interfacing with ESP32.
9) Control an LED using Mobile App.
10) Design and 3D print a Walking Robot
11) Design and 3D Print a Rocket.
12) Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard.
13) Demonstrate all the steps in design thinking to redesign a motor bike.

4. Text Book(s)

1) https://aim.gov.in/pdf/equipment-manual-pdf.pdf
2) https://atl.aim.gov.in/ATL-Equipment-Manual/
3) https://aim.gov.in/pdf/Level-1.pdf
4) https://aim.gov.in/pdf/Level-2.pdf
5) https://aim.gov.in/pdf/Level-3.pdf

PROFESSIONAL ELECTIVE-I

Course Code	Title of the Course	L-T-P	Credits
A40118a	ADVANCED STRUCTURAL ANALYSIS	3-0-0	3
A40118b	AIR POLLUTION AND CONTROL	3-0-0	3
A40118c	ENVIRONMENTAL IMPACT ASSESSMENT	3-0-0	3

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40118a – ADVANCED STRUCTURAL ANALYSIS (PE – 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 objectives of this course are to make the student to understand the fundamental concepts of arches, including three-hinged and two hinged arches, and analyze the effects of horizontal thrust, bending moment, normal thrust, and radial shear. Apply the moment distribution method to analyze single-bay, single-story portal frames with and without side sway. Analyze continuous beams and portal frames using Kani's Method, including cases with and without settlement of supports. Solve structural problems using the flexibility method for continuous beams and single-bay portal frames, considering support settlements and side sway effects. Evaluate the stiffness method for analyzing continuous beams and single-bay portal frames with and without side sway, ensuring structural stability and performance.

Course Pre/co-requisites

A40111. Structural Analysis

2. Course Outcomes (COs)

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

A40118a.1 Explain the behavior of three-hinged and two-hinged arches and analyze the effects of horizontal thrust, bending moment, normal thrust, and radial shear.

A40118a.2 Apply the moment distribution method to analyze single-bay, single-story portal frames with and without side sway.

A40118a.3 Analyze continuous beams and portal frames using Kani's Method, including cases with and without settlement of supports.

A40118a.4 Solve structural problems using the flexibility method for continuous beams considering support settlements and side sway effects.

A40118a.5 Evaluate the stiffness method for analyzing continuous beams ensuring structural stability and performance.

3. Course Syllabus

UNIT I

ARCHES: Three Hinged Arches, Elastic Theory of Arches– Eddys Theorem –Determination of Horizontal Thrust, Bending Moment, Normal Thrust and Radial Shear–Effect of Temperature-Determination of Horizontal Thrust Bending Moment, Normal Thrust and Radial Shear–Rib Shortening and Temperature Stresses.

UNIT II

MOMENT DISTRIBUTION METHOD for FRAMES: Analysis of Single Bay Single Storey Portal Frame Including Side sway analysis

UNIT III

KANI`S METHOD: Analysis of Continuous Beams with and Without Settlement of Supports-Single Bay Single Storey Portal Frames With and Without Side Sway.

UNIT IV

FLEXIBILITY METHODS: Flexibility Methods- Introduction-Application to Continuous Beams Including Support Settlements

UNIT V

STIFFNESS METHODS: Stiffness Methods – Introduction – Application to Continuous Beams Including Support Settlements

Books and Materials

Text Book(s)

1. Analysis of structures by Vazrani & Ratwani– Khanna Publications.
2. Theory of structures by Ramamuratam, jain book depot , New Delhi.

Reference Book(s)

1. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
2. Basic Structural Analysis by K.U.Muthuetal, I.K. International Publishing House Pvt. Ltd
3. Theory of Structures by Gupta SP, G S Pundit R Gupta,Vol II, Tata McGraw Hill Publications Company td.
4. D. S. Prakash Rao —Structural Analysis: A Unified Approach, Universities Press

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/106/105106050/

COURSE STRUCTURE

A40118b – AIR POLLUTION AND CONTROL (PE-1)

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

Understand the sources, classification, and effects of air pollution on humans and the environment. Analyze meteorological factors influencing air pollution and dispersion modeling, Design and evaluate control measures for particulate pollutants, apply techniques for controlling gaseous pollutants through chemical and physical processes, assess vehicular and indoor air pollution and propose control strategies.

Course Pre/corequisites

1. Environmental Engineering

2. Course Outcomes (COs)

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

A40118b.1 Explain the sources, classification, and global effects of air pollution.

A40118b.2 Analyze meteorological parameters affecting air pollution dispersion.

A40118b.3 Design control systems for particulate matter using appropriate removal techniques

A40118b.4 Apply suitable technologies for gaseous pollutant removal through adsorption, absorption, and combustion.

A40118b.5 Evaluate vehicular and indoor air pollution sources and suggest mitigation strategies.

3. Course Syllabus

UNIT I

Air Pollution

Definition - Sources &Classification of Air Pollutants - Effects of Air Pollution On Humans, Plants and Materials-Global Effects - Air Quality and NAAQS - National Clean Air Programme- Sampling of Pollutants in Ambient Air - Stack Sampling

UNIT II

Meteorology and Air Pollution

Factors Influencing Air Pollution, Wind Rose, Mixing Depths, Lapse Rates and Dispersion - Atmospheric Stability, Plume Rise and Dispersion, Prediction of Air Quality, Box Model - Gaussian Model - Dispersion Coefficient - Application of Tall Chimney for Pollutant Dispersion.

UNIT III

Control of Particulate Pollutants

Properties of Particulate Pollution - Particle Size Distribution - Control Mechanism - Dust Removal Equipment - Design and Operation of Settling Chambers, Cyclones, Wet Dust Scrubbers, Fabric Filters &ESP.

UNIT IV

Control of Gaseous Pollutants

Process and Equipment for The Removal By Chemical Methods - Design and Operation of Absorption and Adsorption Equipment - Combustion and Condensation Equipment.

UNIT V

Automobile and Indoor Pollution

Vehicular Pollution – Sources and Types of Emission – Effect of Operating Conditions Alternate Fuels and Emissions-Emission Controls and Standards, Strategies to Control Automobile Pollution– Causes of Indoor Air Pollution-Changes in Indoor Air Quality Control and Air Cleaning Systems-Indoor Air Quality

4. Books and Materials

Text Book(s)

1. Rao, M. N. and Rao H. V. N., Air Pollution, Tata McGraw-Hill, New Delhi, 2007
2. Khare M, Sharma P, Kota, S.H, Sumanth C, Air Pollution Science Engineering and Management Fundamentals, CRC Press, 2024.
3. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers, 1999.

Reference Book(s)

1. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H
2. Air Pollution Control Engineering by Nevers, , McGraw-Hill, Inc., 2000.
3. Rao, C. S., Environmental Pollution Control Engineering, New Age International, New Delhi, 2006.
4. Mahajan S. P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company, New Delhi, 1991.
5. Peavy H. S., Rowe D. R. and Tchobanoglous G., Environmental Engineering, McGraw Hill, New York, 1985

5. Online Learning Resources

https://archive.nptel.ac.in/courses/105/107/105107213/

COURSE STRUCTURE

A40118c – ENVIRONMENTAL IMPACT ASSESSMENT (PE-1)

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

Understand the principles, methodologies, and significance of Environmental Impact Assessment (EIA), Analyze the impact of developmental activities on land use, soil, and water resources, Evaluate the impact of development on vegetation, wildlife, and assess environmental risks, develop environmental audit procedures and assess compliance with environmental regulations, Understand and apply environmental acts, notifications, and legal frameworks in EIA studies.

Course Pre/corequisites

1. Environmental Engineering

2. Course Outcomes (COs)

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

A40118c.1 Apply various methodologies for conducting Environmental Impact Assessments

A40118c.2 Analyze the impact of land-use changes on soil, water, and air quality.

A40118c.3 Evaluate the environmental impact on vegetation, wildlife, and conduct risk assessments

A40118c.4 Develop environmental audit reports and assess compliance with environmental policies.

A40118c.5 Interpret and apply environmental acts and regulations related to EIA

3. Course Syllabus

UNIT I

Concepts and methodologies of EIA

Initial Environmental Examination, Elements of EIA, - Factors Affecting E-I-A Impact Evaluation and Analysis, Preparation of Environmental Base Map, Classification of Environmental Parameters- Criteria for The Selection of EIA Methodology, E I A Methods, Ad-Hoc Methods, Matrix Methods, Network Method Environmental Media Quality Index Method, Overlay Methods and Cost/Benefit Analysis.

UNIT II

Impact of Developmental Activities and Land Use

Introduction and Methodology for The Assessment of Soil and Ground Water, Delineation of Study Area, Identification of Actives. Procurement of Relevant Soil Quality, Impact Prediction, Assessment of Impact Significance, Identification and Incorporation of Mitigation Measures. EIA in Surface Water, Air and Biological Environment: Methodology for The Assessment of Impacts on Surface Water Environment, Air Pollution Sources, Generalized Approach for Assessment of Air Pollution Impact.

UNIT III

Assessment of Impact on Vegetation, Wildlife and Risk Assessment

Introduction - Assessment of Impact of Development Activities on Vegetation and Wildlife, Environmental Impact of Deforestation – Causes and Effects of Deforestation - Risk Assessment and Treatment of Uncertainty-Key Stages in Performing Environmental Risk Assessment-Advantages of Environmental Risk Assessment.

UNIT IV

Environmental audit

Introduction - Environmental Audit &Environmental Legislation Objectives of Environmental Audit, Types of Environmental Audit, Audit Protocol, Stages of Environmental Audit, Onsite Activities, Evaluation of Audit Data and Preparation of Audit Report.

UNIT V

Environmental Acts and Notifications

The Environmental Protection Act, The Water Preservation Act, The Air (Prevention &Control of Pollution Act), Wild Life Act - Provisions in The EIA Notification, Procedure for Environmental Clearance, Procedure for Conducting Environmental Impact Assessment Report- Evaluation of EIA Report. Environmental Legislation Objectives, Evaluation of Audit Data and Preparation of Audit Report. Post Audit Activities, Concept of ISO and ISO 14000.

4. Books and Materials

Text Book(s)

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B. S. Publication, Hyderabad 2nd edition 2011
2. Environmental Impact Assessment, by Canter Larry W., McGraw-Hill education Edi (1996).

Reference Book(s)

1. Environmental Engineering, by Peavy, H. S, Rowe, D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985.
2. Environmental Science and Engineering, by Suresh K. Dhaneja, S.K., Katania& Sons Publication, New Delhi
3. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers.
4. Environmental Pollution and Control, by H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

5. Online Learning Resources

https://archive.nptel.ac.in/courses/124/107/124107160/

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

Open Electives

CourseCode	Title of the Course	L-T-P	Credits	Offered by
Open Elective - I				
A40271	Electrical Safety Practices and Standards	3-0-0	3	EEE
A40371	Sustainable Energy Technologies	3-0-0	3	ME
A40471	Electronic Circuits	3-0-0	3	ECE
A40571	Java Programming	3-0-0	3	CSE
A40572	Artificial Intelligence - Concepts and Techniques	3-0-0	3	CSE
A40573	Quantum Technologies And Applications	3-0-0	3	CSE
A40071	Mathematics for Machine Learning and AI	3-0-0	3	H&S
A40072	Materials Characterization Techniques	3-0-0	3	H&S
A40073	Chemistry of Energy Systems	3-0-0	3	H&S
A40074	English for Competitive Examinations	3-0-0	3	H&S
A40075	Entrepreneurship and New Venture Creation	3-0-0	3	H&S
A40090	Mathematics for Machine Learning	3-0-0	3	H&S
A40091	Entrepreneurship	3-0-0	3	H&S

COURSE STRUCTURE

A40271 – ELECTRICAL SAFETY PRACTICES AND STANDARDS (OE-1)

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

Understand the sources, classification, and effects of air pollution on humans and the environment. Analyze meteorological factors influencing air pollution and dispersion modeling, Design and evaluate control measures for particulate pollutants, apply techniques for controlling gaseous pollutants through chemical and physical processes, assess vehicular and indoor air pollution and propose control strategies.

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40271-1: Understanding the Fundamentals of Electrical Safety

A40271-2: Identifying and Applying Safety Components

A40271-3: Analyzing Grounding Practices and Electrical Bonding

A40271-4: Applying Safety Practices in Electrical Installations and Environments

A40271-5: Evaluating Electrical Safety Standards and Regulatory Compliance

3. Course Syllabus

UNIT I

Introduction To Electrical Safety:

Fundamentals of Electrical safety-Electric Shock- physiological effects of electric current - Safety requirements –Hazards of electricity- Arc - Blast- Causes for electrical failure.

UNIT II

Safety Components:

Introduction to conductors and insulators- voltage classification -safety against over voltages- safety against static electricity-Electrical safety equipment‘s - Fire extinguishers for electrical safety.

UNIT III

Grounding:

General requirements for grounding and bonding- Definitions- System grounding-Equipment grounding - The Earth - Earthing practices- Determining safe approach distance-Determining arc hazard category.

UNIT IV

Safety Practices:

General first aid- Safety in handling hand held electrical appliances tools- Electrical safety in train stations-swimming pools, external lighting installations, medical locations-Case studies.

UNIT V

Standards For Electrical Safety:

Electricity Acts- Rules & regulations- Electrical standards-NFPA 70 E-OSHA standards-IEEE standards-National Electrical Code 2005 – National Electric Safety code NESC-Statutory requirements from electrical inspectorate

4. Books and Materials

Text Book(s)

1. Massimo A.G.Mitolo, —Electrical Safety of Low-Voltage Systems, McGraw Hill, USA, 2009.
2. Mohamed El-Sharkawi, —Electric Safety - Practice and Standards, CRC Press, USA, 2014.

Reference Book(s)

1. Kenneth G.Mastrullo, Ray A. Jones, —The Electrical Safety Program Book, Jones and Bartlett Publishers, London, 2nd Edition, 2011.
2. Palmer Hickman, —Electrical Safety-Related Work Practices, Jones & Bartlett Publishers, London, 2009.
3. Fordham Cooper, W., —Electrical Safety Engineering, Butterworth and Company, London, 1986.
4. John Cadick, Mary Capelli-Schellpfeffer, Dennis K. Neitzel, —Electrical Safety Hand book, McGraw-Hill, New York, USA, 4th edition, 2012.

COURSE STRUCTURE

A40371– SUSTAINABLE ENERGY TECHNOLOGIES (OE-1)

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 Objectives:

The objectives of the course are

1 To demonstrate the importance the impact of solar radiation, solar PV modules
2 To understand the principles of storage in PV systems
3 To discuss solar energy storage systems and their applications.
4 To get knowledge in wind energy and bio-mass
5 To gain insights in geothermal energy, ocean energy and fuel cells.

2. Course Outcomes (COs)

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

A40371.1 Illustrate the importance of solar radiation and solar PV modules.

A40371.2 Discuss the storage methods in PV systems

A40371.3 Explain the solar energy storage for different applications

A40371.4 Understand the principles of wind energy, and bio-mass energy.

A40371.5 Attain knowledge in geothermal energy, ocean energy and fuel cells.

3. Course Syllabus

UNIT – I

SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems.

SOLAR PV MODULES AND PV SYSTEMS: PV Module Circuit Design, Module Structure, Packing Density, Interconnections, Mismatch and Temperature Effects, Electrical and Mechanical Insulation, Lifetime of PV Modules, Degradation and Failure, PV Module Parameters, Efficiency of PV Module, Solar PV Systems-Design of Off Grid Solar Power Plant. Installation and Maintenance.

UNIT-II

STORAGE IN PV SYSTEMS: Battery Operation, Types of Batteries, Battery Parameters, Application and Selection of Batteries for Solar PV System, Battery Maintenance and Measurements, Battery Installation for PV System.

UNIT-III

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

UNIT-IV
WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

UNIT-V
GEOTHERMAL ENERGY: Origin, Applications, Types of Geothermal Resources, Relative Merits.

OCEAN ENERGY: Ocean Thermal Energy; Open Cycle & Closed Cycle OTEC Plants, Environmental Impacts, Challenges.

FUEL CELLS: Introduction, Applications, Classification, Different Types of Fuel Cells Such as Phosphoric Acid Fuel Cell, Alkaline Fuel Cell, PEM Fuel Cell, MC Fuel Cell**.**

4. Books and Materials

TEXT BOOKS:
1. Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/TMH
2. Non-Conventional Energy Resources- Khan B.H/ Tata McGraw Hill, New Delhi, 2006

REFERENCE BOOKS:
1. Principles of Solar Engineering - D.Yogi Goswami, Frank Krieth & John F Kreider / Taylor & Francis 4th edition 2022
2. Non-Conventional Energy - Ashok V Desai /New Age International (P) Ltd
3. Renewable Energy Technologies -Ramesh & Kumar /Narosa 4. Non-conventional Energy Source- G.D Roy/Standard Publishers

Online Learning Resources:

1. https://nptel.ac.in/courses/112106318
2. https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=-mwIa2X-SuSiNy13
3. https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=Apfjx6oDfz1Rb_N3

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40471 – ELECTRONIC CIRCUITS (OE-1)

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

1. Course Description

Course Overview

To understand semiconductor diodes, their characteristics and applications.

To explore the operation, configurations, and biasing of BJTs.

To study the operation, analysis, and coupling techniques of BJT amplifiers.

To learn the operation, applications and uses of feedback amplifiers and oscillators.

To analyze the characteristics, configurations, and applications of operational amplifiers.

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40471-1: Understand semiconductor diodes, their characteristics and applications.

A40471-2: Explore the operation, configurations, and biasing of BJTs.

A40471-3: Gain knowledge about the operation, analysis, and coupling techniques of BJT amplifiers

A40471-4: Learn the operation, applications and uses of feedback amplifiers and oscillators.

A40471-5: Analyze the characteristics, configurations, and applications of operational amplifiers

3. Course Syllabus

UNIT I

Semiconductor Diode and Applications:

Introduction, PN junction diode – structure, operation and VI characteristics, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Positive and Negative Clipping and Clamping circuits (Qualitative treatment only).

Special Diodes:

Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, LED, Varactor Diode, Photo Diode.

UNIT II

Bipolar Junction Transistor (BJT):

Principle of Operation, Common Emitter, Common Base and Common Collector Configurations, Transistor as a switch and Amplifier, Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self Bias, Bias Stability, Bias Compensation using Diodes.

UNIT III

Single stage amplifiers:

Classification of Amplifiers - Distortion in amplifiers, Analysis of CE, CC and CB configurations with simplified hybrid model.

Multistage amplifiers:

Different Coupling Schemes used in Amplifiers - RC coupled amplifiers, Transformer Coupled Amplifier, Direct Coupled Amplifier; Multistage RC coupled BJT amplifier (Qualitative treatment only).

UNIT IV

Feedback amplifiers:

Concepts of feedback, Classification of feedback amplifiers, Effect of feedback on amplifier characteristics, Voltage Series, Voltage Shunt, Current Series and Current Shunt Feedback Configurations (Qualitative treatment only).

Oscillators:

Classification of oscillators, Condition for oscillations, RC Phase shift Oscillators, Generalized analysis of LC Oscillators-Hartley and Colpitts Oscillators, Wien Bridge Oscillator.

UNIT V

Op-amp:

Classification of IC'S, basic information of Op-amp, ideal and practical Op-amp, 741 op-amp and its features, modes of operation-inverting, non-inverting, differential.

Applications of op-amp :

Summing, scaling and averaging amplifiers, Integrator, Differentiator, phase shift oscillator and comparator**.**

4. Books and Materials

Text Book(s)

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. 2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press. 2008.

Reference Book(s)

1. Electronics Devices and Circuits Theory, R.L.Boylestad, LousisNashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012
3. Microelectronic Circuits, S.Sedra and K.C.Smith, 5th Edition, Oxford University Press.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40571 – PROGRAMMING in JAVA (OE-1)

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

Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.

Learn how to extend Java classes with inheritance and dynamic binding and how to use exception • handling in Java applications

Understand how to design applications with threads in Java

Understand how to use Java apis for program development

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40571-1: Analyze problems, design solutions using OOP principles, and implement them efficiently In Java.

A40571-2: Design and implement classes to model real-world entities, with a focus on attributes, behaviors, and relationships between objects.

A40571-3: Demonstrate an understanding of inheritance hierarchies and polymorphic behaviour, including method overriding and dynamic method dispatch.

A40571-4: Apply Competence in handling exceptions and errors to write robust and fault-tolerant code.

A40571-5: Perform file input/output operations, including reading from and writing to files using Java I/O classes, graphical user interface (GUI) programming using JavaFX.

3. Course Syllabus

UNIT I

Object Oriented Programming:

Basic concepts, Principles, Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style. Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, Introduction to Operators, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators, Boolean Logical Operators, Bitwise Logical Operators. Control Statements: Introduction, if Expression, Nested if Expressions, if–else Expressions, Ternary Operator? Switch Statement, Iteration Statements, while Expression, do–while Loop, for Loop, Nested for Loop, for–Each for Loop, Break Statement, Continue Statement.

UNIT II

Classes and Objects:

Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this. Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays:

Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors. Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance. Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV

Packages and Java Library:

Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class. Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions. Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java (Text Book 2)

UNIT V

String Handling in Java:

Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer. Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter thread Communication - Suspending, Resuming, and Stopping of Threads. Java Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface Java FX GUI: Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events (Text Book 3)

4. Books and Materials

Text Book(s)

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.
3. JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson..

Reference Book(s)

1. The complete Reference Java, 11thedition, Herbert Schildt,TMH
2. Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40572 – ARTIFICIAL INTELLIGENCE – Concepts and Techniques (OE-1)

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

1. Course Description

Course Overview

To learn the distinction between optimal reasoning Vs. human like reasoning.

To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.

To learn different knowledge representation techniques.

To understand the applications of AI, namely game playing, theorem proving, and machine learning.

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40572-1: Learn the distinction between optimal reasoning Vs human like reasoning and formulate and efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.

A40572-2: Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.

A40572-3: Learn different knowledge representation techniques

A40572-4: Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.

A40572-5: Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.

3. Course Syllabus

UNIT I

Introduction to AI

Intelligent Agents, Problem-Solving Agents, Searching for Solutions - Breadth-first search, Depth-first search, Hill-climbing search, Simulated annealing search, Local Search in Continuous Spaces.

UNIT II

Games

Optimal Decisions in Games, Alpha–Beta Pruning, Defining Constraint Satisfaction Problems, Constraint Propagation, Backtracking Search for CSPs, Knowledge-Based Agents, Logic- Propositional Logic, Propositional Theorem Proving: Inference and proofs, Proof by resolution, Horn clauses and definite clauses.

UNIT III

First-Order Logic

Syntax and Semantics of First-Order Logic, Using First Order Logic, Knowledge Engineering in First-Order Logic. Inference in First-Order Logic: Propositional vs. First-Order Inference, Unification, Forward Chaining, Backward Chaining, Resolution. Knowledge Representation: Ontological Engineering, Categories and Objects, Events.

UNIT IV

Planning

Definition of Classical Planning, Algorithms for Planning with State Space Search, Planning Graphs, other Classical Planning Approaches, Analysis of Planning approaches. Hierarchical Planning.)

UNIT V

Probabilistic Reasoning:

Acting under Uncertainty, Basic Probability Notation Bayes' Rule and Its Use, Probabilistic Reasoning, Representing Knowledge in an Uncertain Domain, The Semantics of Bayesian Networks, Efficient Representation of Conditional Distributions, Approximate Inference in Bayesian Networks, Relational and First- Order Probability.

4. Books and Materials

Text Book(s)

1. Artificial Intelligence: A Modern Approach, Third Edition, Stuart Russell and Peter Norvig, Pearson Education.

Reference Book(s)

1. Artificial Intelligence, 3rd Edn., E. Rich and K. Knight (TMH)
2. Artificial Intelligence, 3rd Edn., Patrick Henny Winston, Pearson Education.
3. Artificial Intelligence, Shivani Goel, Pearson Education.
4. Artificial Intelligence and Expert systems – Patterson, Pearson Education.

COURSE STRUCTURE

A40071 – MATHEMATICS FOR MACHINE LEARNING AND AI (OE-1)

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

1. Course Description

Course Overview

To provide a strong mathematical foundation for understanding and developing AI/ML algorithms.

To enhance the ability to apply linear algebra, probability, and calculus in AI/ML models.

To equip students with optimization techniques and graph-based methods used in AI applications.

To develop critical problem-solving skills for analyzing mathematical formulations in AI/ML.

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40071-1: Apply linear algebra concepts to ML techniques like PCA and regression.

A40071-2: Analyze probabilistic models and statistical methods for AI applications.

A40071-3: Implement optimization techniques for machine learning algorithms.

A40071-4: Utilize vector calculus and transformations in AI-based models.

A40071-5: Develop graph-based AI models using mathematical representations.

3. Course Syllabus

UNIT I

Linear Algebra for Machine Learning

Review of Vector spaces, basis, linear independence, Vector and matrix norms, Matrix factorization techniques, Eigenvalues, eigenvectors, diagonalization, Singular Value Decomposition (SVD) and Principal Component Analysis (PCA).

UNIT II

Probability and Statistics for AI

Probability distributions: Gaussian, Binomial, Poisson. Bayes' Theorem, Maximum Likelihood Estimation (MLE), and Maximum a Posteriori (MAP).Entropy and Kullback-Leibler (KL) Divergence in AI, Cross entropy loss, Markov chains.

UNIT III

Optimization Techniques for ML

Multivariable calculus: Gradients, Hessians, Jacobians. Constrained optimization: Lagrange multipliers and KKT conditions. Gradient Descent and its variants (Momentum, Adam) Newton's method, BFGS method.

UNIT IV

Vector Calculus & Transformations

Vector calculus: Gradient, divergence, curl. Fourier Transform & Laplace Transform in ML applications.

UNIT V

Graph Theory for AI

Graph representations: Adjacency matrices, Laplacian matrices. Bayesian Networks & Probabilistic Graphical Models. Introduction to Graph Neural Networks (GNNs).

4. Books and Materials

Text Book(s)

1. Mathematics for Machine Learning by Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Cambridge

University Press, 2020.

2. Pattern Recognition and Machine Learning by Christopher Bishop, Springer.

Reference Book(s)

1. Gilbert Strang, Linear Algebra and Its Applications, Cengage Learning, 2016.
2. Jonathan Gross, Jay Yellen, Graph Theory and Its Applications, CRC Press, 2018.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40072 – MATERIALS CHARACTERIZATION TECHNIQUES (OE-1)

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

1. Course Description

Course Overview

To provide exposure to different characterization techniques.

To explain the basic principles and analysis of different spectroscopic techniques.

To elucidate the working of Scanning electron microscope - Principle, limitations and applications.

To illustrate the working of the Transmission electron microscope (TEM) - SAED patterns and its applications.

To educate the uses of advanced electric and magnetic instruments for characterization.

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40072-1: Analyze the crystal structure and crystallite size by various methods.

A40072-2: Analyze the morphology of the sample by using a Scanning Electron Microscope.

A40072-3: Analyze the morphology and crystal structure of the sample by using Transmission electron microscope

A40072-4: Explain the principle and experimental arrangement of various spectroscopic techniques.

A40072-5: Identify the construction and working principle of various Electrical & Magnetic Characterization technique.

3. Course Syllabus

UNIT I

Structure analysis by Powder X-Ray Diffraction

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams, Factors affecting Diffraction, Intensities, Structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherer and Williamson-Hall (W-H) Methods, Small angle X-ray scattering (SAXS) (in brief).

UNIT II

Microscopy technique -1 –Scanning Electron Microscopy (SEM)

Introduction, Principle, Construction and working principle of Scanning Electron Microscopy, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

UNIT III

Microscopy technique -2 – Transmission Electron Microscopy (TEM)

Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantage and Limitations of Transmission Electron Microscopy.

UNIT IV

Spectroscopy techniques

Principle, Experimental arrangement, Analysis and advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

UNIT V

Electrical & Magnetic Characterization techniques

Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID.

4. Books and Materials

Text Book(s)

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2013.
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008.

Reference Book(s)

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville Banwell and Elaine M. McCash, Tata McGraw-Hill, 2008.
2. Elements of X-ray diffraction – Bernard Dennis Cullity& Stuart R Stocks, Prentice Hall, 2001 – Science.
3. Practical Guide to Materials Characterization: Techniques and Applications - Khalid Sultan – Wiley – 2021.
4. Materials Characterization Techniques -Sam Zhang, Lin Li, Ashok Kumar -CRC Press - 2008

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40073 – CHEMISTRY OF ENERGY SYSTEMS (OE-1)

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

1. Course Description

Course Overview

To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries. To understand the basic concepts of processing and limitations of Fuel cells & their applications. To impart knowledge to the students about fundamental concepts of photochemical cells, reactions and applications

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40073-1: Solve the problems based on electrode potential, Describe the Galvanic Cell.

A40073-2: Describe the working Principle of Fuel cell, Explain the efficiency of the fuel cell.

A40073-3: Interpret advantages of photoelectron catalytic conversion

A40073-4: Illustrate the Solar cells, Discuss about concentrated solar power.

A40073-5: Discuss the metal organic frame work, Illustrate the carbon and metal oxide porous structures.

3. Course Syllabus

UNIT I

Electrochemical Systems:

Galvanic cell, Nernst equation, standard electrode potential, application of EMF, electrical double layer, polarization, Batteries- Introduction, Lead acid, Nickel- cadmium, Lithium-ion batteries and their applications.

UNIT II

Fuel Cells:

Fuel cell- Introduction, Basic design of fuel cell, working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency and applications.

UNIT III

Photo and Photo electrochemical Conversions:

Photochemical cells Introduction and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions and their applications.

UNIT IV

Solar Energy:

Introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar cells and applications.

UNIT V

Hydrogen Storage:

Hydrogen storage and delivery: State-of-the art, Established technologies, Chemical and Physical methods of hydrogen storage, Compressed gas storage, Liquid hydrogen storage, Other storage methods, Hydrogen storage in metal hydrides, metal organic frameworks (MOF), Metal oxide porous structures, hydrogel , and Organic hydrogen carriers.

4. Books and Materials

Text Book(s)

1. Physical chemistry by Ira N. Levine

2. Essentials of Physical Chemistry, Bahl and Bahl and Tuli.
3. Inorganic Chemistry, Silver and Atkins.

Reference Book(s)

1. Fuel Cell Hand Book 7th Edition, by US Department of Energy (EG&G technical services And corporation)
2. Hand book of solar energy and applications by Arvind Tiwari and Shyam.
3. Solar energy fundamental, technology and systems by Klaus Jagar et.al.
4. Hydrogen storage by Levine Klebon-off

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40074 – ENGLISH FOR COMPETITIVE EXAMINATIONS (OE-1)

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

1. Course Description

Course Overview

To enable the students to learn about the structure of competitive English

To understand the grammatical aspects and identify the errors

To enhance verbal ability and identify the errors

To improve word power to answer competitive challenges

To make them ready to crack competitive exams

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40074-1: Identify the basics of English grammar and its importance.

A40074-2: Explain the use of grammatical structures in sentences.

A40074-3: Analyze an unknown passage and reach conclusions about it.

A40074-4: Choose the appropriate form of verbs in framing sentences.

A40074-5: Demonstrate the ability to use various concepts in grammar and vocabulary.

3. Course Syllabus

UNIT I

Grammar-1

Nouns-classification-errors-Pronouns-types-errors-Adjectives-types-errors-Articles-definite indefinite-Degrees of Comparison-Adverbs-types- errors-Conjunctions-usage- Prepositions-usage-Tag Questions, types-identifying errors- Practice.

UNIT II

Grammar-2

Verbs-tenses- structure-usages- negatives- positives- time adverbs-Sequence of tenses--If Clause-Voice-active voice and passive voice- reported Speech-Agreement- subject and verb Modals-Spotting Errors-Practices.

UNIT III

Verbal Ability

Sentence completion-Verbal analogies-Word groups-Instructions-Critical reasoning-Verbal deduction-Select appropriate pair-Reading Comprehension-Paragraph-Jumbles-Selecting the proper statement by reading a given paragraph..

UNIT IV

READING COMPREHENSION AND VOCUBULARY:

Competitive Vocabulary :Word Building – Memory techniques-Synonyms, Antonyms, Affixes-Prefix &Suffix-One word substitutes-Compound words-Phrasal Verbs-Idioms and Phrases-Homophones-Linking Words-Modifiers-Intensifiers - Mastering Competitive Vocabulary- Cracking the unknowing passage-speed reading techniques- Skimming & Scanning-types of answering–Elimination methods.

UNIT V

WRITING FOR COMPETITIVE EXAMINATIONS:

Punctuation- Spelling rules- Word order-Sub Skills of Writing- Paragraph meaning-salient features-types - Note-making, Note-taking, summarizing-precise writing- Paraphrasing Expansion of proverbs- Essay writing-types.

4. Books and Materials

Text Book(s)

1. Wren & Martin, English for Competitive Examinations, S.Chand & Co, 2021
2. Objective English for Competitive Examination, Tata McGraw Hill, New Delhi, 2014.

Reference Book(s)

1. Hari Mohan Prasad, Objective English for Competitive Examination, Tata McGraw Hill, New Delhi, 2014.
2. Philip Sunil Solomon, English for Success in Competitive Exams, Oxford 2016
3. Shalini Verma , Word Power Made Handy, S Chand Publications
4. Neira, Anjana Dev & Co. Creative Writing: A Beginner's Manual. Pearson Education India, 2008.
5. Abhishek Jain,Vocabulary Learning Techniques Vol.I&II,RR Global Publishers 2013.
6. Michel Swan, Practical English Usage,Oxford,2006.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40075 – ENTREPRENEURSHIP AND NEW VENTURE CREATION (OE-1)

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

1. Course Description

Course Overview

To foster an entrepreneurial mind-set for venture creation and intrapreneurial leadership.

To encourage creativity and innovation

To enable them to learn pitching and presentation skills

To make the students understand MVP development and validation techniques

To enhance the ability of analyzing Customer and Market segmentation

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40075-1: Develop an entrepreneurial mindset and appreciate the concept of entrepreneurship.

A40075-2: Comprehend the process of problem-opportunity identification through design thinking.

A40075-3: Analyze and refine business models to ensure sustainability and profitability.

A40075-4: Build Prototype for Proof of Concept and validate MVP of their practice venture idea.

A40075-5: Create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture.

3. Course Syllabus

UNIT I

Entrepreneurship Fundamentals and context

Meaning and concept, attributes and mindset of entrepreneurial and intrapreneurial leadership, role models in each and their role in economic development. An understanding of how to build entrepreneurial mindset, skill sets, attributes and networks while on campus. Core Teaching Tool: Simulation, Game, Industry Case Studies (Personalized for students – 16industries to choose from), Venture Activity.

UNIT II

Problem & Customer Identification

Understanding and analysing the macro-Problem and Industry perspective - technological, socioeconomic and urbanization trends and their implication on new opportunities - Identifying passion - identifying and defining problem using Design thinking principles - Analysing problem and validating with the potential customer - Understanding customer segmentation, creating and validating customer personas. Core Teaching Tool: Several types of activities including Class, game, Gen AI, Get out of the Building‘ and Venture Activity.

UNIT III

Solution design, Prototyping & Opportunity Assessment and Sizing

Understanding Customer Jobs-to-be-done and crafting innovative solution design to map to customer‘s needs and create a strong value proposition - Understanding prototyping and Minimum Viable product (MVP) - Developing a feasibility prototype with differentiating value, features and benefits - Assess relative market position via competition analysis - Sizing the market and assess scope and potential scale of the opportunity.

UNIT IV

Business & Financial Model, Go-to-Market Plan:

Introduction to Business model and types, Lean approach, 9 block lean canvas model, riskiest assumptions to

Business models. Importance of Build - Measure – Lean approach. Business planning: components of Business plan- Sales plan, People plan and financial plan. Financial Planning: Types of costs, preparing a financial plan for profitability using financial template, understanding basics of Unit economics and analysing financial performance. Introduction to Marketing and Sales, Selecting the Right Channel, creating digital presence, building customer acquisition strategy. Choosing a form of business organization specific to your venture, identifying sources of funds: Debt& Equity, Map the Start-up Life-cycle to Funding Options.

UNIT V

Scale Outlook and Venture Pitch readiness:

Understand and identify potential and aspiration for scale vis-a-vis your venture idea. Persuasive Storytelling and its key components. Build an Investor ready pitch deck.

4. Books and Materials

Text Book(s)

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha . Entrepreneurship, McGrawHill, 11th Edition.(2020)
2. Ries, E. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business,(2011).
3. Osterwalder, A., & Pigneur, Y. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons. (2010).

Reference Book(s)

1. Simon Sinek,Start with Why, Penguin Books limited. (2011)
2. Brown Tim,Change by Design Revised & Updated: How Design Thinking
3. Transforms Organizations and Inspires Innovation, Harper Business.(2019)
4. Namita Thapar (2022) The Dolphin and the Shark: Stories on Entrepreneurship, Penguin Books Limited
5. Saras D. Sarasvathy, (2008) Effectuation: Elements of Entrepreneurial Expertise, Elgar Publishing Ltd..

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40090– MATHEMATICS FOR MACHINE LEARNING (OE-1)

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 essential mathematical foundations required for understanding and applying machine learning techniques. It covers core topics such as supervised and unsupervised learning, regression analysis, optimization strategies, probabilistic models, and Bayesian inference. Learners will explore gradient-based optimization, regularization methods, dimensionality reduction techniques like PCA, and signal processing tools including the Fourier transform. The course also delves into advanced probabilistic models such as Expectation Maximization, Hidden Markov Models, and variational inference. Emphasis is placed on both theoretical understanding and practical applications in real-world datasets

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40090.1 Understand core concepts of learning types, linear regression, and convex optimization.

A40090.2 Apply optimization techniques like gradient descent and regularization in ML models.

A40090.3 Analyze regression and probabilistic models using MLE and SVR methods

A40090.4 Evaluate dimensionality reduction and signal processing techniques in ML applications.

A40090.5 Create Bayesian and probabilistic learning models for inference and decision-making.

3. Course Syllabus

UNIT-I

Introduction to Learning and Optimization Foundations

Introduction to the Theory of Learning, Meaning of Learning, Supervised Machine Learning, Unsupervised Machine Learning, Linear Regression, Overfitting and Generalization, Convex Optimization, Optimization Problem Formulations.

UNIT-II: Optimization Techniques for Learning

Forward and Backward propagation in Neural network, Sub-gradient Descent for Non-smooth Functions, Regularization Techniques: Lasso and Ridge, Applications of Regularization with Medical Data, Accelerating Gradient Descent, Gradient Descent, Stochastic Gradient Descent (SGD), Minibatch Gradient Descent, SoftMax Activation Function

UNIT-III : Regression and Probabilistic Models

Support Vector Regression (SVR), Logistic Regression for Dichotomous Variables, Maximum Likelihood Estimation (MLE) for Binomial, Multinomial, Gaussian, Models in the Exponential Family, Continuation of MLE in Binomial, Multinomial, Deeper exploration of Exponential Family Models

UNIT-IV: Dimensionality Reduction and Signal Processing Applications

Dimensionality Reduction Techniques (e.g., PCA), Dynamical Systems and Control, Fourier Transform, Applications in Learning

UNIT-V : Probabilistic and Bayesian Learning

Expectation Maximization (EM) Algorithm, Learning in Mixture Models, Hidden Markov Models (HMM),Bayesian Machine Learning, Estimating Decisions using Posterior Distributions, Model Selection with Variational Inference.

4. Books and Materials

Text Book(s)

1.Marc Peter Deisenroth, A. Aldo Faisal, and Cheng Soon Ong, Mathematics for Machine Learning, Cambridge University Press, 2020.

2.Trevor Hastie, Robert Tibshirani, and Jerome Friedman, The Elements of Statistical Learning, Springer, 2009.

3.Kevin P. Murphy, Machine Learning: A Probabilistic Perspective, MIT Press, 2012.

4.Stephen Boyd and Lieven Vandenberghe, Convex Optimization, Cambridge University Press, 2004

Reference Book(s)

1.Bishop, Christopher M, Pattern Recognition and Machine Learning, Springer, 2006.

2.Deepak Khemani, A First Course in Artificial Intelligence, McGraw Hill Education, 2013.

3.Ethem Alpaydin, Introduction to Machine Learning, MIT Press, 4th Edition, 2020.

4.David Barber Bayesian Reasoning and Machine Learning, Cambridge University Press, 2012.

5.Tom Mitchell, Machine Learning, McGraw Hill, 1997

Online Learning Resources:

- NPTEL Course: *Mathematics for Machine Learning* by IIT Faculty https://nptel.ac.in/
- Stanford University: *CS229 - Machine Learning* (Prof. Andrew Ng) https://cs229.stanford.edu/
- MIT OpenCourseWare: *Introduction to Machine Learning* https://ocw.mit.edu

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40091 – ENTREPRENEURSHIP (OE-1)

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 comprehensive exploration of entrepreneurship as a key driver of business growth and economic value. It offers essential frameworks for success and pathways to sustainable development, covering each theme with both conceptual and practical insights. By the end of the course, students will understand entrepreneurship's role in economic progress, gain clarity on success factors and risk mitigation, and develop skills to navigate the challenges of entrepreneurship effectively

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40091.1 Identify business opportunities through market research and competitive analysis.

A40091.2 Apply ideation techniques to create prototypes and MVPs for new ventures.

A40091.3 Evaluate the dynamics of business growth and the role of entrepreneurship in employment creation.

A40091.4 Analyze the impact of technological innovation on entrepreneurship

A40091.5 Explore funding sources and create financial strategies for startups.

3. Course Syllabus

UNIT-I

The Entrepreneurial Process Entrepreneurial Journey
Introduction to the entrepreneurial process, key stages, milestones, and challenges. Success stories and case studies of prominent entrepreneurs
Entrepreneurial Discovery-Techniques for identifying business opportunities and unmet market needs. Tools such as market research, competitive analysis, and consumer behavior insights.
Ideation and Innovation: Ideation and Prototyping-Creative techniques for generating ideas. Steps for developing prototypes and minimum viable products (MVP) using iterative methods and design thinking.

UNIT-II
Testing, Validation, and Commercialization-Strategies for product testing and customer validation. Refining business ideas based on feedback and scaling ideas into commercially viable products and services.
Disruption as a Success Driver-Understanding disruption in industries and its role in driving entrepreneurial success. Case studies of disruptive businesses and lessons on leveraging disruption for growth.

Technological Innovation and Entrepreneurship– 1 -The impact of emerging technologies (AI, blockchain, IoT, etc.) on entrepreneurship. Leveraging technology for innovation and competitive advantage.

UNIT-III

Technological Innovation and Entrepreneurship – 2
Advanced strategies for integrating technological innovation into startups. Digital transformation, automation, and scaling through tech-enabled processes.
Raising Financial Resources
Overview of funding sources such as venture capital, angel investors, and crowdfunding. Strategies for securing funding and best practices for financial management.
Education and Entrepreneurship-The role of education in fostering entrepreneurship. Developing entrepreneurial skills in academic institutions and promoting entrepreneurship as a career path.

UNIT-IV

Beyond Founders and Founder-Families Challenges of scaling a business beyond the founder. Building strong leadership teams and succession planning for family-owned and founder-led businesses.

India as a Start-up Nation-Overview of India's startup ecosystem. Government policies, initiatives, and success stories that support and promote startups in India.

National Entrepreneurial Culture-Examining how different national cultures influence entrepreneurship. A comparative study of entrepreneurial ecosystems across the globe

UNIT-V

Entrepreneurial Thermodynamics-The dynamics of business growth and the concept of "entrepreneurial energy." Strategies for maintaining momentum and managing burnout in startups**.**

Entrepreneurship and Employment-How entrepreneurship contributes to job creation and economic growth. The relationship between startups, employment generation, and economic development**.**

Start-up Case Studies-In-depth analysis of real-world startups. Lessons learned from both successful ventures and failures across various industries.

4. Books and Materials

Text Book(s)

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha. Entrepreneurship, McGrawHill, 11th Edition. (2020)
2. Ries, E. The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business, (2011).
3. Osterwalder, A., & Pigneur, Y. Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons. (2010).

Reference Book(s)

1. Simon Sinek, Start with Why, Penguin Books limited. (2011)
2. Brown Tim, Change by Design Revised & Updated: How Design Thinking
3. Transforms Organizations and Inspires Innovation, Harper Business. (2019)
4. Namita Thapar (2022) The Dolphin and Shark: Stories on Entrepreneurship, Penguin Books Limited

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40573 – QUANTUM TECHNOLOGIES AND APPLICATIONS (OE-1)

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

1. Course Description

Course Overview

To introduce the fundamentals of quantum mechanics relevant to quantum technologies.

To explain key quantum phenomena and their role in enabling novel technologies.

To explore applications in quantum computing, communication, and sensing.

To encourage understanding of emerging quantum-based technologies and innovations.

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40573-1: Understand key quantum mechanical concepts and phenomena

A40573-2: Comprehend the structure and function of quantum algorithms and circuits

A40573-3: Explore applications in quantum communication and cryptography

A40573-4: Appreciate the role of quantum technologies in modern engineering systems

A40573-5: Develop quantum devices and materials

3. Course Syllabus

UNIT I

Fundamentals of Quantum Mechanics

- Classical vs Quantum Paradigm
- Postulates of Quantum Mechanics
- Wavefunction and Schrödinger Equation (Time-independent)
- Quantum states, Superposition, Qubits
- Measurement, Operators, and Observables
- Entanglement and Non-locality

UNIT II

Quantum Computing

- Qubits and Bloch Sphere
- Quantum Logic Gates: Pauli, Hadamard, CNOT, and Universal Gates
- Quantum Circuits
- Basic Algorithms: Deutsch-Jozsa. Gover’s, Shor’s (conceptual)
- Error Correction and Decoherence.

UNIT III

Quantum Communication and Cryptography

- Teleportation & No-Cloning
- BB84 Protocol
- Quantum Networks & Repeaters
- Classical vs Quantum Cryptography
- Challenges in Implementation.

UNIT IV

Quantum Sensors and Metrology

- Quantum Sensing: Principles and Technologies
- Quantum-enhanced Measurements
- Atomic Clocks, Gravimeters
- Magnetometers, NV Centers
- Industrial Applications

UNIT V

Quantum Materials and Emerging Technologies

- Quantum Materials: Superconductors, Topological Insulators
- Quantum Devices: Qubits, Josephson Junctions
- National Quantum Missions (India, EU, USA, China)
- Quantum Careers and Industry Initiatives

4. Books and Materials

Text Book(s)

1. "Quantum Computation and Quantum Information" by Michael A. Nielsen and Isaac L. Chuang (Cambridge University Press)
2. "Quantum Mechanics: The Theoretical Minimum" by Leonard Susskind and Art Friedman (Basic Books)

Reference Book(s)

1. "Quantum Computing for Everyone" by Chris Bernhardt (MIT Press)
2. "Quantum Physics: A Beginner’s Guide" by Alastair I.M. Rae
3. "An Introduction to Quantum Computing" by Phillip Kaye, Raymond Laflamme, and Michele Mosca
4. IBM Quantum Experience and Qiskit Documentation (https://qiskit.org/)

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40536– INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS(SEC)

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

- Introduce fundamental quantum concepts like superposition and entanglement.
- Understand theoretical structure of qubits and quantum information.
- Explore conceptual challenges in building quantum computers.
- Explain principles of quantum communication and computing.
- Examine real-world applications and the future of quantum technologies

Course Pre/corequisites

There are no pre/corequisites

2. Course Outcomes (COs)

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

A40536.1 Explain core quantum principles in a non-mathematical manner.

A40536.2 Compare classical and quantum information systems.

A40536.3 Identify theoretical issues in building quantum computers.

A40536.4 Discuss quantum communication and computing concepts

A40536.5 Recognize applications, industry trends, and career paths in quantum technology.

3. Course Syllabus

UNIT-I

Introduction to Quantum Theory and Technologies

The transition from classical to quantum physics, Fundamental principles explained conceptually: Superposition, Entanglement, Uncertainty Principle, Wave-particle duality, Classical vs Quantum mechanics – theoretical comparison, Quantum states and measurement: nature of observation, Overview of quantum systems: electrons, photons, atoms, The concept of quantization: discrete energy levels, Why quantum? Strategic, scientific, and technological significance, A snapshot of quantum technologies: Computing, Communication, and Sensing, National and global quantum missions: India's Quantum Mission, EU, USA, China.

UNIT-II

Theoretical Structure of Quantum Information Systems

What is a qubit? Conceptual understanding using spin and polarization, Comparison: classical bits vs quantum bits, Quantum systems: trapped ions, superconducting circuits, photons (non-engineering view),Quantum coherence and decoherence – intuitive explanation, Theoretical concepts: Hilbert spaces, quantum states, operators – only interpreted in abstract, The role of entanglement and non-locality in systems, Quantum information vs classical information: principles and differences, Philosophical implications: randomness, determinism, and observer role

UNIT-III

Building a Quantum Computer – Theoretical Challenges and Requirements

What is required to build a quantum computer (conceptual overview) Fragility of quantum systems: decoherence, noise, and control, Conditions for a functional quantum system: Isolation, Error management, Scalability, Stability, Theoretical barriers:

Why maintaining entanglement is difficult, Error correction as a theoretical necessity, Quantum hardware platforms (brief conceptual comparison), Superconducting circuits, Trapped ions, Photonics, Visionvs reality: what’s working and what remains elusive, The role of quantum software in managing theoretical complexities.

UNIT-IV

Quantum Communication and Computing – Theoretical Perspective

Quantum vs Classical Information, Basics of Quantum Communication, Quantum Key Distribution (QKD), Role of Entanglement in Communication, The Idea of the Quantum Internet – Secure Global Networking, Introduction to Quantum Computing, Quantum Parallelism (Many States at Once), Classical vs Quantum Gates, Challenges: Decoherence and Error Correction, Real-World Importance and Future Potential

UNIT-V

Applications, Use Cases, and the Quantum Future

Real-world application domains: Healthcare (drug discovery),Material science, Logistics and optimization, Quantum sensing and precision timing, Industrial case studies: IBM, Google, Microsoft, PsiQuantum, Ethical, societal, and policy considerations, Challenges to adoption: cost, skills, standardization, Emerging careers in quantum: roles, skillsets, and preparation pathways, Educational and research landscape – India's opportunity in the global quantum race.

4. Books and Materials

Text Book(s)

1. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
3. Chris Bernhardt, Quantum Computing for Everyone, MIT Press, 2019

Reference Book(s)

1. David McMahon, Quantum Computing Explained, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, An Introduction to Quantum Computing, Oxford University Press, 2007.
3. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press, 2013.
4. Alastair I.M. Rae, Quantum Physics: A Beginner's Guide, Oneworld Publications, Revised Edition, 2005.
5. Eleanor G. Rieffel, Wolfgang H. Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
6. Leonard Susskind, Art Friedman, Quantum Mechanics: The Theoretical Minimum, Basic Books, 2014.
7. Bruce Rosenblum, Fred Kuttner, Quantum Enigma: Physics Encounters Consciousness, Oxford University Press, 2nd Edition, 2011.
8. GiulianoBenenti, GiulioCasati, GiulianoStrini, Principles of Quantum Computation and Information, Volume I: Basic Concepts, World Scientific Publishing, 2004.
9. K.B. Whaley et al., Quantum Technologies and Industrial Applications: European Roadmap and Strategy Document, Quantum Flagship, European Commission, 2020.
10. Department of Science & Technology (DST), Government of India, National Mission on Quantum Technologies & Applications – Official Reports and Whitepapers, MeitY/DST Publications, 2020 onward

Online Learning Resources:

1. IBM Quantum Experience and Qiskit Tutorials
2. Coursera – Quantum Mechanics and Quantum Computation by UC Berkeley
3. edX – The Quantum Internet and Quantum Computers
4. YouTube – Quantum Computing for the Determined by Michael Nielsen
5. Qiskit Textbook – IBM Quantum

COURSE STRUCTURE

VI - SEMESTER

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

VI SEMESTER (III YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40123	Design of Steel Structures	PC	3	0	0	3	30	70	100
A40124	Highway Engineering	PC	3	0	0	3	30	70	100
A40125	Environmental Engineering	PC	3	0	0	3	30	70	100
A40126a A40126b A40126c	**Professional Elective-II** 1. Design of Earthquake Resistant Structures 2. Open Channel Flow 3. Foundation Engineering	PE-II	3	0	0	3	30	70	100
A40127a A40127b A40127c	**Professional Elective-III** 1. Cost effective Housing Techniques 2. Watershed Management 3. Prestressed Concrete	PE-III	3	0	0	3	30	70	100
	Open Elective-II	OE-II	3	0	0	3	30	70	100
A40128	Highway Engineering Lab	PC	0	0	3	1.5	30	70	100
A40129	Environmental Engineering Lab	PC	0	0	3	1.5	30	70	100
A40130	Building Information Modelling	SC	0	1	2	2	30	70	100
A40033	Technical paper writing & IPR	MC	2	0	0	-	100*	-	100*
TOTAL			20	1	8	23	270	630	900

COURSE STRUCTURE
A40123– DESIGN OF STEEL STRUCTURES

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

1. Course Description

Course Overview

The primary objective of the course is to understand the properties, types, and applications of structural steel in construction. Analyze the behavior and design of bolted and welded connections for steel structures. Design tension and compression members, including built-up members and column bases. Develop steel structural elements such as beams, plate girders, roof trusses and eccentric connections.

Course Pre/co-requisites

A40116. Design of Reinforced Concrete Structures

2. Course Outcomes (COs)

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

A40123.1 Explain the properties of structural steel, types of sections, and the concept of limit state design.

A40123.2 Analyze and design bolted and welded connections for structural steel members.

A40123.3 Design tension and compression members, including built-up sections and column bases.

A40123.4 Develop design solutions for beams, plate girders and roof trusses.

A40123.5 Design beam to column and beam to beam connections.

3. Course Syllabus

UNIT I

INTRODUCTION to STRUCTURAL STEEL and DESIGN of CONNECTIONS: General -Types of Steel -Properties of Structural Steel - I.S. Rolled Sections - Concept of Limit State Design - Design of Simple and Eccentric Bolted and Welded Connections - Types of Failure and Efficiency of Joint – Prying Action - Introduction to HSFG bolts

UNIT II

DESIGN of TENSION and COMPRESSION MEMBERS: Behavior and Design of Simple and Built-Up Members Subjected to Tension - Shear Lag Effect - Tension Splice - Behavior of Short and Long Columns - Design of Simple and Built-Up Compression Members with Lacings and Battens - Design of Column Bases - Slab Base and Gusseted Base

UNIT III

DESIGN of BEAMS: Design of Laterally Supported and Unsupported Beams - Design of Built-Up Beams - Design of Welded Plate Girders

UNIT IV

INDUSTRIAL STRUCTURES: Design of Roof Trusses – Loads on Trusses – Purlin Design Using Angle and Channel Sections – Design of Joints and End Bearings– Introduction to Pre-Engineered Buildings.

UNIT V

ECCENTRIC CONNECTIONS: Introduction – Beam Column Connections, Bolted framed connections, Bolted framed connections.

4.Books and Materials

Text Book(s)

1. Duggal S.K., Design of Steel Structures, Tata McGraw Hill, Publishing Co. Ltd., New Delhi, 2010.
2. Bhavikatti S.S, Design of Steel Structures, Ik International Publishing House, New Delhi, 2017.

Reference Book(s)

1. Gambhir M L, Fundamentals of Structural Steel Design, McGraw Hill Education India Pvt Limited, 2013
2. Jack C. McCormac & Stephen F. Csernak - Structural Steel Design, Pearson, 7th Edition, 2023.
3. William T. Segui & Farid Soleimani - Steel Design, Cengage, 7th Edition, 2023.
4. Sarwar Alam Raz, Structural Design in Steel, New Age International Publishers, 2014
5. Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi, 2016

Online Learning Resources:

https://nptel.ac.in/courses/105105162

Codes/Tables: IS 800-2007 and relevant steel tables to be permitted into the examinations Hall.

Exam Pattern:

The end examination paper should consist of Part A and Part B.

Part A consists of two questions on Design out of which one question is to be answered.

Part-B should consist of five questions on design out of which three are to be answered.

Weightage for Part -A is 40% and Part-B is 60%.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40124– HIGHWAY 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

The objectives of this course are to make the student to understand the history, importance, and planning aspects of highway development in India. Apply geometric design principles for highway alignment, sight distance, and curves. Analyze traffic characteristics, capacity, level of service, and road safety measures. Design flexible and rigid pavements using IRC guidelines. Evaluate highway construction materials, testing methods, and maintenance techniques.

Course Pre/co-requisites

No Pre-requisites

2. Course Outcomes (COs)

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

A40124.1 Explain the significance, planning, and alignment of highways.

A40124.2 Design geometric elements of highways, including curves, gradients, and sight distances.

A40124.3 Analyze traffic flow, capacity, level of service, and implement road safety measures.

A40124.4 Design flexible and rigid pavements as per IRC guidelines.

A40124.5 Assess construction practices, highway materials, and pavement maintenance techniques.

3. Course Syllabus

UNIT I

PLANNED HIGHWAY DEVELOPMENT in INDIA: Highway development in India – Necessity for Highway Planning - Different Road Development Plans - Classification of Roads - Road Network Patterns – Highway Alignment- Factors affecting Alignment - Engineering Surveys – Drawings and Reports.

UNIT II

GEOMETRIC DESIGN of HIGHWAYS: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT III

TRAFFIC ENGINEERING STUDIES: Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-Speed studies- Data Collection and Presentation- - Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

UNIT IV

INTERSECTION DESIGN: Conflicts at Intersections- Channelization: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade-Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersections.

UNITV

PAVEMENT DESIGN: Types of Pavements – Difference Between Flexible and Rigid Pavements – Pavement Components – Sub Grade, Sub Base, Base and Wearing Course – Functions of Pavement Components – Design Factors – Flexible Pavement Design Methods – G.I Method, CBR Method, (As Per IRC 37-2002) –Design of

Rigid Pavements – Critical Load Positions – Westergaard's Stress Equations – Computing Radius of Relative Stiffness and Equivalent Radius of Resisting Section – Stresses in Rigid Pavements – Design of Expansion and Contraction Joints in CC Pavements. Design of Dowel Bars and Tie Bars.

4.Books and Materials

Text Book(s)

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 9th edition (2011).
2. Transportation Engineering, Volume I, C Venkatramaiah, Universities Press, 2015

Reference Book(s)

1. Principles of Highway Engineering by L.R.Kadiyali, Khanna Publishers
2. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- Khanna Publications 9th edition
3. Highway Engineering – Dr. S.K.Sharma, S.Chand Publishers 2014 edition

Online Learning Resources:

https://nptel.ac.in/courses/105101087

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40125– ENVIRONMENTAL ENGINEERING

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

1. Course Description

Course Overview

The objectives of this course are to make the student to understand the sources, demand estimation, and quality parameters of water. Apply water treatment processes for purification and supply. Analyze storage, distribution, and operation of water supply systems. Design sewerage systems, storm-water drainage, and plumbing networks. Evaluate sewage treatment, sludge management, and water reuse methods.

Course Pre/co-requisites

A40115. WATER RESOURCES ENGINEERING

2. Course Outcomes (COs)

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

A40125.1 Explain water sources, quality standards, and waterborne diseases.

A40125.2 Design unit processes of water treatment plants.

A40125.3 Analyze water distribution networks and pumping stations.

A40125.4 Design sewerage systems, including storm-water and sanitary sewers.

A40125.5 Assess sewage treatment methods and advanced wastewater management techniques.

3. Course Syllabus

UNIT I

WATER SUPPLY: Estimation of Surface and Subsurface Water Resources - Predicting Demand for Water-Impurities of Water and Their Significance - Physical, Chemical and Bacteriological Analysis - Waterborne Diseases - Standards for Potable Water. Intake of Water: Pumping and Gravity Schemes.

UNIT II

WATER TREATMENT: Objectives - Unit Operations and Processes - Principles, Functions, and Design of Water Treatment Plant Units, Aerators of Flash Mixers, Coagulation and Flocculation – Clari-floccuator- Plate and Tube Settlers – Pulsator Clarifier - Sand Filters - Disinfection - Softening, Removal of Iron and Manganese – De-fluoridation- Softening - Desalination Process - Residue Management - Construction, Operation and Maintenance Aspects

UNIT III

WATER STORAGE and DISTRIBUTION: Storage and Balancing Reservoirs - Types, Location and Capacity. Distribution System: Layout, Hydraulics of Pipe Lines, Pipe Fittings, Valves Including Check and Pressure Reducing Valves, Meters, Analysis of Distribution Systems, Leak Detection, Maintenance of Distribution Systems, Pumping Stations and Their Operations - House Service Connections.

UNIT IV

PLANNING and DESIGN of THE SEWERAGE SYSTEM: Characteristics and Composition of Sewage - Population Equivalent - Sanitary Sewage Flow Estimation - Sewer Materials - Hydraulics of Flow in Sanitary Sewers - Sewer Design - Storm Drainage-Storm Runoff Estimation - Sewer Appurtenances - Corrosion in Sewers - Prevention and Control – Sewage Pumping-Drainage in Buildings - Plumbing Systems for Drainage

UNITV

SEWAGE TREATMENT and DISPOSAL: Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended Aeration Systems - Trickling Filters - Sequencing Batch Reactor(SBR) - UASB - Waste Stabilization Ponds - Other Treatment Methods - Reclamation and Reuse of Sewage - Recent Advances in Sewage Treatment - Construction, Operation and Maintenance Aspects. - Discharge Standards-

Sludge Treatment -Disposal of Sludge

Books and Materials

Text Book(s)

1. Environmental Engineering by H. S Peavy, D. R. Rowe, G. Tchobanoglous, McGraw Hill Education (India) Pvt Ltd, 2014
2. Environmental Engineering, I and II by BC Punmia, Std. Publications.

Reference Book(s)

1. Environmental Engineering, I and II by SK Garg, Khanna Publications.
2. Environmental Pollution and Control Engineering CS Rao,Wiley Publications
3. Waste water engineering by Metcalf and Eddy, McGraw Hill, 2015.
4. Environmental Engineering by D. P. Sincero and G.A Sincero, Pearson 2015.
5. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.Wiley, 2007.

Online Learning Resources:

https://nptel.ac.in/courses/103107084

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40128 – HIGHWAY ENGINEERING LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

The objectives of this course are to make the student to understand the properties and behavior of aggregates and bitumen used in highway construction. Perform standard laboratory tests on aggregates and bitumen to evaluate their suitability for road construction. Analyze the strength, durability, and performance characteristics of pavement materials. Assess the quality and compliance of highway materials with standard specifications. Develop hands-on skills for material testing and interpretation of test results.

Course Pre/co-requisites

A40123 – HIGHWAY ENGINEERING

2. Course Outcomes (COs)

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

A40128.1 Determine the physical properties of coarse aggregates, such as specific gravity, water absorption, and shape characteristics.

A40128.2 Evaluate the mechanical properties of aggregates, including abrasion resistance, impact strength, and crushing value.

A40128.3 Analyze the physical and chemical properties of bituminous materials through standard tests.

A40128.4 Perform Marshall stability tests and assess the optimum binder content for bituminous mixes.

A40128.5 Interpret test results to assess the suitability of aggregates and bitumen for pavement construction.

3. Course Syllabus

LIST OF EXPERIMENTS

I. TEST ON AGGREGATES

1. Specific Gravity Determination of the Coarse Aggregate Sample
2. Determination of Abrasion Value of the Coarse Aggregate Sample.
3. Determination of Impact Value of Coarse Aggregate
4. Determination of Elongation Index of Coarse Aggregate
5. Determination of Flakiness Index of Coarse Aggregate
6. Determination of Aggregate Crushing Value of Coarse Aggregate
7. Determination of Water Absorption Capacity of the Coarse Aggregate Sample.

II. TEST ON BITUMEN

1. Specific Gravity Determination of the Bitumen/Asphalt Sample.
2. Penetration Test on Bitumen.

3. Viscosity Determination of Bituminous Binder.
4. Determination of Softening Point of the Asphalt/Bitumen Sample
5. Determination of Ductility Value of the Bitumen Sample
6. Estimation of Loss of Bitumen on Heating
7. Bitumen Extraction Test

Books and Materials

Text Book(s)

1. Highway Material Testing Manual, Khanna, Justo and Veera Raghavan, Nemchand Brothers

Reference Book(s)

1. IS 383 :1993 "Specification for Coarse and Fine Aggregates From Natural Sources for Concrete"
2. IS 1201 -1220 (1978) "Methods for testing tars and bituminous materials"
3. IRC SP 53 -2010 "Guidelines on use of modified bitumen"
4. MS-2 Manual for Marshalls Mix design 2002

Online Learning Resources:

https://ts-nitk.vlabs.ac.in

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40129 – ENVIRONMENTAL ENGINEERING LAB

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	0	3	0	0	42	1.5	30	70	100

1. Course Description

Course Overview

The objectives of this course are to make the student to understand the principles and methods of water and wastewater sampling and preservation. Perform standard laboratory tests to determine water quality parameters. Analyze wastewater characteristics and assess pollution levels. Evaluate the effectiveness of treatment processes using chemical and biological tests. Develop hands-on skills in advanced laboratory techniques for environmental monitoring.

Course Pre/co-requisites

A40125 – ENVIRONMENTAL ENGINEERING

2. Course Outcomes (COs)

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

A40129.1 Apply appropriate sampling and preservation techniques for water and wastewater.

A40129.2 Measure physical and chemical parameters such as turbidity, conductivity, and chlorine content.

A40129.3 Analyze key water and wastewater quality indicators like BOD, COD, and TKN.

A40129.4 Assess the efficiency of water treatment processes through laboratory tests.

A40129.5 Perform microbiological analysis for coli-form detection and sludge characterization.

3. Course Syllabus

LIST OF EXPERIMENTS

I. ANALYSIS of WATER SAMPLE

1. Sampling and preservation methods for water and wastewater (Demonstration only)
2. Measurement of Electrical conductivity and turbidity
3. Determination of fluoride in water by spectrophotometric method /ISE
4. Determination of iron in water (Demo)
5. Determination of Sulphate in water
6. Determination of Optimum Coagulant Dosage by Jar test apparatus
7. Determination of available Chlorine in Bleaching powder and residual chlorine in water

II. ANALYSIS of WASTEWATER SAMPLE

1. Estimation of suspended, volatile and fixed solids
2. Determination of Sludge Volume Index in waste water
3. Determination of Dissolved Oxygen
4. Estimation of B.O.D.

5. Estimation of C.O.D.
6. Determination of TKN and Ammonia Nitrogen in wastewater
7. Determination of total and fecal coliform (Demonstration only)

Note: Minimum 10 out of the above experiments are to be carried out.

Books and Materials

Text Book(s)

1. Manual on Water Supply and Treatment. Ministry of Urban Development, New Delhi.
2. Manual on Sewerage and Sewage Treatment Systems, Part A, B and C. Central Public Health and Environmental Engineering Organization, Ministry of Urban Development.

Reference Book(s)

1. Environmental Engineering Laboratory Manual by Dr. S.K. Panigrahi, L. Mohanty, S.K. Kataria& Sons

Online Learning Resources:

https://ee1-nitk.vlabs.ac.in/
https://ee2-nitk.vlabs.ac.in/

COURSE STRUCTURE

A40130– BUILDING INFORMATION MODELING

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	1	2	0	14	28	2	30	70	100

1. Course Description

Course Overview

The objectives of this course are to make the student to understand the fundamentals of Building Information Modeling (BIM) and Autodesk Revit. Develop proficiency in Revit's basic drawing and editing tools for structural and architectural modeling. Create 3D models of buildings, including walls, floors, ceilings, roofs, stairs, and railings. Analyze different components such as curtain walls, doors, windows, and structural elements. Apply various visualization and detailing techniques to generate callouts, elevations, and sections.

Course Pre/co-requisites

A40104. Strength of Materials

A40111. Structural Analysis

A40116. Design Of Reinforced Concrete Structures

2. Course Outcomes (COs)

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

A40130.1 Explain the fundamentals of BIM and Autodesk Revit's interface and workflow.

A40130.2 Use basic drawing, editing, and modification tools in Revit for creating and modifying models.

A40130.3 Model various architectural elements such as walls, doors, windows, floors, ceilings, and roofs.

A40130.4 Construct structural elements including grids, columns, stairs, railings, and ramps.

A40130.5 Generate 3D views, sections, and elevations for visualization and detailing purposes.

3. Course Syllabus

LIST OF EXPERIMENTS

1. INTRODUCTION to BIM & AUTODESK REVIT - About Autodesk and AutoCAD, Workflow and BIM, Rivet Terms, Overview of the Interface, Starting Projects, Viewing Commands.
2. BASIC DRAWING and EDITING tools - Using General Drawing tools, Editing Elements, Working With Modification tools.
3. SETTING UP LEVELS and GRIDS - Setting up Levels and Grids, Creating Structural Grids, Adding Columns, Linking and Importing CAD files.
4. MODELING WALLS Modeling Walls, Modifying Walls, Model Exterior Shell, Add Interior Walls.
5. WORKING WITH DOORS and WINDOWS Inserting Doors and Windows, Loading Door and Window Types from Library, Creating Additional Door and Window Sizes.
6. WORKING WITH CURTAIN WALLS Creating Curtain Walls, Adding Curtain Grids, Working With Curtain Wall Panels, Attaching Mullions to Curtain Grids.
7. WORKING WITH VIEWS Setting the View Display, Duplicating Views, Adding Callout Views, Elevations and Sections.
8. ADDING COMPONENTS Adding Component, Modifying Component, Working With Elements.

9. MODELING FLOORS Modeling & Modifying Floors, Joining Geometry, Creating Shaft Openings, Creating Sloped Floors
10. MODELING CEILINGS & ROOFS Modeling Ceilings, Adding Ceiling Fixtures, Creating Ceiling Soffits, Modeling Roofs
11. MODELING STAIRS and RAILING Creating Component Stairs, Modifying Component Stairs, Working With Railings, Sketching Custom Stairs, Creating Ramps.

Books and Materials

Text Book(s)

1. Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston —BIM HANDBOOK, Wiley, 2ndEdition, 2011
2. Wing, Eric. Autodesk Revit Architecture 2017: No Experience Required. Indianapolis: John Wiley & Sons, 2016

Reference Book(s)

1. Kim, Marcus, Lance Kirby, and Eddy Krygiel. Mastering Autodesk Revit 2017 for architecture. 1st ed. INpolis, IN: John Wiley & Sons, 2016.
2. Garber, Richard. BIM Design: Realizing the Creative Potential of Building Information Modeling. AD Smart 02. Chichester, U.K.: Wiley, 2004
3. Peter B. and Nigel D., —BIMin Principle and in Practice‖, 1 st Edition, ICE Publishing, 2014.
4. BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors,
5. Chuck Eastman, Paul Teicholz, Rafael Sacks and Kathleen Liston, John Wiley & Sons, 2008.
6. BIM and Construction Management: Proven tools, Methods, and Workflows, Brad Hardin, Sybex, 2009.
7. Building Information Modeling: BIM in Current and Future Practice, Karen Kensek and Douglas Noble, Wiley, 2014, First Edition.

Online Learning Resources:

https://minnodillc.com/building-information-modeling-bim/

https://www.skyfilabs.com/online-courses/building-information-modelling-course

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40033-TECHNICAL PAPER WRITING AND INTELLECTUAL PROPERTY RIGHTS

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 objectives of this course are to make the student to enable the students to practice the basic skills of research paper writing. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights. To practice the basic skills of performing quality literature review. To help them in knowing the significance of real-life practice and procedure of Patents. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks.

Course Pre/co-requisites

No Pre-requisites

2. Course Outcomes (COs)

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

A40033-1 Identify key secondary literature related to their proposed technical paper writing

A40033-2 Explain various principles and styles in technical writing

A40033-3 Use the acquired knowledge in writing a research/technical paper

A40033-4 Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, International

A40033-5 Evaluate different forms of IPR available at national & international level

A40033-6 Develop skill of making search of various forms of IPR by using modern tools and techniques.

3. Course Syllabus

UNIT I

Principles of Technical Writing: styles in technical writing; clarity, precision, coherence and logical sequence in writing-avoiding ambiguity- repetition, and vague language highlighting your findings-discussing your limitations -hedging and criticizing -plagiarism and paraphrasing.

UNIT II

Technical Research Paper Writing: Abstract- Objectives-Limitations-Review of Literature- Problems and Framing Research Questions- Synopsis

UNIT III

Process of research: publication mechanism: types of journals- indexing-seminars- conferences- proof reading –plagiarism style; seminar & conference paper writing; Methodology-discussion-results- citation rules

UNIT IV

Introduction to Intellectual property: Introduction, types of intellectual property, International organizations, agencies and treaties, importance of intellectual property rights

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trade mark, trade mark registration processes.

UNIT V

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. Patent law, intellectual property audits.

Books and Materials

Text Book(s)

1. Deborah. E. Bouchoux, Intellectual Property Rights, Cengage Learning India, 2013
2. Meenakshi Raman, Sangeeta Sharma. Technical Communication: Principles and practices. Oxford.

Reference Book(s)

1. R.Myneni, Law of Intellectual Property, 9th Ed, Asia law House, 2019.
2. Prabuddha Ganguli,Intellectual Property Rights Tata Mcgraw Hill, 2001
3. P.Naryan,Intellectual Property Law, 3rd Ed ,Eastern Law House, 2007.
4. Adrian Wallwork. English for Writing Research Papers Second Edition. Springer Cham Heidelberg New York ,2016
5. Dan Jones, Sam Dragga, Technical Writing Style

Online Learning Resources:

1. https://theconceptwriters.com.pk/principles-of-technical-writing/
2. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html
3. https://www.ewh.ieee.org/soc/emcs/acstrial/newsletters/summer10/TechPaperWriting.html
4. https://www.manuscriptedit.com/scholar-hangout/process-publishing-research-paper-journal/
5. https://www.icsi.edu/media/website/IntellectualPropertyRightLaws&Practice.pdf
6. https://lawbhoomi.com/intellectual-property-rights-notes/
7. https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf

Professional Electives - II & III

CourseCode	Title of the Course	L-T-P	Credits
Professional Elective-II			
A40126a	Design of Earthquake Resistant Structures	3-0-0	3
A40126b	Open Channel Flow	3-0-0	3
A40126c	Foundation Engineering	3-0-0	3
Professional Elective-III			
A40127a	Cost effective Housing Techniques	3-0-0	3
A40127b	Watershed Management	3-0-0	3
A40127c	Prestressed Concrete	3-0-0	3

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40126a– DESIGN OF EARTHQUAKE RESISTANT STRUCTURES (PE - 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 objectives of this course are to make the student to understand the fundamental concepts of engineering seismology, including earthquake phenomena, seismic waves, and measuring instruments. Analyze the principles of structural vibrations, degrees of freedom, and dynamic response of structures to earthquake ground motions. Evaluate conceptual design strategies, seismic design principles, and methods for improving earthquake resistance in structures. Apply earthquake-resistant design principles to reinforced concrete and masonry buildings using IS codes and lateral force methods. Assess the role of structural walls, non-structural elements, and ductility considerations in enhancing earthquake resistance.

Course Pre/co-requisites

A40111. Structural Analysis

2. Course Outcomes (COs)

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

A40126a.1 Explain earthquake mechanisms, seismic waves, and seismic zones, including measuring techniques and instruments.

A40126a.2 Analyze vibratory systems, single-degree-of-freedom (SDOF) models, damping effects, and earthquake-induced dynamic forces.

A40126a.3 Evaluate conceptual design strategies, ductility factors, and seismic design methods for ensuring structural resilience.

A40126a.4 Apply IS code provisions and lateral force methods for seismic design of reinforced concrete and masonry buildings.

A40126a.5 Assess the significance of structural walls, non-structural elements, and ductile detailing in enhancing earthquake resistance.

3. Course Syllabus

UNIT I

Engineering Seismology: Earthquake Phenomenon - Cause of Earthquakes-Faults- Plate Tectonics- Seismic Waves- Terms Associated With Earthquakes-Magnitude/Intensity of An Earthquake-Scales- Energy Released-Earthquake Measuring Instruments Seismogram - Seismoscope, Seismograph, - Strong Ground Motions-Seismic Zones of India.

Theory of Vibrations: Elements of A Vibratory System- Degrees of Freedom-Continuous System- Lumped Mass Idealization-Oscillatory Motion-Simple Harmonic Motion-Free Vibration of Single Degree of Freedom (SDOF) System- Undamped and Damped-Critical Damping-Logarithmic Decrement-Forced Vibrations-Harmonic Excitation-Dynamic Magnification Factor-Excitation By Rigid Based Translation for SDOF System-Earthquake Ground Motion.

UNIT II

Conceptual Design: Introduction-Functional Planning-Continuous Load Path-Overall form Simplicity and Symmetry-Elongated Shapes-Stiffness and Strength-Horizontal and Vertical Members-Twisting of Buildings-

Ductility-Ductility Relationships-Flexible Buildings Framing Systems-Choice of Construction Materials-Unconfined Concrete-Confined Concrete-Masonry-Reinforcing Steel.

Introduction to Earthquake Resistant Design: Seismic Design Requirements-Regular and Irregular Configurations-Basic Assumptions-Design Earthquake Loads-Basic Load Combinations-Permissible Stresses-Seismic Methods of Analysis-Factors in Seismic Analysis-Equivalent Lateral force Method.

UNIT III

Reinforced Concrete Buildings: Principles of Earthquake Resistant Deign of RC Members- Structural Models for Frame Buildings - Seismic Methods of Analysis- Is Code Based Methods for Seismic Design - Vertical Irregularities - Plan Configuration Problems- Lateral Load Resisting Systems- Determination of Design Lateral forces as Per Is 1893 (Part 1):2016- Equivalent Lateral force Procedure- Lateral Distribution of Base Shear.

UNIT IV

Masonry Buildings: Introduction- Elastic Properties of Masonry Assemblage- Categories of Masonry Buildings- Behaviour of Unreinforced and Reinforced Masonry Walls- Behavior of Walls- Box Action and Bands- Behaviour of Infill Walls- Improving Seismic Behaviour of Masonry Buildings- Load Combinations and Permissible Stresses- Seismic Design Requirements- Lateral Load Analysis of Masonry Buildings.

UNITV

Structural Walls and Non-Structural Elements: Strategies in The Location of Structural Walls- Sectional Shapes- Variations in Elevation- Cantilever Walls Without Openings – Failure Mechanism of Non-Structures-Effects of Non-Structural Elements On Structural System- Analysis of Non-Structural Elements- Prevention of Non-Structural Damage Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors Affecting Ductility- Ductile Detailing Considerations as Per Is 13920-2016 - Behaviour of Beams, Columns and Joints in RC Buildings During Earthquakes

Books and Materials

Text Book(s)

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.

Reference Book(s)

1. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly,John Wiley & Sons.
2. Eartquake Resistant Design of Building structures by Vinod Hosur, Wiley India Pvt. Ltd.
3. Elements of Mechanical Vibration by R.N.Iyengar, I.K.International Publishing House Pvt. Ltd.
4. Masory and Timber structures including earthquake Resistant Design –AnandS.Arya, Nemchand& Bros
5. Earthquake Tips – Learning Earthquake Design and Construction, C.V.R. Murthy
6. BIS Codes: 1. IS 1893(Part-1):2016 or Latest codes;. 2. IS 13920:2016. 3. IS 4326. 4. IS 456:2000 or latest.

Online Learning Resources:

https://nptel.ac.in/courses/105107204

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40126b– OPEN CHANNEL FLOW (PE – 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 objectives of this course are to make the student to explain the principles governing fluid flow in pipelines and networks, including steady and unsteady flow conditions. Apply fundamental concepts of uniform and varied flow in open channels for analyzing hydraulic structures and networks. Analyze the behavior of unsteady flows in open channels, including wave motion and dam break scenarios. Evaluate sediment transport mechanisms and their impact on hydraulic structures, reservoirs, and river morphology. Design and assess hydraulic models, flow measurement devices, and physical models for hydraulic applications.

Course Pre/co-requisites

A40112. Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

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

A40126b.1 Describe the fundamental principles of fluid flow in pipelines and networks under steady and unsteady conditions.

A40126b.2 Solve problems related to uniform and varied flow in open channels using theoretical and computational approaches.

A40126b.3 Analyze the impact of unsteady flow phenomena such as surges and dam breaks in open channels.

A40126b.4 Evaluate sediment transport processes and their influence on river morphology and hydraulic structures.

A40126b.5 Develop and validate hydraulic models for flow measurement and physical modeling applications in fluid mechanics.

3. Course Syllabus

UNIT I

HYDRAULICS of PIPELINES and PIPE NETWORKS: Review of Fluid Mechanics. Reynolds Transport Theorem and Applications. Steady Flow Analysis of Pipe Network Systems. Unsteady Flows - Basic Equations of Water Hammer, Solution By Method of Characteristics. Network Analysis

UNIT II

STEADY VARIED FLOWS in OPEN CHANNELS: Basic Concepts of Uniform Flow. Specific Energy and Specific force Concepts. Dynamic Equation for Spatially Varied Flows. Flow Profile Computations. Introduction to Hec-Ras. Spatially Varied Flows and Rapidly Varied Flows – Applications.

UNIT III

UNSTEADY FLOWS in OPEN CHANNELS: Equations of Motion. Uniformly Progressive Wave. Rapidly Varied Unsteady Flow – Positive and Negative Surges. Dam Break Problem

UNIT IV

SEDIMENT TRANSPORT: Sediment Properties – Inception of Sediment Motion – Bed forms. Bed Load Suspended Load – total Sediment Transport. Design of Stable Channels and Regime Channels. Reservoir

Sedimentation and Trap Efficiency.

UNIT V

FLOW MEASUREMENTS and HYDRAULIC MODELING: Sharp-Crested Weirs, Broad-Crested Weirs, Critical Depth Flumes. Recent Advancement in Open Channel Flow Measurements. Physical Modeling in Hydraulics. Dimensional Analysis. Modeling Closed Flows and Free Surface Flows. Distorted Models. Design of Physical Models.

Books and Materials

Text Book(s)

1. Flow in Open Channels, Subramanya K., Tata McGraw Hill Pub., New Delhi 2015
2. Flow through Open Channels, Rajesh Srivastava, Oxford Univ. Press. N Delhi, 2011
3. Open Channel Hydraulics, Chow,V.T., McGrawHillInc.NYork,1979

Reference Book(s)

1. Open Channel Hydraulics, French, R.H., McGraw Hill PubCo.,NYork,1986
2. Open Channel Hydraulics, Terry Sturm, Tata McGraw Hill Pub. N Delhi,2011

Online Learning Resources:

https://nptel.ac.in/courses/105/106/105106114/

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40126c– FOUNDATION ENGINEERING (PE – 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 objectives of this course are to make the student to understand the need for soil exploration and various methods used in site investigations. Analyze the stability of slopes under different conditions using various stability methods. Apply earth pressure theories to analyze retaining walls and soil pressures. Evaluate the bearing capacity and settlement characteristics of shallow foundations. Assess the load-carrying capacity and settlement of deep foundations, including pile and well foundations.

Course Pre/co-requisites

A40117 – Soil Mechanics

2. Course Outcomes (COs)

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

A40126c.1 Classify soils based on their physical and index properties as per BIS and Unified classification systems.

A40126c.2 Analyze soil permeability and seepage problems using Darcy's law and flow net concepts.

A40126c.3 Apply stress distribution theories and settlement analysis to predict soil behavior under loading.

A40126c.4 Evaluate shear strength of soils using experimental methods and interpret test results.

A40126c.5 Assess slope stability and recommend suitable protection measures.

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

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 III

PILE FOUNDATION: 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

UNIT IV

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 V

EARTH PRESSURE THEORIES: Rankine's Theory of Earth Pressure – Earth Pressures in Layered Soils – Coulomb's Earth Pressure Theory – Rebhann's and Cullman's Graphical Method

RETAINING WALLS: Types of Retaining Walls – Stability of Retaining Walls

Books and Materials

Text Book(s)

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications (2002).
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi 7th edition 2009
3. Soil Mechanics and Foundations by B.C.Punmia, Ashok Kumar Jain andArun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi 17th edition 2017.

Reference Book(s)

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications 2nd edition 2013
2. Principles of Foundation Engineering by Das, B.M., - (1999)–6th edition (Indian edition) Thomson Engineering
3. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.

Online Learning Resources:

https://nptel.ac.in/courses/105105176

COURSE STRUCTURE

A40127a– COST EFFECTIVE HOUSING TECHNIQUES (PE – III)

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 objectives of this course are to make the student to analyze the housing scenario in urban and rural areas, including challenges in housing finance and urban planning. Explore and evaluate innovative low-cost housing technologies for sustainable construction. Investigate alternative building materials and infrastructure services for cost-effective housing solutions. Assess rural housing techniques, including traditional mud housing, soil stabilization, and fire treatment for roofing. Develop strategies for housing in disaster-prone areas, with a focus on earthquake, cyclone, and flood-resistant construction.

Course Pre/co-requisites

A40108. Building Planning and Drawing

2. Course Outcomes (COs)

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

A40127a.1 Examine the current status of urban and rural housing and analyze the role of finance and planning in housing development.

A40127a.2 Evaluate and recommend cost-effective construction techniques, including prefabrication and innovative roofing/flooring systems.

A40127a.3 Assess the feasibility of alternative building materials and infrastructure solutions for low-cost housing.

A40127a.4 Analyze traditional rural housing methods and propose modern techniques for improving rural housing quality.

A40127a.5 Design housing solutions for disaster-prone areas by incorporating earthquake, cyclone, and flood-resistant strategies.

3. Course Syllabus

UNIT I

Housing Scenario: Introducing - Status of Urban Housing - Status of Rural Housing

Housing Finance: Introducing - Existing Finance System in India - Government Role as Facilitator - Status at Rural Housing Finance – Impedimental in Housing Finance and Related Issues

Land Use and Physical Planning for Housing: Introduction - Planning of Urban Land - Urban Land Ceiling and Regulation Act - Efficiency of Building Bye Lass - Residential Densities

Housing the Urban Poor: Introduction - Living Conditions in Slums - Approaches and Strategies for Housing Urban Poor.

UNIT II

Development and adoption of low cost Resilient housing technology: Introduction - Adoption of Innovative Cost Effective Construction Techniques - Adoption of Precast Elements in Partial Prefabrication- 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 III

Alternative Building Materials for Low-Cost Housing: Introduction - Substitute for Scarce Materials – Ferro-Cement - Gypsum Boards - Timber Substitutions - Industrial Wastes - Agricultural Wastes - Alternative Building Maintenance

Low-Cost Infrastructure Services: Introduction - Present Status - Technological Options - Low Cost Sanitation - Domestic Wall - Water Supply, Energy

UNIT IV

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 Program

UNITV

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 Precast Roofing Units Against Earthquake forces Status of R&D in Earthquake Strengthening Measures - Floods, Cyclone, Future Safety

Books and Materials

Text Book(s)

1. Building materials for low – income houses – International council for building research studies and documentation.
2. Hand book of low cost housing by A.K.Lal – Newage international publishers.
3. Low cost Housing – G.C. Mathur by South Asia Books

Reference Book(s)

1. Properties of concrete – Neville A.m. Pitman Publishing Limited, London.
2. Light weight concrete, Academic Kiado, Rudhai.G – Publishing home of Hungarian Academy of Sciences 1963.
3. Modern trends in housing in developing countries – A.G. Madhava Rao, D.S. Rama chandra Murthy & G.Annamalai. E. & F. N. Spon Publishers

Online Learning Resources:

https://nptel.ac.in/courses/124107001

COURSE STRUCTURE

A40127b– WATERSHED MANAGEMENT (PE – III)

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 objectives of this course are to make the student to understand the concept of watershed management, stakeholder roles, pollution sources, and environmental guidelines for water quality. Analyze soil erosion processes, sediment yield, and wetland hydrology, including the role of water in wetland ecosystems. Evaluate surface water and groundwater interactions, wetland water quality, and hydrological models for effective watershed planning. Apply principles of wetland hydrologic assessment, water harvesting, and watershed treatment system design to real-world scenarios. Assess irrigation planning, participatory water management, and water footprint concepts to ensure sustainable water resource utilization.

Course Pre/co-requisites

A40112. Hydraulics and Hydraulic Machinery

2. Course Outcomes (COs)

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

A40127b.1 Explain watershed management concepts, pollution control strategies, and environmental policies related to water quality.

A40127b.2 Analyze erosion processes, wetland water budgets, and sediment transport models to assess land degradation and conservation needs.

A40127b.3 Evaluate surface and groundwater interactions, wetland treatment efficiency, and hydrological models for integrated water resource management.

A40127b.4 Apply water harvesting techniques, hydrologic modeling, and wetland design methods for sustainable watershed management.

A40127b.5 Assess irrigation water management strategies, drought mitigation policies, and the role of water foot print in agricultural sustainability.

3. Course Syllabus

UNIT I

Concept of Watershed, Introduction to Watershed Management, Different Stakeholders and Their Relative Importance, Watershed Management Policies and Decision Making, Watershed Management Practices in Arid and Semiarid Regions, Short Term and Long Term Strategic Planning, Types and Sources of Pollution, Environmental Guidelines for Water Quality, Perspective On Recycle and Reuse

UNIT II

Morphometry, Soil Erosion - Erosion - Factors Affecting Erosion, Effects of Erosion On Land Fertility and Land Capability, Soil Erosion Modeling, Erosivity and Erodibility - Sediment Yield and Sedimentation- Wetland Definitions and The Role of Water in Wetland Structure and Function, Introduction to Wetland Water Budgets and Hydro-Period Components of The Water Budget: Inflows, Outflows, and Storage, Precipitation and Runoff, Evapotranspiration;

UNIT III

Surface Water Flows: Structures and Channels, Groundwater-Surface Water Exchange in Wetlands, Surface Water Flows Ii and Wetland Hydrology Case Studies, Flow and Mixing in Wetlands Wetland Water Quality Information: Nutrients, Organic/Inorganic Contaminants, Sediments and Colloids, Wetland Transport Models I: Plug Flow, C strs and C strs in Series; Intro to Method of Moments.

UNIT IV

Wetland Hydrologic Assessment: Physical and Biological Processes, Anthropogenic and Climate Change Impacts On Wetland Hydrology, Modeling Wetland Hydrology, Hydraulics, and Hydrodynamics, Introduction to Wetland Treatment Systems Design - Water Harvesting: Rainwater Harvesting, Catchment Harvesting, Harvesting Structures - Model Watershed – Government and Ngo Projects.

UNIT V

Rain Water Management. Planning and Operation of Irrigation Systems. Conjunctive Use of Water. Participatory Irrigation Management and Integrated Water Resources Management (IWRM), Water Management Policy During Droughts. Predicting Effect of Water Shortage On Crops. Introduction to Water Footprint of Crops and Its Applications. Blue, Green and Grey Water Foot Print.

Books and Materials

Text Book(s)

1. T. O. Randhir, Watershed Management: Issues and Approaches, IWA Publishing, 2006
2. J. V. S. Murty, Watershed Management, New Age International, 2013

Reference Book(s)

1. D. K. Majumdar, Irrigation Water Management, Prentice Hall, 2014
2. K. N. Brooks, P. F. Folliott, J. A. Magner, Hydrology and the Management of Watersheds, Wiley-Blackwell, Fourth edition, 2012
3. E. M. Tideman, Watershed Management: Guidelines for Indian Conditions, Omega Scientific Publishers, 1996
4. R. Rajora, Integrated Watershed Management: Field Manual for Equitable, Productive and Sustainable Development, Rawat Publications, 2019

Online Learning Resources:

https://nptel.ac.in/courses/126105334

https://nptel.ac.in/courses/126105334

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40127c – PRESTRESSED CONCRETE (PE-III)

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

Understand the principles, methods, and materials used in prestressed concrete, analyze various losses of prestress in both pre-tensioned and post-tensioned members, Design prestressed concrete beams considering flexure and shear forces, evaluate deflections in prestressed concrete structures and their controlling factors, Analyze the behavior of composite beams under different loading conditions.

Course Pre/corequisites

1. Concrete Technology

2. Course Outcomes (COs)

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

A40127c.1 Explain the principles and methods of prestressing and the need for high-strength materials.

A40127c.2 Analyze the different types of prestress losses and their impact on structural performance.

A40127c.3 Design prestressed concrete beams considering flexural and shear stresses.

A40127c.4 Evaluate deflections in prestressed beams and suggest control measures.

A40127c.5 Analyze the stress distribution and differential shrinkage in composite beams.

3. Course Syllabus

UNIT I

Introduction

Principles of Pre-Stressing – Prestressing Systems - Pre-Tensioning and Post Tensioning- Advantages and Limitations of Pre-Stressed Concrete- Need for High Strength Materials. Methods of Pre-Stressing: Pre-Tensioning (Hoyer System) and Post-Tensioning Methods (Freyssinet System and Gifford- Udall System)

UNIT II

Losses of pre-stress

Loss of Pre-Stress in Pre-Tensioned and Post-Tensioned Members Due to Elastic Shortening, Shrinkage and Creep of Concrete, Relaxation of Stress in Steel, Anchorage Slip and Frictional Losses.

UNIT III

Flexure and Shear

Analysis of Beams for Flexure and Shear - Beams Pre-Stressed with Straight, Concentric, eccentric, Bent and Parabolic Tendons- Kern Line - Cable Profile - Design of PSC Beams (Rectangular and I Sections) Using IS 1343. Analysis and Design of Rectangular and I Beams for Shear. Introduction to Transmission Length and End Block (No Design and Analytical Problems).

UNIT IV

Deflections

Control of Deflections- Factors Influencing Deflections - Short Term Deflections of Uncracked Beams- Prediction of Long Time Deflections

UNIT V

Composite beams

Different Types- Propped and Un-Propped- Stress Distribution- Differential Shrinkage- Analysis of Composite Beams.

4. Books and Materials

Text Book(s)

1. Prestressed Concrete by N. Krishna Raju, Tata McGraw Hill Publications 6th edition 2018
2. Prestressed concrete by N.Rajagopalan, Narosa Publishing House 2nd edition

Reference Book(s)

1. Design of Prestressed Concrete Structures by T.Y. Lin & Ned H. Burns, John Wiley & Sons 3rd edition 2010
2. Prestressed Concrete Design by Praveen Nagrajan, Pearson publications, 2013.
3. Prestressed Concrete by Ramamrutam, Dhanpatrai Publications 2020 edition
4. BIS code on —prestressed concrete, IS: 1343 to be permitted into the examination Hall

5. Online Learning Resources

https://archive.nptel.ac.in/courses/105/106/105106118/

https://nptel.ac.in/courses/105106117

Open Elective-II

Course Code	Title of the Course	L-T-P	Credits	Offered by
Open Elective - II				
A40272	Renewable Energy Sources	3-0-0	3	EEE
A40372	Automation and Robotics	3-0-0	3	ME
A40472	Digital Electronics	3-0-0	3	ECE
A40574	Introduction to Operating Systems	3-0-0	3	CSE
A40372	Introduction to Machine Learning	3-0-0	3	CSE
A40076	Optimization Techniques	3-0-0	3	H&S
A40077	Physics Of Electronic Materials and Devices	3-0-0	3	H&S
A40078	Chemistry Of Polymers and Applications	3-0-0	3	H&S
A40079	Academic Writing and Public Speaking	3-0-0	3	H&S
A40080	Mathematical Foundation of Quantum Technologies	3-0-0	3	H&S

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40272– RENEWABLE ENERGY SOURCES (OE-2)

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 to understand the fundamentals of solar energy systems, including solar radiation types, solar geometry, and the components and functioning of solar thermal and PV systems. Explore photovoltaic (PV) energy systems, focusing on the working principles of different PV technologies, the design and configuration of PV modules, and the operation of stand-alone and grid-connected systems. Learn the principles of wind energy conversion, including wind turbine design, aerodynamic analysis, site selection, and performance estimation. Study geothermal energy sources and technologies, including the classification of geothermal resources, extraction techniques, and potential applications with emphasis on Indian prospects. Examine other renewable energy technologies, such as ocean energy (tidal and wave), biomass energy systems, and fuel cells, with an emphasis on their working principles, design considerations, advantages, limitations, and applications.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40272.1 Understand principal operation of various renewable energy sources.

A40272.2 Identify site selection of various renewable energy sources.

A40272.3 Analyze various factors affecting on solar energy measurements, wind energy conversion techniques, Geothermal, Biomass, Tidal Wave and Fuel cell energies.

A40272.4 Design of Solar PV modules and considerations of horizontal and vertical axis Wind energy systems.

A40272.5 Apply the concepts of Geo Thermal Energy, Ocean Energy, Bio mass and Fuel Cells for generation of power.

3. Course Syllabus

UNIT I

Solar Energy: Solar radiation - beam and diffuse radiation, solar constant, Sun at Zenith, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy-thermal storage.

UNIT II

PV Energy Systems: Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Solar PV modules from solar cells, mismatch in series and parallel connections design and structure of PV modules, Electrical characteristics of silicon PV cells and modules, Stand-alone PV system configuration, Grid connected PV systems.

UNIT III

Wind Energy: Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades; wind data and energy estimation and site selection considerations.

UNIT IV

Geothermal Energy: Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India.

UNITV

Miscellaneous Energy Technologies:

Ocean Energy: Tidal Energy-Principle of working, Operation methods, advantages and limitations. Wave Energy-Principle of working, energy and power from waves, wave energy conversion devices, advantages and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration **Fuel cell:** Principle of working of various types of fuel cells and their working, performance and limitations.

Books and Materials

Text Book(s)

1. G. D. Rai, ―Non-Conventional Energy Sources‖, 4th Edition, Khanna Publishers, 2000.
2. Chetan Singh Solanki ―Solar Photovoltaics fundamentals, technologies and applications 2nd Edition PHI Learning Private Limited. 2012.

Reference Book(s)

1. Stephen Peake, Renewable Energy Power for a Sustainable Future, Oxford International Edition, 2018.
2. S. P. Sukhatme, Solar Energy,3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd, 2008.
3. B H Khan , Non-Conventional Energy Resources, 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
4. S. Hasan Saeed and D.K.Sharma,Non-Conventional Energy Resources,3rd Edition, S.K.Kataria & Sons, 2012.
5. G. N. Tiwari and M.K.Ghosal, Renewable Energy Resource: Basic Principles and Applications, Narosa Publishing House, 2004.

Online Learning Resources:

https://nptel.ac.in/courses/103103206

https://nptel.ac.in/courses/108108078

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40372– AUTOMATION AND ROBOTICS (OE-2)

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 objectives of the course are to fundamentals of industrial automation, production types, automation strategies, and hardware elements used in modern manufacturing processes. Understanding of automated manufacturing systems, and strategies for improving productivity and flexibility in industrial automation. Knowledge of industrial automation and robotics, sensors, and end-effect or design for modern manufacturing environments. Explain industrial automation and robotics, and trajectory planning for intelligent and efficient manufacturing applications. Familiarity of industrial automation and robotics, and practical applications in manufacturing processes.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40372.1 Understand and analyze the structure and functions of automated manufacturing systems, and evaluate hardware components for efficient production.

A40372.2 Analyze and design automated flow lines with or without buffer storage, perform quantitative evaluations, apply assembly line balancing techniques.

A40372.3 Classify robot configurations, select suitable actuators and sensors, analyze and apply automation and robotics principles to optimize production efficiency and flexibility.

A40372.4 Apply kinematic and dynamic modeling using D-H notation and select appropriate hardware and control strategies for real-world industrial scenario to analyze and design automated and robotic systems.

A40372.5 Design, program, and implement robotic systems, understand and apply robotics technology to manufacturing tasks.

3. Course Syllabus

UNIT I

Introduction to Automation: Introduction to Automation, Need, Types, Basic elements of an automated system, Manufacturing Industries, Types of production, Functions in manufacturing, Organization and information processing in manufacturing, Automation strategies and levels of automation, Hardware components for automation and process control, mechanical feeders, hoppers, orienters, high speed automatic insertion devices.

UNIT II

Automated flow lines: Automated flow lines, Part transfer methods and mechanisms, types of Flow lines, flow line with/without buffer storage, Quantitative analysis of flow lines. Assembly line balancing: Assembly process and systems assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT III

Introduction to Industrial Robotics: Introduction to Industrial Robotics, Classification of Robot Configurations, functional line diagram, degrees of freedom. Components common types of arms, joints grippers, factors to be considered in the design of grippers.

Robot actuators and Feedback components: Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

UNIT IV

Manipulator Kinematics: Manipulator Kinematics, Homogenous transformations as applicable to rotation and transition - D-H notation, forward inverse kinematics.

Manipulator Dynamics: Differential transformations, Jacobians, Lagrange - Euler and Newton – Euler formations. Trajectory Planning: Trajectory Planning and avoidance of obstacles path planning, skew motion, joint integrated motion - straight line motion.

UNIT V

Robot Programming: Robot Programming, Methods of programming - requirements and features of programming languages, software packages. Problems with programming languages.

Robot Application in Manufacturing: Material Transfer - Material handling, loading and unloading - Process - spot and continuous arc welding & spray painting - Assembly and Inspection.

Books and Materials

Text Book(s)

1. Automation, Production systems and CIM, M.P. Groover /Pearson Edu.
2. Industrial Robotics - M.P. Groover, TMH.

Reference Book(s)

1. Robotics, Fu K S, McGraw Hill, 4th edition, 2010.
2. An Introduction to Robot Technology, P. Coiffet and M. Chaironze, Kogam Page Ltd. 1983 London.
3. Robotic Engineering, Richard D. Klafter, Prentice Hall
4. Robotics, Fundamental Concepts and analysis – Ashitave Ghosal, Oxford Press, 1/e, 2006
5. Robotics and Control, Mittal R K &Nagrath I J , TMH.

Online Learning Resources:

https://www.youtube.com/watch?v=yxZm9WQJUA0&list=PLRLB5WCqU54UJG45UnazSYmnmhl-gt76o

https://www.youtube.com/watch?v=6f3bvIhSWyM&list=PLRLB5WCqU54X5Vy4Dwjf

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40472– DIGITAL ELECTRONICS (OE-2)

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 objectives of the course are to learn Boolean algebra, logic simplification techniques, and combinational circuit design. Analyze combinational circuits like adders, subtractors, and code converters. Explore combinational logic circuits and their applications in digital design. Understand sequential logic circuits, including latches, flip-flops, counters, and shift registers. Gain knowledge about programmable logic devices and digital IC's.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40472.1 Learn Boolean algebra, logic simplification techniques, and combinational circuit design.

A40472.2 Analyze combinational circuits like adders, sub-tractors, and code converters.

A40472.3 Explore combinational logic circuits and their applications in digital design.

A40472.4 Understand sequential logic circuits, including latches, flip-flops, counters, and shift registers.

A40472.5 Gain knowledge about programmable logic devices and digital IC's.

3. Course Syllabus

UNIT I

Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Minimization of Switching Functions: Karnaugh map method, Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

UNIT II

Introduction to Combinational Design 1: Binary Adders, Sub-tractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

UNIT III

Combinational Logic Design 2: Decoders, Encoders, Priority Encoder, Multiplexers, De-multiplexers, Comparators, Implementations of Logic Functions using Decoders and Multiplexers.

UNIT IV

Sequential Logic Design: Latches, Flip-flops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, set up and hold times, Ripple counters, Shift registers.

UNIT V

Programmable Logic Devices: ROM, Programmable Logic Devices (PLA and PAL).

Digital IC's: Decoder (74x138), Priority Encoder (74x148), multiplexer (74x151) and de multiplexer (74x155), comparator (74x85).

Books and Materials

Text Book(s)

1. Digital Design, M.Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, ZviKohavi and NirahK.Jha, 2nd Edition, Tata McGraw Hill, 2005.

Reference Book(s)

1. Fundamentals of Logic Design, Charles H Roth,Jr., 5th Edition, Brooks/cole Cengage Learning, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40574– INTRODUCTION TO OPERATING SYSTEMS (OE-2)

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 objectives of the course are to understand the fundamental principles of operating systems and their role in managing hardware and software resources. Explore process management techniques, including scheduling algorithms, multithreading, and inter-process communication mechanisms. Analyze memory management strategies such as paging, segmentation, and virtual memory to optimize system performance. Evaluate deadlock conditions and file system structures, including resource allocation, disk scheduling, and RAID technologies. Implement security and protection mechanisms to safeguard computer systems from threats and unauthorized access.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40574.1 Explain core operating system functions such as process, memory, file, and device management.

A40574.2 Analyze scheduling algorithms and IPC mechanisms to enhance process efficiency.

A40574.3 Apply memory management techniques to improve system performance.

A40574.4 Assess deadlock conditions and propose solutions for resource management.

A40574.5 Design security strategies to protect systems using cryptographic methods and firewalling techniques.

3. Course Syllabus

UNIT I

Operating Systems Overview, System Structures

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Open-Source Operating Systems System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Operating system debugging, System Boot.

UNIT II

Process Concept, Multithreaded Programming, Process Scheduling, Inter process Communication

Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems. Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples. Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples. Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

UNIT III

Memory-Management Strategies, Virtual Memory Management

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples. Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

UNIT IV

Deadlocks, File Systems

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection And recovery, Deadlock avoidance, Deadlock prevention. File Systems: Files, Directories, File system implementation, management and optimization. Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

UNIT V

System Protection, System Security

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights. System Security: Introduction, Program threats, System and network threats, Cryptography as a security, User authentication, implementing security defenses, firewalling to protect systems and networks, Computer security classification. Case Studies: Linux, Microsoft Windows.

Books and Materials

Text Book(s)

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (Topics: Inter-process Communication and File systems.)

Reference Book(s)

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

Online Learning Resources:

https://nptel.ac.in/courses/106/106/106106144/

http://peterindia.net/OperatingSystems.html

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40575– INTRODUCTION TO MACHINE LEARNING (OE-2)

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 objectives of the course are to understand the fundamental concepts of machine learning, its types, applications, and data preprocessing techniques. Learn to select, train, evaluate, and improve machine learning models while applying feature engineering techniques. Explore Bayesian methods for concept learning and understand various classification algorithms. Understand regression techniques for predictive modeling and methods to enhance model accuracy. Learn unsupervised learning techniques such as clustering and association rule mining for pattern discovery.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40575.1 Explain the significance of machine learning types, applications, and data quality in model building

A40575.2 Apply feature engineering methods to improve model performance and interpretability. Implement classification models such as k-NN, Decision Trees, and Random Forest for predictive tasks

A40575.3 Implement classification algorithms such as k-NN, Decision Trees, and Random Forests.

A40575.4 Analyze regression algorithms and improve model accuracy using optimization techniques.

A40575.5 Design clustering models using partitioning and density-based techniques for pattern recognition.

3. Course Syllabus

UNIT I

Introduction to Machine Learning & Preparing to Model

Introduction: What is Human Learning? Types of Human Learning, what is Machine Learning? Types of Machine Learning, Problems Not to Be Solved Using Machine Learning, Applications of Machine Learning, State-of-The-Art Languages/Tools in Machine Learning, Issues in Machine Learning **Preparing to Model:** Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing

UNIT II

Modeling and Evaluation &Basics of Feature Engineering

Introduction, selecting a Model, training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model, Improving Performance of a Model Basics of Feature Engineering: Introduction, Feature Transformation, Feature Subset Selection

UNIT III

Bayesian Concept Learning & Supervised Learning: Classification

Introduction, Why Bayesian Methods are Important? Bayes‘ Theorem, Bayes‘ Theorem and Concept Learning, Bayesian Belief Network.

Supervised Learning: Classification: Introduction, Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms-k Nearest Neighbour (kNN), Decision tree, Random Forest model, Support vector machines

UNIT IV

Supervised Learning: Regression

Introduction, Example of Regression, Common Regression Algorithms-Simple linear regression, Multiple linear regression, Assumptions in Regression Analysis, Main Problems in Regression Analysis, Improving Accuracy of the Linear Regression Model, Polynomial Regression Model, Logistic Regression, Maximum Likelihood Estimation.

UNIT V

Unsupervised Learning

Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning, Clustering – Clustering as a machine learning task, Different types of clustering techniques, Partitioning methods, K-Medoids: a representative object-based technique, Hierarchical clustering, Density-based methods-DBSCAN Finding Pattern using Association Rule- Definition of common terms, Association rule, Theapriori algorithm for association rule learning, Build the a priori principal rules.

Books and Materials

Text Book(s)

1. Machine Learning, Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Pearson, 2019.

Reference Book(s)

1. Ethern Alpaydin, Introduction to Machine Learning, MIT Press, 2004.
2. Stephen Marsland, Machine Learning -An Algorithmic Perspective, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series,2014.
3. Andreas C. Müller and Sarah Guido Introduction to Machine Learning with Python: A Guide for Data Scientists, Oreilly.

Online Learning Resources:

1. Andrew Ng, Machine Learning B.Techning

2. **https://www.deeplearning.ai/machine-learning-**

3. Shai Shalev-Shwartz, Shai Ben-David, —Understanding Machine Learning: From Theory to Algorithms, Cambridge Press

4. **https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html**

COURSE STRUCTURE
A40076– OPTIMIZATION TECHNIQUES (OE-2)

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 objectives of the course are to introduce the fundamental concepts and applications of linear programming (LP) and to provide students with the ability to formulate LP models for real-world problems. Develop students' skills in solving linear programming problems using graphical methods, the Simplex method, Two-Phase and Big-M methods, and to interpret the results effectively. Understand the concept of duality in linear programming, explore primal-dual relationships, and apply the Dual Simplex Method, Transportation and Assignment Problems. Apply unconstrained non-linear programming techniques, including direct search methods such as random search, descent methods, and grid search methods. Understand and apply constrained non-linear optimization techniques, including the complex method, sequential linear programming, and feasible direction methods such as Zoutendijk's method. Introduce the principles of geometric programming, and provide methods to solve both unconstrained and constrained geometric programming problems using differential calculus and inequality-based approaches.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40076.1 Understand the meaning, purpose, tools of Operations Research and linear programming in solving practical problems in industry.

A40076.2 Interpret the transportation models' solutions and infer solutions to the real-world problems.

A40076.3 Develop mathematical skills to analyze and solve nonlinear programming models arising from a wide range of applications.

A40076.4 Apply the concept of non-linear programming for solving the problems involving non L3 linear constraints and objectives.

A40076.5 Apply the concept of unconstrained geometric programming for solving the problems L2, L3 involving non-linear constraints and objectives.

3. Course Syllabus

UNIT I

Linear programming I

Introduction, Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method, Big-M method.

UNIT II

Linear programming II: Duality in Linear Programming

Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method, Transportation Problem and assignment problem, Complementary slackness Theorem.

UNIT III

Non-linear programming: Unconstrained optimization techniques

Introduction: Classification of Unconstrained minimization methods,

Direct Search Methods: Random Search Methods: Descent Method and Fletcher Powell Method, Grid Search Method

UNIT IV

Non-linear programming: Constrained optimization techniques

Introduction, Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

UNIT V

Geometric Programming

Unconstrained Minimization Problems: solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

Constrained minimization Problems: Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

Books and Materials

Text Book(s)

1. Singiresu S Rao., Engineering Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.
2. J. C. Panth, Introduction to Optimization Techniques, (7-e) Jain Brothers, New Delhi.

Reference Book(s)

1. Harvey M. Wagner, Principles of Operation Research, Printice-Hall of India Pvt. Ltd. New Delhi.
2. Peressimi A.L., Sullivan F.E., Vhl, J. J. Mathematics of Non-linear Programming, Springer – Verlag.

Online Learning Resources:

https://onlinecourses.nptel.ac.in/noc24_ee122/preview

https://archive.nptel.ac.in/courses/111/105/111105039/

https://onlinecourses.nptel.ac.in/noc21_ce60/preview

COURSE STRUCTURE

A40077– PHYSICS OF ELECTRONIC MATERIALS AND DEVICES (OE-2)

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 objectives of the course are to make the students to understand the concept of crystal growth, defects in crystals and thin films. Provide insight into various semiconducting materials and their properties. Develop a strong foundation in semiconductor physics and device engineering. Elucidate excitonic and luminescent processes in solid-state materials. Understand the principles, technologies, and applications of modern display systems.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40077.1 Understand crystal growth and thin film preparation.

A40077.2 Summarize the basic concepts of semiconductors.

A40077.3 Illustrate the working of various semiconductor devices.

A40077.4 Analyze various luminescent phenomena and the devices based on these concepts.

A40077.5 Explain the working of different display devices.

3. Course Syllabus

UNIT I

Fundamentals of Materials Science

Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. The basic idea of point, line, and planar defects. Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RF and glow discharge).

UNIT II

Semiconductors

Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, Diffusion and recombination, Diffusion length. The Fermi level & Fermi-Dirac distribution, Electron and Hole in quantum well, Change of electron-hole concentration- Qualitative analysis, Temperature dependency of carrier concentration, Conductivity and mobility, Effects of temperature and doping on mobility, High field effects.

UNIT III

Physics of Semiconductor Devices: Introduction, Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Heterojunctions, Transistors, MOSFETs.

UNIT IV

Excitons and Luminescence:

Luminescence: Different types of luminescence, basic definitions, Light emission in solids, Inter-band luminescence, Direct and indirect gap materials.

Photoluminescence: General Principles of photoluminescence, Excitation and relaxation, OLED, Quantum-dot.

Electro-luminescence: General Principles of electroluminescence, light emitting diode, diode laser.

Method of feasible directions: direction finding problem, determination of step length, Termination criteria.

UNIT V

Display devices: LCD, three-dimensional display: Holographic display, light-field displays: Head-mounted display, MOEMS (Micro-Opto-Electro-Mechanical Systems) and MEMS displays.

Books and Materials

Text Book(s)

1. Principles of Electronic Materials and Devices-S.O. Kasap, McGraw-Hill Education (India) Pvt. Ltd.,4thedition, 2021.
2. Semiconductor physics & devices: basic principles, 4th Edition, McGraw-Hill, 2012.

Reference Book(s)

1. Solid State Electronic Devices -B.G. Streetman and S. Banerjee, PHI Learning,6th edition
2. Electronic Materials Science- Eugene A. Irene, Wiley, 2005
3. Electronic Components and Materials, Grover and Jamwal, DhanpatRai and Co., New Delhi., 2012.
4. An Introduction to Electronic Materials for Engineers-Wei Gao, Zhengwei Li, Nigel Sammes, World Scientific Publishing Co. Pvt. Ltd. 2nd Edition,2011

Online Learning Resources:

https://nptel.ac.in/courses/113/106/113106062/

https://onlinecourses.nptel.ac.in/noc20_ph24/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40078– CHEMISTRY OF POLYMERS AND APPLICATIONS (OE-2)

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 understand the basic principles of polymers. Understand natural polymers and their applications. Impart knowledge to the students about synthetic polymers, their preparation and importance. Enumerate the applications of hydo-gel polymers. Enumerate applications of conducting and degradable polymers in engineering.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40078.1 Classify the polymers, explain polymerization mechanism, differentiate addition, condensation polymerizations, Describe measurement of molecular weight of polymer.

A40078.2 Describe the physical and chemical properties of natural polymers and modified cellulosic.

A40078.3 Differentiate Bulk, solution, Suspension and emulsion polymerization, describe fibers and elastomers, Identify the thermosetting and thermos polymers.

A40078.4 Identify types of polymer networks, describe methods involve in hydrogel preparation, Explain applications of hydrogels in drug delivery.

A40078.5 Explain classification and mechanism of conducting and degradable polymers.

3. Course Syllabus

UNIT I

Polymers-Basics and Characterization: Basic concepts: monomers, repeating units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: addition, condensation, copolymerization and coordination polymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: End group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

UNIT II

Natural Polymers & Modified cellulosic:

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.

Modified cellulosic: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

UNIT III

Synthetic Polymers: Addition and condensation polymerization processes– Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties. Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers (PE, PVC), Butadiene polymers (BUNA-S, BUNA-N), nylons, Urea-formaldehyde, phenol – formaldehyde, Melamine Epoxy and Ion exchange resins.

UNIT IV

Hydrogels of Polymer networks: Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, Applications of hydrogels in drug delivery.

UNIT V

Conducting and Degradable Polymers:

Conducting polymers: Introduction, Classification, Mechanism of conduction in Poly Acetylene, Poly Aniline, Poly Thiophene, Doping, Applications.

Degradable polymers: Introduction, Classifications, Examples, Mechanism of degradation, poly lactic acid, Nylon-6, Polyesters, applications.

Books and Materials

Text Book(s)

1. A Text book of Polymer science, Billmayer
2. Polymer Chemistry – G.S.Mishra
3. Polymer Chemistry – Gowarikar

Reference Book(s)

1. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall
2. Advanced Organic Chemistry, B.Miller, Prentice Hall
3. Polymer Science and Technology by Premamoy Ghosh, 3rd edition, McGraw-Hill, 2010.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40079– ACADEMIC WRITING AND PUBLIC SPEAKING (OE-2)

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 encourage all round development of the students by focusing on writing skills. Make the students aware of non-verbal skills. Develop analytical skills. Deliver effective public speeches.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40079.1 Understand various elements of Academic Writing.

A40079.2 Identify sources and avoid plagiarism.

A40079.3 Demonstrate the knowledge in writing a Research paper.

A40079.4 Analyse different types of essays.

A40079.5 Assess the speeches of others and know the positive strengths of speakers.

A40079.6 Build confidence in giving an impactful presentation to the audience.

3. Course Syllabus

UNIT I

Introduction to Academic Writing: Introduction to Academic Writing – Essential Features of Academic Writing – Courtesy – Clarity – Conciseness – Correctness – Coherence – Completeness – Types – Descriptive, Analytical, Persuasive, Critical writing

UNIT II

Academic Journal Article: Art of condensation- summarizing and paraphrasing - Abstract Writing, writing Project Proposal, writing application for internship, Technical/Research/Journal Paper Writing – Conference Paper writing - Editing, Proof Reading - Plagiarism.

UNIT III

Essay & Writing Reviews: Compare and Contrast – Argumentative Essay – Exploratory Essay – Features and Analysis of Sample Essays – Writing Book Report, Summarizing, Book/film Review- SoP.

UNIT IV

Public Speaking: Introduction, Nature, characteristics, significance of Public Speaking – Presentation – 4 Ps of Presentation – Stage Dynamics – Answering Strategies –Analysis of Impactful SpeechesSpeeches for Academic events.

UNIT V

Public Speaking and Non-Verbal Delivery: Body Language – Facial Expressions-Kinesics – Oculesics – Proxemics – Haptics – Chronomics -Paralanguage – Signs

Books and Materials

Text Book(s)

1. Critical Thinking, Academic Writing and Presentation Skills: MG University Edition Paperback – 1 January 2010 Pearson Education; First edition (1 January 2010)

2. Pease, Allan & Barbara. The Definitive Book of Body Language RHUS Publishers, 2016

Reference Book(s)

1. Alice Savage, Masoud Shafiei Effective Academic Writing,2Ed.,2014 Oxford University Press.
2. Shalini Verma, Body Language, S Chand Publications 2011.
3. Sanjay Kumar and Pushpalata, Communication Skills 2E 2015, Oxford.
4. Sharon Gerson, Steven Gerson, Technical Communication Process and Product, Pearson, New Delhi, 2014
5. Elbow, Peter. Writing with Power. OUP USA, 1998

Online Learning Resources:

1. https://youtu.be/NNhTIT81nH8
2. https://www.youtube.com/watch?v=478ccrWKY-A
3. https://www.youtube.com/watch?v=nzGo5ZC1gMw
4. https://www.youtube.com/watch?v=Qve0ZBmJMh4
5. https://courses.lumenlearning.com/publicspeakingprinciples/chapter/chapter-12-nonverbal-aspects-of-delivery/
6. https://onlinecourses.nptel.ac.in/noc21_hs76/preview
7. https://archive.nptel.ac.in/courses/109/107/109107172/
8. https://archive.nptel.ac.in/courses/109/104/109104107/

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40080– MATHEMATICAL FOUNDATION OF QUANTUM TECHNOLOGIES (OE-2)

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

1. Course Description

Course Overview

To provide a strong mathematical foundation for understanding Quantum Mechanics.

To equip students with fundamental basis of the statistical theory, Conclusions from Experiments, Measurement, and reversibility.

To enhance the ability to apply the concept in Thermodynamics, Reversibility and equilibrium problems and Macroscopic Measurement.

To develop critical problem-solving skills for composite system and measuring process.

Course Pre/co-requisites

No Pre/co-requisites.

2. Course Outcomes (COs)

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

A40080.1 Understand the Transformation theory and Hilbert space.

A40080.2 Analyze the properties and operators of Hilbert space and apply Eigen values to it.

A40080.3 Apply statistics to measure theory, uncertainty relations and radiation theory.

A40080.4 Evaluate problems on reversibility, equilibrium and macroscopic measurements.

A40080.5 Formulate problems of composite system and measuring process.

3. Course Syllabus

UNIT I

Introductory Considerations: The origin of the Transformation Theory, The Original Formulation of Quantum Mechanics, The Equivalence of the two Theories: (i) The Transformation Theory, (ii) Hilbert Space

UNIT II

Abstract Hilbert Space: The definition of Hilbert space, The Geometry of Hilbert space, Degression on the Conditions A-E, Closed linear Manifolds, Operators in Hilbert space, The Eigen Value Problem, Continuation, Initial Consideration concerning the Eigenvalue Problem, Degression on the Existence and Uniqueness of solutions of the Eigenvalue Problems, Cumulative operators, The Trace.

UNIT III

The Quantum Statistics: The statistical assertions of quantum mechanics, the statistical interpretation, Simultaneous Measurability and Measurability in General, Uncertainty Relations, Projections as Propositions, Radiation Theory.

UNIT IV

Deductive development of the Theory and general considerations: The fundamental basis of the statistical theory, Conclusions from Experiments. Measurement and reversibility, Thermodynamics Considerations, Reversibility and equilibrium problems, The Macroscopic Measurement.

UNITV

The measuring Process:

Formulation of the problems, Composite systems, discussion of the Measuring process

Books and Materials

Text Book(s)

1. John von Neumann and Robert T Beyer, Mathematical Foundations of Quantum Mechanics, Princeton Univ. Press (1996).
2. Srinivas, M. D., Measurements and Quantum Probabilities, University Press, Hyderabad (2001).

Reference Book(s)

1. Leonard Schiff, Quantum Mechanics, Mc, Graw Hill (Education) (2010).
2. Parthasarathy. K. R., Mathematical Foundations of Quantum, Hindustan Book Agency, New Delhi.
3. Gerad Tesch, Mathematical Methods in Quantum Mechanics with application to Schrodinger operators, Graduate Studies in Mathematics, 99, AMS, Providence, 2009.

COURSE STRUCTURE

VII - SEMESTER

VII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40131	Finite Element Methods	PC	3	0	0	3	30	70	100
A40034 A40035 A40036	**Management Course-II** 1. Business Ethics and Corporate Governance 2. E-Business 3. Management Science	BS&H	2	0	0	2	30	70	100
A40132a A40132b A40132c	**Professional Elective-IV** 1. Geo-synthetics and Reinforced Earth Structures 2. Railways, Airports, Docks and Harbour Engineering 3. Pre-Engineered Buildings	PE-IV	3	0	0	3	30	70	100
A40133a A40133b A40133c	**Professional Elective-V** 1. Ground Improvement Techniques 2. Subsurface Investigation and Instrumentation 3. Transportation Economics	PE-V	3	0	0	3	30	70	100
	Open Elective-III	OE-III	3	0	0	3	30	70	100
	Open Elective-IV	OE-IV	3	0	0	3	30	70	100
A40134	Skill oriented course Skills in Civil Engineering software (STAADPRO/CAD/TEKL)	SC	0	1	2	2	30	70	100
A40037	Gender Sensitization	MC	2	0	0	-	100*	-	100*
A40135	Evaluation of Industry Internship	PW	-	-	-	2	-	-	100
TOTAL			19	1	2	21	210	490	800

COURSE STRUCTURE

A40131 – FINITE ELEMENT 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

The objectives of this course are to make the student to Understand the fundamental principles of the Finite Element Method (FEM) and its applications in structural analysis. Apply the concepts of elasticity, stress-strain relationships, and displacement functions in FEM. Develop finite element formulations for1D, 2D, and 3D elements. Analyze bar, beam, and plane stress/strain problems using shape functions and stiffness matrices. Implement solution techniques such as numerical integration, static condensation, and element assembly.

Course Pre/corequisites

1. Strength of Materials

2. Course Outcomes (COs)

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

A40131.1 Explain the basic principles, advantages, and limitations of FEM in engineering applications.

A40131.2 Derive shape functions and stiffness matrices for 1D bar and beam elements.

A40131.3 Analyze continuous beams and plane stress/strain problems using FEM.

A40131.4 Develop iso-parametric formulation for 2D elements such as CST and LST.

A40131.5 Implement solution techniques for assembling elements and solving FEM equations.

3. Course Syllabus

UNIT I

Introduction To Finite Element Method

Introduction to Finite Element Method – Basic Equations in Elasticity Stress – Strain Equation – Concept of Plane Stress – Plane Strain Advantages and Disadvantages of FEM. Element Shapes – Nodes – Nodal Degree of Freedom Displacement Function – Natural Coordinates – Strain Displacement Relations.

UNIT II

Lagrangian– Serendipity Elements

Lagrangian– Serendipity Elements – Hermite Polynomials – Regular, Irregular 2 D &3D – Element – Shape Functions Up to Quadratic formulation. Finite Element Analysis (FEA) of – One Dimensional Problems – Bar Element – Shape Functions Stiffness Matrix – Stress – Strain Relation.

UNIT III

FEA Beam Elements

FEA Beam Elements – Stiffness Matrix - Shape Function– Analysis of Continuous Beams

UNIT IV

FEA Two dimensional problems

FEA Two-Dimensional Problem – CST – LST Element – Shape Function – Stress – Strain. Iso-parametric formulation – Concepts of, Iso-parametric Elements for2D Analysis Formulation of CST Element.

UNIT V

Solution Techniques

Solution Techniques: Numerical Integration, Static Condensation, Assembly of Elements and Solution Techniques for Static Loads.

4. Books and Materials

Text Book(s)

1. A first course in Finite Element Method by Daryl L. Logan, 5th Edition, Cengage Learning India Pvt. Ltd.
2. Introduction to finite Elements in Engineering by Tirupathi R. Chandrupatla, and Ashok D. Belegundu, Prentice Hall of India

Reference Book(s)

1. Finite Element Aanalysis by P. Seshu, PHI Learning Private Limited
2. Concepts and applications of Finite Element Analysis by Robert D. Cook et al., Wiley India Pvt. Ltd.
3. Applied Finite Element Analysis by G. Ramamurty, I.K. International Publishing House Pvt. Ltd.

5. Online Learning Resources

https://archive.nptel.ac.in/courses/105/105/105105041/

https://archive.nptel.ac.in/noc/courses/noc22/SEM1/noc22-me43/

COURSE STRUCTURE

A40134– SKILLS IN CIVIL ENGINEERING SOFTWARE (STAADPRO/CAD/TEKLA)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	1	2	0	14	28	2	30	70	100

1. Course Description

Course Overview

The objectives of this course are to Provide fundamental knowledge of AutoCAD and Tekla for 2D drafting and 3D modeling. Train students in structural analysis and design using STAAD.Pro. Develop skills in reinforcement detailing and structural component modeling. Introduce seismic and nonlinear analysis for structural safety evaluation. Enable students to apply civil engineering software tools for real-world projects.

Course Pre/co-requisites

A40104. Strength of Materials

A40111. Structural Analysis

A40116. Design Of Reinforced Concrete Structures

2. Course Outcomes (COs)

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

A40134.1 Create 2D drawings and structural detailing using AutoCAD

A40134.2 Develop 3D building models and analyze site topography in Revit.

A40134.3 Perform structural analysis and design of multi-story buildings using STAAD.Pro and ETABS

A40134.4 Conduct seismic and performance-based analysis for high-rise structures

A40134.5 Apply SAP2000 for bridge modeling, water tank design, and advanced structural systems

3. Course Syllabus

LIST OF EXPERIMENTS

1. Determination of Basic Drawing and Editing Commands in AutoCAD
2. Creation of a 2D Floor Plan for a Residential Building in AutoCAD
3. Development of Structural Detailing for Beams and Columns in AutoCAD
4. Application of Reinforcement Detailing for Slabs and Footings in AutoCAD
5. Creation and analysis of a steel column using TEKLA
6. Modelling a Roof Truss by TEKLA
7. Design of a Composite Beam by TEKLA
8. Column Base Plate Design by TEKLA
9. Determination of STAAD.Pro Interface and Structural Model Setup
10. Analysis and Design of a Simply Supported Beam in STAAD.Pro
11. Development of Structural Analysis for a Multi-Story RCC Building in STAAD.Pro
12. Application of Seismic Load Analysis on a Building Structure in STAAD.Pro

Books and Materials

Text Book(s)

1. George Omura, Brian C. Benton – Mastering AutoCAD 2025 and AutoCAD LT 2025, Wiley, 2025 Edition
2. TEKLA Structural Designer 2023 Engineers Hand Book by Trimble Solutions Corporation

Reference Book(s)

1. Phil Read, Eddy Krygiel, James Vandezande – BIM Handbook: A Guide to Building Information Modeling for Owners, Designers, Engineers, and Contractors, John Wiley & Sons, 4th Edition, 2023
2. Nighat Yasmin Ph.D., Introduction to AutoCAD 2025 for Civil Engineering Applications, SDC Publications, 2024 Edition

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40034 – BUSINESS ETHICS AND CORPORATE GOVERNANCE

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

1. Course Description

Course Overview

To make the student understand the principles of business ethics

To enable them in knowing about the ethics in management

To facilitate the student' role in corporate culture

To impart knowledge about the fair-trade practices

To encourage the student in knowing about the corporate governance

Course Pre/corequisites

1. Managerial Economics and Financial analysis

2. Course Outcomes (COs)

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

A40034-1	Understand the Ethics and different types of ethics.
A40034-2	Understand business ethics and ethical practices in management.
A40034-3	Understand the role of ethics in management.
A40034-4	Apply the knowledge of professional ethics & technical ethics.
A40034-5	Evaluate corporate governance & corporate scams
A40034-6	Analyze corporate law, ethics, codes & principles.

3. Course Syllabus

UNIT I

Ethics

Introduction – Meaning – Nature, Scope, significance, Loyalty, and ethical behavior. Value systems - Business Ethics - Types, Characteristics, Factors, Contradictions and Ethical Practices in Management -Corporate . Social Responsibility – Issues of Management – Crisis Management.

UNIT II

Ethics in Management

Introduction- Ethics in production, finance, Human resource management and Marketing Management - The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures - Culture and Individual Ethics – professional ethics and technical ethics.

UNIT III

Corporate Culture

Introduction - Meaning, definition, Nature, and significance – Key elements of corporate culture, shared values, beliefs and norms, rituals, symbols and language - Types of corporate culture, hierarchical culture, market driven culture – Organization leadership and corporate culture, leadership styles and their impact on culture, transformational leadership and culture change.

UNIT IV

Legal Frame work

Law and Ethics -Agencies enforcing Ethical Business Behavior - Legal Impact – Environmental Protection, Fair Trade Practices, legal Compliances, Safeguarding Health and wellbeing of Customers – Corporate law, Securities and financial regulations, corporate governance codes and principles.

UNIT V

Corporate Governance

Introduction - Meaning – Corporate governance code, transparency & disclosure -Role of auditors, board of directors and shareholders. Global issues, accounting and regulatory frame work - Corporate scams - Committees in India and abroad, corporate responsibility. BoDs composition, Cadbury Committee - Various committees - Reports Benefits and Limitations.

4. Books and Materials

Text Book(s)

1. Murthy CSV: Business Ethics and Corporate Governance, HPH July 2017
2. Bholananth Dutta, S.K. Podder – Corporation Governance, VBH. June 2010

Reference Book(s)

1. Dr. K. Nirmala, KarunakaraReaddy. Business Ethics and Corporate Governance, HPH
2. H.R.Machiraju: Corporate Governance, HPH, 2013
3. K. Venkataramana, Corporate Governance, SHBP.
4. N.M.Khandelwal. Indian Ethos and Values for Managers

5. Online Learning Resources

https://onlinecourses.nptel.ac.in/noc21_mg46/
https://archive.nptel.ac.in/courses/110/105/110105138/
https://onlinecourses.nptel.ac.in/noc21_mg54/ https://onlinecourses.nptel.ac.in/noc22_mg54/
https://archive.nptel.ac.in/courses/109/106/109106117/

COURSE STRUCTURE
A40035 – E-BUSINESS

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	2	30	70	100

1. Course Description

Course Overview

To provide knowledge on emerging concept on E-Business related aspect.

To understand various electronic markets & business models.

To impart the information about electronic payment systems & banking.

To create awareness on security risks and challenges in E-commerce.

To create awareness on different e-marketing channels & strategies.

Course Pre/corequisites

1. Managerial Economics and Financial analysis

2. Course Outcomes (COs)

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

A40035-1 Remember E-Business & its nature, scope and functions.

A40035-2 Understand E-market-Models which are practicing by the organizations

A40035-3 Apply the concepts of E-Commerce in the present globalized world.

A40035-4 Analyze the various E-payment systems & importance of net banking.

A40035-5 Evaluate market research strategies & E-advertisements.

A40035-6 Understand importance of E-security & control

3. Course Syllabus

UNIT I

Electronic Business

Introduction – Nature, meaning, significance, functions and advantages - Definition of Electronic Business - Functions of Electronic Commerce (EC)-Advantages & Disadvantages of E-Commerce and E-Business, Internet Services, Online Shopping- E-Commerce Opportunities for Industries.

UNIT II

Electronic Markets and Business Models

Introduction –E-Shops-E-Malls E-Groceries - Portals - Vertical Portals-Horizontal Portals - Advantages of Portals -Business Models- Business to Business (B2B)-Business to Customers(B2C) - Business to Government(B2G)-Auctions-B2B Portals in India.

UNIT III

Electronic Payment Systems

Introduction to electronic payment systems (EPS) -Types of electronic payments - Credit/debit cards, e-wallets, UPI, and crypto currencies -Smart cards and digital wallets: Features and usage -Electronic Fund Transfer (EFT): Role in business transactions -Infrastructure requirements and regulatory aspects of e-payments.

UNIT IV

E-Security

Security risks and challenges in electronic commerce - Cyber threats - Phishing, hacking, identity theft, and malware - Digital Signatures & Certificates - Security protocols over public networks (HTTP, SSL, TLS) -Firewalls in securing e-business platforms.

UNIT V

E-Marketing:

Introduction – Online Marketing – Advantages of Online Marketing – Internet Advertisement – Advertisement Methods – Conducting Online Market Research– – E-marketing planning: Online branding, social media marketing, and email marketing - E-business strategies: Digital advertising, content marketing, and analytics – E-Customer Relationship Management (eCRM) E-supply chain management (e-SCM)

4. Books and Materials

Text Book(s)

1. Arati Oturkar & Sunil Khilari. E-Business. Everest Publishing House, 2022
2. P.T.S Joseph. E-Commerce, Fourth Edition, Prentice Hall of India, 2011

Reference Book(s)

1. Debjani, Kamalesh K Bajaj. E-Commerce, Second Edition Tata McGraw-Hill's, 2005
2. Dave Chaffey. E-Commerce E-Management, Second Edition, Pearson, 2012.
3. Henry Chan. E-Commerce Fundamentals and Application, Raymond Leatham Wiley India 2007
4. S. Jaiswal. E-Commerce Galgotia Publication Pvt Ltd., 2003.

5. Online Learning Resources

https://www.slideshare.net/fatimahAlkreem/e-businessppt-67935771
https://www.slideshare.net/VikramNani/e-commerce-business-models
https://www.slideshare.net/RiteshGoyal/electronic-payment-system
https://www.slideshare.net/WelingkarDLP/electronic-security
https://www.slideshare.net/Ankitha2404/emarketing-ppt

COURSE STRUCTURE
A40036 – MANAGEMENT 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	2	30	70	100

1. Course Description

Course Overview

To provide fundamental knowledge on Management, Administration, Organization & its concepts.

To make the students understand the role of management in Production.

To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts.

To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management.

To create awareness on contemporary issues in modern management.

Course Pre/corequisites

1. Managerial Economics and Financial analysis

2. Course Outcomes (COs)

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

A40036-1 Remember the concepts & principles of management and designs of organization in a practical world.

A40036-2 Understand the knowledge of Work-study principles & Quality Control techniques in industry

A40036-3 Apply the process of Recruitment & Selection in organization.

A40036-4 Analyze the concepts of HRM & different training methods.

A40036-5 Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.

3. Course Syllabus

UNIT I

INTRODUCTION TO MANAGEMENT

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Elton Mayo's Human relations - Organizational Designs - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

UNIT II

OPERATIONS MANAGEMENT

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control- Material Management - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Marketing Management - Concept - Meaning - Nature-Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

UNIT III

HUMAN RESOURCES MANAGEMENT (HRM)

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Job Analysis - Human Resource Planning (HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection - Process - Employee Training and Development - methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration.

UNIT IV

STRATEGIC & PROJECT MANAGEMENT

Definition& Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - Project Management - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simple problems).

UNIT V

CONTEMPORARY ISSUES IN MANAGEMENT

Customer Relations Management (CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management (SCM) - Enterprise Resource Planning (ERP) - Performance Management – employee engagement and retention - Business Process Re-engineering and Bench Marking - Knowledge Management – change management –sustainability and corporate social responsibility.

4. Books and Materials

Text Book(s)

1. Frederick S. Hillier, Mark S. Hillier. Introduction to Management Science, October 26, 2023
2. A.R Aryasri, Management Science, TMH, 2019

Reference Book(s)

1. Stoner, Freeman, Gilbert Management, Pearson Education, New Delhi, 2019.
2. Koontz & Weihrich, Essentials of Management, 6/e, TMH, 2005.
3. Thomas N.Duening & John M.Ivancevich, Management Principles and Guidelines, Biztantra.
4. Kanishka Bedi, Production and Operations Management, Oxford University Press, 2004.
5. Samuel C.Certo, Modern Management, 9/e, PHI, 2005 2003.

5. Online Learning Resources

1. https://www.slideshare.net/slideshow/introduction-to-management-and-organization 231308043/231308043

2. https://nptel.ac.in/courses/112107238

3. https://archive.nptel.ac.in/courses/110/104/110104068/

4. https://archive.nptel.ac.in/courses/110/105/110105069/

5. https://onlinecourses.nptel.ac.in/noc24_mg112/

COURSE STRUCTURE
A40037– GENDER SENSITIZATION

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	0	100	0	100

1. Course Description

Course Overview

The objectives of this course are to enable students to understand the gender related issues, vulnerability of women and men. Familiarize them about constitutional safeguard for gender equality. Expose the students to debates on the politics and economics of work. Help students reflect critically on gender violence. Make them understand that gender identities and gender relations are part of culture as they. Shape the way daily life is lived in the family as well as wider community and the workplace**.**

Course Pre/co-requisites

No Pre or co-requisites

2. Course Outcomes (COs)

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

A40037.1 Understand the basic concepts of gender and its related terminology.

A40037.2 Identify the biological, sociological, psychological and legal aspects of gender.

A40037.3 Use the knowledge in understanding how gender discrimination works in our society and how to counter it.

A40037.4 Analyze the gendered division of labour and its relation to politics and economics.

A40037.5 Appraise how gender-role beliefs and sharing behaviour are associated with more well-being in all culture and gender groups.

A40037.6 Develop student’s sensibility with regard to issues of gender in contemporary India.

3. Course Syllabus

UNIT I

UNDERSTANDING GENDER
Introduction: Definition of Gender-Basic Gender Concepts and Terminology-Exploring Attitudes towards Gender-Construction of Gender-Socialization: Making Women, Making Men - Preparing for Womanhood. Growing up Male. First lessons in Caste.

UNIT II
GENDER ROLES AND RELATIONS
Two or Many? -Struggles with Discrimination-Gender Roles and Relations-Types of Gender Roles- Gender Roles and Relationships Matrix-Missing Women-Sex Selection and its Consequences- Declining Sex Ratio-Demographic Consequences-Gender Spectrum

UNIT III
GENDER AND LABOUR: Division and Valuation of Labour-Housework: The Invisible Labor-My Mother doesn‘t Work. Share the Load. Work: Its Politics and Economics -Fact and Fiction- Unrecognized and Unaccounted work -Gender Development Issues-Gender, Governance and Sustainable Development Gender and Human Rights-Gender and Mainstreaming.

UNIT IV

GENDER-BASED VIOLENCE

The Concept of Violence- Types of Gender-based Violence-Gender-based Violence from a Human Rights Perspective-Sexual Harassment - Domestic Violence - Different forms of violence against women - Causes of violence, impact of violence against women - Consequences of gender-based violence.

UNIT V

GENDER AND CULTURE

Gender and Film-Gender and Electronic Media-Gender and Advertisement-Gender and Popular Literature-Gender Development Issues-Gender Issues-Gender Sensitive Language- Just Relationships.

Books and Materials

Text Book(s)

1. A.Suneetha, Uma Bhrugubanda, et al. Towards a World of Equals: A Bilingual Textbook on Gender, Telugu Akademi, Telangana, 2015.
2. Butler, Judith. Gender Trouble: Feminism and the Subversion of Identity. UK Paperback Edn. March 1990

Reference Book(s)

1. Wtatt, Robin and Massood, Nazia, Broken Mirrors: The dowry Problems in India, London : Sage Publications, 2011
2. Datt, R. and Kornberg, J.(eds), Women in Developing Countries, Assessing Strategies for Empowerment, London: Lynne Rienner Publishers, 2002
3. Brush, Lisa D., Gender and Governance, New Delhi, Rawat Publication, 2007
4. Singh, Direeti, Women and Politics World Wide, New Delhi, Axis Publications, 2010
5. Raj Pal Singh, Anupama Sihag, Gender Sensitization: Issues and Challenges (English, Hardcover), Raj Publications, 2019
6. A.Revathy & Murali, Nandini, A Life in Trans Activism (Lakshmi Narayan Tripathi). The University of Chicago Press, 2016

Online Learning Resources:

https://onlinecourses.swayam2.ac.in/nou24_hs53/preview

https://www.plannedparenthood.org/learn/gender-identity/sex-gender-identity/what-are-gender-roles-and-stereotypes

https://www.verywellmind.com/understanding-gender-roles-and-their-effect-on-our-relationships-7499408

https://www.economicsobservatory.com/what-explains-the-gender-division-of-labour-and-how-can-it-be-redressed

https://eige.europa.eu/gender-based-violence/what-is-gender-based-violence?language_content_entity=en

https://gender.study/psychology-of-gender/culture-impact-gender-roles-identities/

http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

Professional Electives - IV & V

Course Code	Title of the Course	L-T-P	Credits
Professional Elective-IV			
A40132a	Geo-synthetics and Reinforced Earth Structures	3-0-0	3
A40132b	Railways, Airports, Docks and Harbour Engineering	3-0-0	3
A40132c	Pre-Engineered Buildings	3-0-0	3
Professional Elective-V			
A40133a	Ground Improvement Techniques	3-0-0	3
A40133b	Subsurface Investigation and Instrumentation	3-0-0	3
A40133c	Transportation Economics	3-0-0	3

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40132a– GEO SYNTHETICS AND REINFORCED EARTH STRUCTURES (PE – IV)

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 objectives of this course are to understand the concept and applications of reinforced earth, including friction coefficient determination. Analyze the classification, functions, and durability aspects of geosynthetics and their advantages over conventional materials. Design reinforced earth retaining walls considering stability mechanisms and material selection. Evaluate the performance of reinforced embankments and their foundation mattresses for settlement and stability control. Develop reinforced soil beds and analyze reinforced pavements using standard design approaches.

Course Pre/co-requisites

A40117. Soil Mechanics

2. Course Outcomes (COs)

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

A40132a.1 Explain the fundamentals of reinforced earth and analyze the effects of reinforcement on soil properties.

A40132a.2 Compare different types of geosynthetics, their functions, and durability aspects in geotechnical applications.

A40132a.3 Design reinforced earth retaining walls considering stability mechanisms and reinforcement layouts.

A40132a.4 Evaluate reinforced embankments and foundation mattresses with respect to settlement and load-bearing capacity.

A40132a.5 Design and analyze reinforced pavements and soil beds using standard methodologies.

3. Course Syllabus

UNIT I

Reinforced Earth: Concept, Effects of Reinforcement On Soils – Equal Confining and Psuedo Cohesion Concepts, Materials, Friction Coefficient – Definition, Laboratory Determination, Factors Affecting Fiction Coefficient; Application of Reinforced Earth.

UNIT II

Geosynthetics - Advantages Over Conventional Materials - Classification Based On Material Type and Function - Types of Geosynthetics - Functions of Geosynthetics - Tests On Geosynthetics - Durability Aspects of Geosynthetics - Applications of Geosynthetics

UNIT III

Reinforced Earth Retaining Walls: Introduction, Stability Mechanisms, Design of Reinforced Earth Retaining Wall - Selection of Materials - Geotechnical Analysis - Reinforcement Layout and Spacing - Stability Analysis - Advantages Over Conventional Retaining Walls.

UNIT IV

Reinforced Embankments: Introduction, Design of Reinforced Embankment, Foundation Mattress Below the Embankment - Purpose and Function of Foundation Mattresses - Components of Reinforced Mattress - Design of Reinforced Mattress - Design Calculations for Settlement Control, Bearing Capacity, and Long-Term Performance. Field Implementation and Monitoring Techniques.

UNIT V

Reinforced Soil Beds: Introduction, Factors Affecting the Behaviour of Reinforced Soil Beds, Analysis and Design Reinforced Pavements: Benefits of Placing Reinforcement in Flexible Pavement Layers, Design of Reinforced Pavements By Giroud and Noiray Approach and Modified CBR Method.

Books and Materials

Text Book(s)

1. An Introduction to Soil Reinforcement and Geosynthetics By G.L. Siva Kumar Babu, University Press
2. Fundamentals of Geosynthetics Engineering, Sanjay Kumar Shukla and Jian-Hua Yin, CRC Press, 2017, 1st edition.
3. Reinforced Soil and its Engineering Applications, Swami Saran, I.K. International Publishing House Pvt. Ltd., 2019, 1st edition

Reference Book(s)

1. Designing with Geosynthetics by Robert M Koerner, R.M. Pearson Education Inc., 2012, 6th edition
2. Advances in Geosynthetics by G. Venkatappa rao, Sai Master Geo environmental Services Pvt. Ltd. Publications
3. Designing with Geosynthetics, Koerner, R.M., Pearson Education Inc., 2012, 6th edition
4. IS:13162-1992; IS:14293& 94-1995; IS:14324-1995; IS:14714-1999, Geotextiles – Methods of Tests
5. IRC: SP:102-2014: Guidelines for design and construction of reinforced soil walls

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/106/105106052/

https://onlinecourses.nptel.ac.in/noc20_ce06/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40132b– RAILWAYS, AIRPORTS, DOCKS AND HARBOR ENGINEERING (PE – IV)

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 objectives of this course are to understand the components and geometric design principles of railway tracks. Analyze the principles of railway track design, signaling, and interlocking. Evaluate airport site selection, runway orientation, and terminal area planning. Design runways and taxiways based on aircraft characteristics and geometric elements. Assess the requirements and classification of ports, harbors, docks, and navigation aids.

Course Pre/co-requisites

A40123. Highway Engineering

2. Course Outcomes (COs)

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

A40132b.1 Explain railway track components, functions, and requirements.

A40132b.2 Apply geometric design principles to railway track layout and interlocking systems.

A40132b.3 Evaluate airport planning aspects, including site selection, runway design, and terminal planning.

A40132b.4 Design runways and taxiways based on geometric standards and safety regulations.

A40132b.5 Analyze ports and harbor structures, including docks, breakwaters, and navigation aids.

3. Course Syllabus

UNIT I

RAILWAY ENGINEERING: Introduction – Permanent Way Components – Cross Section of Permanent Way – Functions and Requirements of Rails, Sleepers and Ballast – Types of Gauges – Creep of Rails – Theories Related to Creep – Coning of Wheels – Adzing of Sleepers – Rail Fastenings

UNIT II

GEOMETRIC DESIGN of RAILWAY TRACK: Gradients – Grade Compensation – Cant and Negative Super Elevation – Cant Deficiency – Degree of Curves – Safe Speed On Railway Track – Points and Crossings – Layout and Functioning of Left Hand Turn Out and Right Hand Turn Outs – Station Yards – Signaling and Interlocking.

UNIT III

AIRPORT ENGINEERING: Airport Site Selection – Factors Affecting Site Selection and Surveys- Runway Orientation – Wind Rose Diagram – Basic Runway Length – Correction for Runway Length – Terminal Area – Layout and Functions – Concepts of Terminal Building – Simple Building , Linear Concept, Pier Concept and Satellite Concept – Typical Layouts

UNIT IV

GEOMETRIC DESIGN of RUNWAYS and TAXIWAYS: Aircraft Characteristics – Influence of Characteristics On Airport Planning and Design – Geometric Design Elements of Runway – Standards and Specifications - Functions of Taxiways – Taxiway Geometric Design – Geometric Elements and Standard Specifications – Runway and Taxiway Lighting.

UNIT V

PORTS and HARBORS: Harbours - Requirements of Ports and Harbors – Types of Ports – Classification of Harbors – Docks and Types of Docks – Dry Docks, Wharves and Jetties – Breakwaters: Layouts of Different Types of Harbors and Docks – Dredging Operations – Navigation Aids.

Books and Materials

Text Book(s)

1. A Text Book of Railway Engineering-S.C.Saxena andS.Arora, Dhanpatrai and Sons, New Delhi 2010
2. Highway, railway, Airport andHarbour Engineering – K.P. Subramanian, Scitech Publishers

Reference Book(s)

1. Harbour, Dock and Tunnel Engineering – R. Srinivasan, Charotar Publishing House Pvt. Limited, 200
2. Railway Track Engineering by J.S.MundreyMcGraw Hill Education 5th edition 2017
3. A Text book of Transportation Engineering – S.P.Chandola – S.Chand& Co. Ltd. – (2001)

Online Learning Resources:

https://nptel.ac.in/courses/105107123

https://archive.nptel.ac.in/courses/114/106/114106025/

https://www.mkube.co.in/product-detail/railways-airports-docks-and-harbour-engineering

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40132c– PRE-ENGINEERED BUILDINGS (PE – IV)

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 comprehensive understanding of Pre-Engineered Buildings (PEBs), an innovative construction solution designed to optimize structural efficiency and cost-effectiveness. Students will explore the principles, design techniques, and applications of PEBs in various sectors, including industrial, commercial, and residential projects.

Course Pre/co-requisites

Basic Civil Engineering

2. Course Outcomes (COs)

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

A40132c.1 To design the pre-engineered structures and execute the same for a given structure.

A40132c.2 To know the different types of stresses acting on the structures while lifting the prefabricated structures and type of equipment required to support such stresses.

A40132c.3 Know Production and Hoisting Technology.

A40132c.4 Impact of different Precast sandwich Panels, Pre-stressed concrete in construction industry.

A40132c.5 Apply the latest Pre-Engineered Buildings equipment technique in the construction industry

3. Course Syllabus

UNIT I

INTRODUCTION TO PRE-ENGINEERED BUILDINGS: Introduction – History Advantages of PEB, Materials used for manufacturing of PEB, Difference between conventional steel buildings and pre-engineering buildings.

UNIT II

PRE-ENGINEERED BUILDING COMPONENTS: Primary systems, main frames, gable end frames, secondary frame system, sizes and properties of purlins & girts, bracing system, rod, angle, portal, pipe bracings, sheeting and cladding roof sheeting and wall sheeting, accessories turbo ventilators, ridge vents, sky lights, louvers, insulation stair cases

UNIT III

DESIGN LOADS ON PRE-ENGINEERED BUILDINGS: Design of PEB frame under the influence of dead load, live load, collateral, wind, seismic and other applicable loads, serviceability limits as per code

UNIT IV

PEB DESIGN METHODOLOGY: Design parameters of PEB frames, depth of section, depth of flange with ratios, thickness of flange to thickness of web ratios, Ratios of sections as per IS code, Section sizes as per manufacturing limitations, analysis and design of rigid frames

UNIT V

PEB FRAME CONNECTION DESIGN METHODOLOGY: Rigid frame moment connection, shear connection, high strength bolts and grades, lever arm, bolt pattern its effects on connection design, thickness of connection plate, selection of governing forces for connection design

Books and Materials

Text Book(s)

1. Pre-Engineered Metal Building Structure Installation Handbook, Lambert publishing 2023
2. Pre-Engineered Building by Subramanian, Ashwin Palaniappan Hariharan
3. Pre - Engineered Steel Building: Limit State Design of Structural Members, K S Vivek, P Vyshnavi, KS Omniscriptum Publishing, 2017

Reference Book(s)

1. Pre-Engineering Metal Building Structure by Santosh Kumar Panda, KS Omniscirptum Publishers

COURSE STRUCTURE

A40133a– GROUND IMPROVEMENT TECHNIQUES (PE – V)

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 objectives of this course are to make the student to understand various dewatering methods, including sumps, well points, and electro osmosis, for effective groundwater control. Analyze the properties and applications of grouts, grouting techniques, and post grouting tests for soil and rock stabilization. Evaluate different densification techniques for granular and cohesive soils, such as vibro-compaction, preloading, and thermal methods. Apply stabilization techniques, including mechanical, chemical, and bituminous stabilization, to improve soil properties. Assess the design principles of reinforced earth walls and the role of geosynthetics in soil improvement and slope stability.

Course Pre/co-requisites

A40117. Soil Mechanics

A40156. Foundation Engineering

2. Course Outcomes (COs)

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

A40133a.1	Explain the methods of dewatering and grouting and their importance in foundation engineering.
A40133a.2	Analyze densification techniques for granular and cohesive soils to enhance soil strength.
A40133a.3	Evaluate the effectiveness of soil stabilization methods for different ground conditions.
A40133a.4	Apply reinforced earth principles and geosynthetics for soil retention and foundation stability.
A40133a.5	Assess expansive soil problems, their identification methods, and suitable foundation techniques like under-reamed piles.

3. Course Syllabus

UNIT I

EXPANSIVE SOILS: Problems of Expansive Soils – Tests for Identification – Methods of Determination of Swell Pressure. Improvement of Expansive Soils – Foundation Techniques in Expansive Soils – Under Reamed Piles.

UNIT II

DEWATERING: Methods of De-Watering- Sumps and Interceptor Ditches- Single, Multi Stage Well Points - Vacuum Well Points- Horizontal Wells-Foundation Drains-Blanket Drains - Criteria for Selection of Fill Material Around Drains –Electro-Osmosis.

GROUTING: Objectives of Grouting- Grouts and Their Properties- Grouting Methods- Ascending, Descending and Stage Grouting- Hydraulic Fracturing in Soils and Rocks- Post Grout Test

UNIT III

DENSIFICATION METHODS in GRANULAR SOILS: In – Situ Densification Methods in Granular Soils: – Vibration at The Ground Surface, Impact at the Ground Surface, Vibration at Depth, Impact at Depth.

DENSIFICATION METHODS in COHESIVE SOILS: In – Situ Densification Methods in Cohesive Soils: – Preloading or Dewatering, Vertical Drains – Sand Drains, Sand Wick Geo-drains – Stone and Lime Columns – Thermal Methods

UNIT IV

STABILISATION: Methods of Stabilization-Mechanical-Cement- Lime-Bituminous Chemical Stabilization with Calcium Chloride, Sodium Silicate and Gypsum

UNIT V

REINFORCED EARTH: Principles – Components of Reinforced Earth – Factors Governing Design of Reinforced Earth Walls – Design Principles of Reinforced Earth Walls.

GEOSYNTHETICS: Geotextiles- Types, Functions and Applications – Geogrids and Geo Membranes – Functions and Applications

Books and Materials

Text Book(s)

1. Engineering Principles of Ground Modification, Haussmann M.R., McGraw-Hill International Edition (1990).
2. Ground Improvement Techniques, Dr.P.Purushotham Raj. Laxmi Publications, New Delhi University science press, New Delhi 2nd edition 2016

Reference Book(s)

1. Ground Improvement, Moseley M.P. Blackie Academic and Professional, Boca Taton, Florida, USA (1993).
2. Ground Improvement Techniques, Nihar Ranajan Patra Vikas Publications, New Delhi
3. Ground Control and Improvement, Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) John Wiley and Sons, New York, USA.

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/108/105108075/

https://archive.nptel.ac.in/courses/105/105/105105210/

COURSE STRUCTURE

A40133b– SUBSURFACE INVESTIGATION AND INSTRUMENTATION (PE – V)

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 objectives of this course are to make the student to understand the fundamental concepts of soil formation, classification, and stratification processes. Analyze various soil exploration methods, including boring, drilling, and sampling techniques. Evaluate borehole logging methods and groundwater observations for site investigation. Apply field testing techniques such as SPT, PLT, PMT, CPT, and geophysical methods to assess soil properties. Assess soil exploration report preparation, including instrumentation and data interpretation.

Course Pre/co-requisites

A40117. Soil Mechanics

2. Course Outcomes (COs)

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

A40133b.1 Explain soil formation processes, classification methods, and stratification phenomena.
A40133b.2 Analyze soil exploration methods and sampling techniques for various geotechnical applications.
A40133b.3 Evaluate borehole logging, groundwater observations, and their influence on soil properties.
A40133b.4 Apply field testing procedures, including penetration tests and geophysical methods, to assess subsurface conditions.
A40133b.5 Assess soil exploration report writing and field instrumentation techniques for site investigations.

3. Course Syllabus

UNIT I
Introduction: Soil formation, Types of Soils, Physical and Chemical Weathering, Soil Transport, Deposition and Stratification Phenomena and Soil Classification.

UNIT II
Methods of Soil Exploration: Methods of Boring, Auguring and Drilling. Machinery Used for Drilling, Types of Augers and Their Usage for Various Projects. Soil Sampling: Sampling Methods, Types of Samples, Storage of Samples and Their Transport. Sample Preparation, Sample Sizes, Types of Sampler's Specifications for Testing.

UNIT III
Borehole Logging: Logging of Boreholes - Logging Methods - Groundwater Observations – Water Table Fluctuations and Effects - Preparation of Soil Profiles and Exploration Report.

UNIT IV

Field Testing of Soils: Methods and Specifications – Visual Identification Tests, Standard Penetration Test (SPT), Plate Load Test (PLT), Pressure Meter Test (PMT) Dilatometer Test (DMT) Vane Shear Test (VST), Cone Penetration Test (CPT), Becker Penetration Test (BPT), Analysis of Test Results. Geophysical Methods of Soil Exploration- Seismic Refraction, Electrical Resistivity, Cross Hole Test.

UNIT V

Report Writing: Soil Exploration Reports- Identification, Calculations and Preparation. Field Instrumentation: Strain Gauges, Piezometer, Pressure Cells, Inclinometers, Proving Ring, Load Cells, Displacement Gauges

Books and Materials

Text Book(s)

1. Site Investigation, Clayton C. R., Matthews M. C and Simons N. E., Blackwell Science. 2005
2. Geotechnical Instrumentation for Monitoring Field Performance, John Dunn cliff, Wiley Inter science, 2008

Reference Book(s)

1. Basic and Applied Soil Mechanics- A.S. Rao and Gopal Ranjan, New Age International.
2. IS:1892-Code of Practice for subsurface investigation for foundation, 1979
3. IS: SP36 Part 1-Compendium of India Standards on Soil Engineering-Laboratory Testing of Soils for Civil Engineering Purposes, 1987.
4. IS: SP36 Part 2-Compendium of India Standards on Soil Engineering-Field Testing of Soils for Civil Engineering Purposes, 1988.

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/103/105103182/

https://onlinecourses.nptel.ac.in/noc25_ce27/preview

https://onlinecourses.nptel.ac.in/noc22_ce81/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40133c– TRANSPORTATION ECONOMICS (PE – V)

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 objectives of this course are to make the student to understand the fundamentals of transportation project development and decision making. Analyze transportation costs, including agency and user costs. Evaluate vehicle operating costs and traffic congestion economics. Apply economic evaluation methods for transportation projects. Assess financing methods and risk analysis in transportation projects.

Course Pre/co-requisites

A40123. HIGHWAY ENGINEERING

2. Course Outcomes (COs)

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

A40133c.1 Describe the overall process of transportation project development and financial planning.

A40133c.2 Analyze transportation cost structures, including demand and supply elasticity.

A40133c.3 Evaluate vehicle operating costs and traffic congestion pricing strategies.

A40133c.4 Apply economic analysis techniques to assess the feasibility of transportation projects.

A40133c.5 Assess financial models, PPP strategies, and risk analysis for road projects.

3. Course Syllabus

UNIT I

Introductory Concepts in Transportation Decision Making: Overall Transportation Project Development, Budgeting, Financial Planning, The Process of Transportation Project Development, Models Associated With Transportation Impact Evaluation Professional Ethics.

UNIT II

Transportation Costs-Classification of Transportation Costs, Transportation Agency Costs, Transportation User Costs, General Structure and Behavior of Cost Functions and Road Pricing. Estimating Transportation Demand and Supply - Supply Equilibration, Dynamics of Transportation Demand and Supply, Elasticity of Travel Demand and Supply, Classification of Elasticity

UNIT III

Vehicle Operating Costs: Fuel Costs - Maintenance and Spares, Depreciation - Crew Costs - Value of Travel Time Savings - Accident Costs. Economics of Traffic Congestion - Pricing Policy

UNIT IV

Economic Analysis of Projects - Methods of Evaluation - Cost-Benefit Ratio, First Year Rate of Return, Net Present Value, and Internal-Rate of Return Methods; Indirect Costs and Benefits of Transport Projects.

UNIT V

Financing of Road Projects - Methods – Private Public Partnership (PPP) - toll Collection - Economic Viability of Design-Build-Operate-Transfer Schemes – Risk Analysis – Value for Money Analysis - Case Studies.

Books and Materials

Text Book(s)

1. Winfrey, Economic analysis for Highways, International Textbook Company, Pennsylvania, 1969.
2. Sarkar, P. K., and Maitri, V., Economics in Highway and Transportation Planning, Standard Publisher, New Delhi, 2010.

Reference Book(s)

1. IRC, Manual on Economic Evaluation of Highway Projects in India, SP30, 2007
2. David, H., and Brewer, A., Transport: An Economics and Management Perspective. Oxford University Press, UK, 2000.
3. Quinet, E., and Vickerman, R., Principles of Transport Economics, Edward Elgar Pub, 2005
4. Button, K. J., Transport Economics, Elgar, 2010

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/104/105104098/

https://archive.nptel.ac.in/content/storage2/courses/105101087/01-Ltexhtml/p2/p.html

Open Electives

Course Code	Title of the Course	L-T-P	Credits	Offered by
Open Elective - III				
A40273	Smart Grid Technologies	3-0-0	3	EEE
A40373	3D Printing Technologies	3-0-0	3	ME
A40473	Introduction to Microprocessors and Microcontrollers	3-0-0	3	ECE
A40576	Fundamentals of Data Base Management Systems	3-0-0	3	CSE
A40577	Cyber Security	3-0-0	3	CSE
A40081	Wavelet transforms and its applications	3-0-0	3	H&S
A40082	Smart Materials and Devices	3-0-0	3	H&S
A40083	Green Chemistry and Catalysis for Sustainable Environment	3-0-0	3	H&S
A40084	Employability Skills	3-0-0	3	H&S
A40085	Introduction to quantum mechanics	3-0-0	3	H&S
Open Elective - IV				
A40274	Introduction to Electric Vehicles	3-0-0	3	EEE
A40374	Total Quality Management	3-0-0	3	ME
A40474	Transducers and Sensors	3-0-0	3	ECE
A40578	Computer Networks and Applications	3-0-0	3	CSE
A40579	Introduction to Internet of Things	3-0-0	3	CSE
A40086	Financial Mathematics	3-0-0	3	H&S
A40087	Sensors And Actuators for Engineering Applications	3-0-0	3	H&S
A40088	Chemistry Of Nanomaterials and Applications	3-0-0	3	H&S
A40089	Literary Vibes	3-0-0	3	H&S
A40580	Quantum Computing	3-0-0	3	CSE

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40273 – SMART GRID TECHNOLOGIES (OE-3)

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 explores the fundamental principles, design, and implementation of smart grid technologies that transform traditional electrical power systems into highly automated, efficient, and sustainable energy networks. It delves into advanced communication protocols, integration of renewable energy sources, and intelligent systems for grid management. Students will gain insights into the key components, challenges, and emerging trends in smart grids.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40273.1 Understanding the Concept and Evolution of Smart Grids.

A40273.2 Analyzing Wide Area Monitoring System and Synchrophasor Technology.

A40273.3 Applying Smart Metering and Advanced Metering Infrastructure (AMI) Concepts

A40273.4 Evaluating Information and Communication Technology (ICT) Systems in Smart Grids.

A40273.5 Designing Smart Grid Applications and Cybersecurity Measures.

3. Course Syllabus

UNIT I

Introduction to Smart Grid

Evolution of Electric Grid – Need for Smart Grid – Difference between conventional & smart grid – Overview of enabling technologies – International experience in Smart Grid deployment efforts – Smart Grid road map for India – Smart Grid Architecture.

UNIT II

Wide Area Monitoring System

Fundamentals of Synchro phasor Technology – concept and benefits of Wide Area Monitoring System – Structure and functions of Phasor Measuring Unit (PMU) and Phasor Data Concentrator (PDC) – Road Map for Synchrophasor applications (NAPSI) – Operational experience and Blackout analysis using PMU - Case study on PMU.

UNIT III

Smart Meters

Smart Meters: Features and functions of Smart Meters – Functional specification – category of Smart Meters – Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) drivers and benefits – AMI protocol – Demand Side Integration: Peak load, Outage and Power Quality management.

UNIT IV

Information and Communication Technology:

Overview of Smart Grid Communication system – Modulation and Demodulation Techniques: Radio Communication – Mobile Communication – Power Line Communication – Optical Fibre Communication – Communication Protocol for Smart Grid.

UNIT V

Smart Grid Applications and Cyber Security:

Applications: Overview and concept of Renewable Integration – Introduction to distributed generation - Role of Protective Relaying in Smart Grid – House Area Network – Advanced Energy Storage Technology: Flow battery – Fuel cell – SMES – Super capacitors – Plug – in Hybrid electric Vehicles - Cyber Security: Security issues in DG, Distribution Automation, AMI, Electric Vehicle Management Systems – Approach to assessment of smart grid cyber security risks – Methodologies. Cyber Security requirements – Smart Grid Information Model.

4. Books and Materials

Text Book(s)

1. James Momoh, "SMART GRID: Fundamentals of Design and Analysis", John Wiley and Sons, New York, 2012.
2. Janaka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", John Wiley & Sons, New Jersey, 2012.

Reference Book(s)

1. Power Grid Corporation of India Limited, "Smart Grid Primer", 1st Edition, Power Grid Corporation of India Limited, Bangalore, India, 2013.
2. Fereidoon.P.Sioshansi, "Smart Grid – Integrating Renewable, Distributed and Efficient Energy", 1st Edition, Academic Press, USA, 2011.
3. Stuart Borlase, "Smart Grids: Infrastructure, Technology and Solutions", 1st Edition, CRC Press Publication, England, 2013.
4. Phadke A G, Thorp J S, "Synchronized Phasor Measurements and Their Applications", 1st Edition, Springer, New York, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40373 – 3D PRINTING TECHNOLOGIES (OE-3)

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 an in-depth exploration of 3D printing technologies, also known as additive manufacturing, and their applications across various industries. Students will learn about the principles of 3D printing, different techniques and materials used, and the steps involved in the design-to-production process. The course also examines the potential and limitations of 3D printing, focusing on its impact on design innovation, prototyping, and manufacturing processes.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40373.1 Define and explain the evolution and need for rapid prototyping in modern product development.

A40373.2 Compare and contrast various 3D printing technologies based on working principles, materials, and limitations

A40373.3 Apply knowledge of rapid tooling and reverse engineering techniques for industrial and design applications

A40373.4 Diagnose and interpret different types of errors encountered in 3D printing processes and recommend solutions.

A40373.5 Use RP-specific software tools to manipulate STL files and prepare models for printing in real-world scenarios.

3. Course Syllabus

UNIT I

Introduction to 3D Printing

Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

UNIT II

Solid and Liquid Based RP Systems

Working Principle, Materials, Advantages, Limitations and Applications of Fusion Deposition Modelling (FDM), Laminated Object Manufacturing (LOM), Stereo lithography (SLA), Direct Light Projection System (DLP) and Solid Ground Curing (SGC).

UNIT III

Powder Based & Other RP Systems

Powder Based & Other RP Systems Powder Based RP Systems: Working Principle, Materials, Advantages, Limitations and Applications of Selective Laser Sintering (SLS), Direct Metal Laser Sintering (DMLS), Laser Engineered Net Shaping (LENS) and Electron Beam Melting (EBM). Other RP Systems: Working Principle, Materials, Advantages, Limitations and Applications of Three Dimensional Printing (3DP), Ballastic Particle Manufacturing (BPM) and Shape Deposition Manufacturing (SDM).

UNIT IV

Rapid Tooling & Reverse Engineering

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods. Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

UNIT V

Errors in 3D Printing and Applications

Pre-processing, processing and post-processing errors, Part building errors in SLA, SLS, etc. Software: Need for software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, Solid View, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP. Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

4. Books and Materials

Text Book(s)

1. Chee Kai Chua and Kah Fai Leong, ―3D Printing and Additive Manufacturing Principles and Applications‖ 5/e, World Scientific Publications, 2017.
2. Ian Gibson, David W Rosen, Brent Stucker, ―Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing‖, Springer, 2/e, 2010.

Reference Book(s)

1. Frank W.Liou, ―Rapid Prototyping & Engineering Applications‖, CRC Press, Taylor & Francis Group, 2011.
2. Rafiq Noorani, ―Rapid Prototyping: Principles and Applications in Manufacturing‖, John Wiley & Sons, 2006.

COURSE STRUCTURE

A40473 – INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS (OE-3)

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 a comprehensive understanding of microprocessors and microcontrollers, their architecture, programming, and applications. It covers fundamental concepts, hardware interfacing, and real-world applications of these devices in embedded systems. Students will learn assembly and high-level programming, explore communication protocols, and develop projects that highlight the role of microprocessors and microcontrollers in modern electronics and automation.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40473.1 Gain knowledge on the architecture, operation, and configurations of the 8086 microprocessors.

A40473.2 Get familiar with 8086 programming concepts, instruction set, and assembly language development tools.

A40473.3 Know the interfacing of 8086 with memory, peripherals, and controllers for various applications

A40473.4 Learn the architecture, instruction set, and programming of the 8051 microcontrollers.

A40473.5 Understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

3. Course Syllabus

UNIT I

8086 Architecture

Main features, pin diagram/description, 8086 microprocessor family, internal architecture, bus interfacing unit, execution unit, interrupts and interrupt response, 8086 system timing, minimum mode and maximum mode configuration.

UNIT II

8086 Programming

Program development steps, instructions, addressing modes, assembler directives, writing simple programs with an assembler, assembly language program development tools.

UNIT III

8086 Interfacing

Semiconductor memories interfacing (RAM, ROM), Intel 8255 programmable peripheral interface, Interfacing switches and LEDS, Interfacing seven segment displays, software and hardware interrupt applications, Intel 8251 USART architecture and interfacing, Intel 8237a DMA controller, stepper motor, A/D and D/A converters, Need for 8259 programmable interrupt controllers.

UNIT IV

Microcontroller

Microcontroller - Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V

Interfacing microcontroller

Interfacing Microcontroller - Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing - ADC, DAC & Sensor Interfacing - External Memory Interface- Stepper Motor and Waveform generation - Comparison of Microprocessor, Microcontroller, PIC and ARM processors

4. Books and Materials

Text Book(s)

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rd Edition,1994.
2. K M Bhurchandi, A K Ray, Advanced Microprocessors and Peripherals, 3rd edition, McGraw Hill Education, 2017.
3. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd edition, Pearson, 2012.

Reference Book(s)

1. Ramesh S Gaonkar, Microprocessor Architecture Programming and Applications with the 8085, 6th edition, Penram International Publishing, 2013.
2. Kenneth J. Ayala, The 8051 Microcontroller, 3rd edition, Cengage Learning, 2004.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40576 – FUNDAMENTALS OF DATA BASE MANAGEMENT SYSTEM (OE-3)

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

1. Course Description

Course Overview

To introduce the fundamental concepts of database systems and data modeling.

To provide knowledge on relational databases and SQL for data retrieval and manipulation.

To understand database design principles using normalization and ER modeling.

To study transaction management, concurrency control, and database recovery.

To explore emerging database technologies and architectures including NoSQL.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40576.1	Understand the basic concepts of database systems and their architecture.
A40576.2	Apply ER modeling and relational algebra for database design.
A40576.3	Analyze and implement normalization techniques for schema refinement.
A40576.4	Evaluate transaction management techniques, concurrency control, and recovery.
A40576.5	Explore non-relational databases and recent trends in database systems

3. Course Syllabus

UNIT I

Introduction to databases

Database System Applications and Purpose, View of Data: Data Abstraction and Data Independence, Database Users and Administrators, DBMS Architecture and Data Models, ER Model: Entities, Attributes, Relationships, ER Diagrams, Reduction of ER Model to Tables.

UNIT II

Relational Model and Algebra

Structure of Relational Databases, Relational Model Concepts and Integrity Constraints, Relational Algebra: Selection, Projection, Set Operations, Joins, Tuple Relational Calculus, Introduction to SQL: DDL, DML, DCL, Advanced SQL: Subqueries, Joins, Views, Indexes.

UNIT III

Database Design and Normalization

Schema Design and Logical Database Design, Functional Dependencies, Normal Forms: 1NF, 2NF, 3NF, BCNF, Decomposition and Lossless Join, Dependency Preservation, Multi-Valued and Join Dependencies.

UNIT IV

Transaction Management and Concurrency Control:

Concept of a Transaction, ACID Properties, Serializability and Schedules, Concurrency Control: Lock-Based, Timestamp-Based Protocols, Deadlock Handling, Recovery Techniques: Log-Based, Shadow Paging.

UNIT V

Advanced Topics and NoSQL Databases:

Distributed Databases and Parallel Databases, Introduction to NoSQL: Types – Document, Columnar, Key-Value, Graph, CAP Theorem, MongoDB: Basics and CRUD Operations, Big Data and NewSQL Overview, Case Studies on Real-World Databases.

4. Books and Materials

Text Book(s)

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan – Database System Concepts, 7th Edition, McGraw Hill
2. Ramez Elmasri, Shamkant B. Navathe – Fundamentals of Database Systems, 7th Edition, Pearson Education.

Reference Book(s)

1. C.J. Date – An Introduction to Database Systems, 8th Edition, Addison-Wesley
2. Raghu Ramakrishnan, Johannes Gehrke – Database Management Systems, 3rd Edition, McGraw Hill
3. Pramod J. Sadalage & Martin Fowler – NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Pearson.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40577 – CYBER SECURITY (OE-3)

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

1. Course Description

Course Overview

To introduce the concept of cybercrime and its impact on information security, and provide an overview of cybercriminal behavior and various classifications of cybercrimes.

To explore the methodologies used by cybercriminals to plan and execute attacks, including techniques like social engineering, botnets, and cloud-related threats.

To understand the security risks associated with mobile and wireless devices, and examine countermeasures for securing mobile computing in organizational environments.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40577.1 Understand the fundamentals of cybercrime and information security, and explain the legal and global perspectives, especially with reference to Indian IT Act 2000.

A40577.2 Analyze how cybercriminals plan and execute cyber offenses using techniques like social engineering, cyberstalking, and botnets, including threats posed by cloud computing.

A40577.3 Evaluate the security challenges of mobile and wireless devices and formulate measures to secure mobile environments within an organization.

A40577.4 Identify and explain various cyberattack tools and methods such as phishing, keyloggers, Trojans, and SQL injection used in committing cybercrimes.

A40577.5 Assess the organizational implications of cybercrimes, including IPR issues, social media risks, and formulate strategies to mitigate security and privacy challenges.

3. Course Syllabus

UNIT I

Introduction to cybercrime

Introduction, Cybercrime, and Information Security, who are Cybercriminals, Classifications of Cybercrimes, And Cybercrime: The legal Perspectives and Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes.

UNIT II

Cyber offences

Introduction, How Criminals plan the Attacks, Social Engineering, Cyber stalking, Cyber Cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector, Cloud Computing.

UNIT III

Cybercrime

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile

Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies a Measures in Mobile Computing Era, Laptops.

UNIT IV

Tools and Methods Used in Cybercrime

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horse and Backdoors, Steganography, DoS and DDoS attacks, SQL Injection, Buffer Overflow.

UNIT V

Cyber Security: Organizational Implications

Introduction, Cost of Cybercrimes and IPR issues, Web threats for Organizations, Security and Privacy Implications, Social media marketing: Security Risks and Perils for Organizations, Social Computing and the associated challenges for Organizations.

4. Books and Materials

Text Book(s)

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

Reference Book(s)

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu, J.DavidIrwin.CRC Press T&F Group.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40081 – WAVELET TRANSFORMS AND ITS APPLICATIONS (OE-3)

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 explores the fundamental principles, design, and implementation of smart grid technologies that transform traditional electrical power systems into highly automated, efficient, and sustainable energy networks. It delves into advanced communication protocols, integration of renewable energy sources, and intelligent systems for grid management. Students will gain insights into the key components, challenges, and emerging trends in smart grids.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40081.1 Understand wavelets and wavelet basis and characterize continuous and discrete wavelet transforms.

A40081.2 Illustrate the multi resolution analysis ad scaling functions.

A40081.3 Implement discrete wavelet transforms with multirate digital filters

A40081.4 Understand multi resolution analysis and identify various wavelets and evaluate their time-frequency resolution properties.

A40081.5 Design certain classes of wavelets to specification and justify the basis of the application of wavelet transforms to different fields.

3. Course Syllabus

UNIT I

Wavelets

Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets effectiveness of Wavelet Analysis -The Discrete Wavelet Transform- The Discrete-Time and Continuous Wavelet Transforms.

UNIT II

A Multiresolution Formulation of Wavelet Systems

Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

UNIT III

Filter Banks and the Discrete Wavelet Transform

Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - -Different Points of View.

UNIT IV

Time-Frequency and Complexity:

Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms - The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

UNIT V

Bases and Matrix Examples

Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

4. Books and Materials

Text Book(s)

1. C. Sidney Burrus, Ramesh A. Gopinath, ―Introduction to Wavelets and Wavelets Transforms‖, Prentice Hall, (1997).
2. James S. Walker, ―A Primer on Wavelets and their Scientific Applications‖, CRC Press, (1999).

Reference Book(s)

1. Raghuveer Rao, ―Wavelet Transforms‖, Pearson Education, Asia
2. C. S. Burrus, Ramose and A. Gopinath, Introduction to Wavelets and Wavelet Transform, Prentice Hall Inc.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40082 – SMART MATERIALS AND DEVICES (OE-3)

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

1. Course Description

Course Overview

To provide exposure to smart materials and their engineering applications.

To impart knowledge on the basics and phenomenon behind the working of smart materials

To explain the properties exhibited by smart materials

To educate various techniques used to synthesize and characterize smart materials.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40082.1 Identify key discoveries that led to modern applications of shape memory materials, describe the two phases in shape memory alloys.

A40082.2 Describe how different external stimuli influence smart material properties.

A40082.3 Summarize various types of synthesis of smart materials

A40082.4 Analyze various characterization techniques used for smart materials.

A40082.5 Interpret the importance of smart materials in various devices.

3. Course Syllabus

UNIT I

Introduction to Smart Materials

Historical account of the discovery and development of smart materials, Shape memory materials, chromo-active materials, magnetorheological materials, photoactive materials, Polymers and polymer composites (Basics).

UNIT II

Properties of Smart Materials

Optical, Electrical, Dielectric, Piezoelectric, Ferroelectric, Pyroelectric and Magnetic properties of smart materials.

UNIT III

Synthesis of Smart Materials

Chemical route: Chemical vapour deposition, Sol-gel technique, Hydrothermal method, Mechanical alloying and Thin film deposition techniques: Chemical etching, Spray pyrolysis.

UNIT IV

Characterization Techniques:

Powder X-ray diffraction, Raman spectroscopy (RS), UV-Visible spectroscopy, Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), Atomic force microscopy (AFM).

UNIT V

Smart Materials based Devices

Devices based on smart materials: Shape memory alloys in robotic hands, piezoelectric based devices, MEMS and intelligent devices.

4. Books and Materials

Text Book(s)

1. Yaser Dahman, Nanotechnology and Functional Materials for Engineers-, Elsevier, 2017
2. E. Zschech, C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.

Reference Book(s)

1. Gauenzi, P.,Smart Structures, Wiley, 2009.
2. Mahmood Aliofkhazraei, Handbook of functional nanomaterials, Vol (1&2), Nova Publishers, 2014
3. Handbook of Smart Materials, Technologies, and Devices: Applications of Industry,4.0, Chaudhery Mustansar Hussain, Paolo Di Sia, Springer,2022.
4. Fundamentals of Smart Materials, Mohsen Shahinpoor, Royal Society of Chemistry, 2020

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40083 – GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT (OE-3)

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

1. Course Description

Course Overview

To understand principle and concepts of green chemistry.

To understand the types of catalysis and industrial applications.

To apply green solvents in chemical synthesis.

To enumerate different sourced of green energy.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40083.1 Apply the Green chemistry Principles for day-to-day life as well as synthesis, describe the sustainable development and green chemistry

A40083.2 Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries.

A40083.3 Explain Supercritical water, recycling of green solvents

A40083.4 Describe importance of Biomass and Solar Power.

A40083.5 Discuss Alternative green methods like Photoredox catalysis.

3. Course Syllabus

UNIT I

PRINCIPLES AND CONCEPTS OF GREEN CHEMISTRY

Introduction, Green chemistry Principles, sustainable development and green chemistry, E factor, atom economy, atom economic Reactions: Rearrangement and addition reactions and atom un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

UNIT II

CATALYSIS AND GREEN CHEMISTRY

Introduction, Types of catalysis, Heterogeneous catalysis: Basics of Heterogeneous Catalysis, Zeolite and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, and Phase transfer catalysis, Bio-catalysis and Photo-catalysis with examples.

UNIT III

GREEN SOLVENTS IN CHEMICAL SYNTHESIS

Green Solvents: Concept, Tools and techniques for solvent selection, supercritical fluids: Super critical carbon dioxide, super critical water, Polyethylene glycol (PEG), Ionic liquids, Recycling of green solvents.

UNIT IV

EMERGING GREENER TECHNOLOGIES:

Biomass as renewable resource, Energy: Energy from Biomass, Solar Power, Chemicals from Renewable

Feedstock's, Chemicals from Fatty Acids, Polymers from Renewable Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency, Mechanochemical synthesis.

UNIT V

ALTERNATIVE GREENER METHODS

Photochemical Reactions - Examples, Advantages and Challenges, Photoredox catalysis, single electron transfer reactions (SET), Examples of Photochemical Reactions, Microwave-assisted Reactions and Sono-chemical reactions, examples and applications.

4. Books and Materials

Text Book(s)

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA

Reference Book(s)

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva, Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40084 – EMPLOYABILITY SKILLS (OE-3)

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

1. Course Description

Course Overview

To encourage all round development of the students by focusing on productive skills

To make the students aware of Goal setting and writing skills

To enable them to know the importance of presentation skills in achieving desired goals.

To help them develop organizational skills through group activities.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40084.1 Understand the importance of goals and try to achieve them.

A40084.2 Explain the significance of self-management.

A40084.3 Apply the knowledge of writing skills in preparing eye-catchy resumes

A40084.4 Analyse various forms of Presentation skills.

A40084.5 Judge the group behavior appropriately and Develop skills required for employability.

3. Course Syllabus

UNIT I

Goal Setting and Self-Management

Definition, importance, types of Goal Setting – SMART Goal Setting – Advantages-Motivation – Intrinsic and Extrinsic Motivation – Self-Management - Knowing about self – SWOC Analysis.

UNIT II

Writing Skills

Definition, significance, types of writing skills – Resume writing Vs CV Writing - E-Mail writing, Cover Letters - E-Mail Etiquette -SoP (Statement of Purpose).

UNIT III

Technical Presentation Skills

Nature, meaning & significance of Presentation Skills – Planning, Preparation, Presentation, Stage Dynamics –Anxiety in Public speaking (Glossophobia)- PPT & Poster Presentation.

UNIT IV

Group Presentation Skills

Body Language – Group Behaviour - Team Dynamics – Leadership Skills – Personality Manifestation- Group Discussion-Debate –Corporate Etiquette.

UNIT V

Job Cracking Skills

Nature, characteristics, importance & types of Interviews – Job Interviews – Skills for success – Job searching skills - STAR method - FAQs- Answering Strategies – Mock Interviews.

4. Books and Materials

Text Book(s)

1. Sabina Pillai, Agna Fernandez. Soft Skills & Employability Skills,2014. Cambridge Publisher.
2. Alka Wadkar. Life Skills for Success, Sage Publications 2016.

Reference Book(s)

1. Gangadhar Joshi. Campus to Corporate Paperback, Sage Publications. 2015
2. Sherfield Montogomery Moody, Cornerstone Developing Soft Skills, Pearson Publications. 4 Ed. 2008
3. Shikha Kapoor. Personality Development and Soft Skills - Preparing for Tomorrow .1 Edition, Wiley, 2017.
4. M. Sen Gupta, Skills for Employability, Innovative Publication, 2019.
5. Steve Duck and David T McMahan, The Basics of Communication Skills A Relational Perspective, Sage press, 2012.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40085 – INTRODUCTON TO QUANTUM MECHANICS (OE-3)

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

1. Course Description

Course Overview

To understand the fundamental differences between classical and quantum mechanics.

To study wave-particle duality, uncertainty principle, and their implications.

To learn and apply Schrödinger equations to basic quantum systems.

To use operator formalism and mathematical tools in quantum mechanics.

To explore angular momentum, spin and their quantum mechanical representations.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40085.1 Explain the key principles of quantum mechanics and wave-particle duality

A40085.2 Apply Schrödinger equations to solve one-dimensional quantum problems

A40085.3 Solve quantum mechanical problems using operator and matrix methods.

A40085.4 Evaluate quantum states using Dirac notation and expectation values.

A40085.5 Analyze angular momentum and spin systems using Pauli matrices and operators.

3. Course Syllabus

UNIT I

PRINCIPLES OF QUANTUM MECHANICS

Introduction: Limitations of classical Mechanics, Difficulties with classical theories of black body radiation and origin of quantum theory of radiation. Wave-particle duality: de Broglie wavelength, Heisenberg uncertainty principle. Schrödinger time independent and time dependent wave equation, Solution of the time dependent Schrödinger equation, Concept of stationary states, Physical significance of wave function (ψ), Orthogonal, Normalized and Orthonormal functions.

UNIT II

ONE DIMENSIONAL PROBLEMS AND SOLUTIONS

Potential step – Reflection and Transmission at the interface. Potential well: Square well potential with rigid walls, Square well potential with finite walls. Potential barrier: Penetration of a potential barrier (tunneling effect). Periodic potential and Harmonic oscillator, Energy eigen functions and eigen values.

UNIT III

OPERATOR FORMALISM

Operators, Operator Algebra, Eigen values and Eigen vectors, Postulates of quantum mechanics, Matrix representation of wave functions and linear operators.

UNIT IV

MATHEMATICAL TOOLS FOR QUANTUM MECHANICS

The concept of row and column matrices, Matrix algebra, Hermitian operators – definition. Dirac's bra and ket notation, Expectation values, Heisenberg (operator) representation of harmonic oscillator, Ladder operators and their significance.

UNIT V

ANGULAR MOMENTUM AND SPIN

Angular momentum operators: Definition. Eigen functions and Eigen values of AM operators. Matrix representation of angular momentum operators, System with spin half(1/2), Spin angular momentum, Pauli's spin matrices. Clebsch-Gordon coefficients. Rigid Rotator: Eigen functions and Eigen values.

4. Books and Materials

Text Book(s)

1. Quantum Mechanics. Vol 1, A. MessaiaNoth-Holland Pub. Co., Amsterdam,(1961).
2. A Text Book of Quantum Mechanics. P.M.Mathews and K.Venkatesam, Tata McGraw Hill, New Delhi,(1976).
3. Introduction to Quantum Mechanics. R.H.Dicke and J.P.Witke, Addison-Wisley Pub.Co.Inc.,London, (1960).
4. Quantum Mechanics. S.L.Gupta, V.Kumar, H.V.Sarama and R.C.Sharma, Jai PrakashNath& Co, Meerut, (1996).

Reference Book(s)

1. Quantum Mechanics. L.I. Schiff, McGraw Hill Book Co., Tokyo, (1968).
2. Introduction to Quantum Mechanics. Richard L. Liboff, Pearson Education Ltd (Fourth Edn.) 2003.

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40274 – INTRODUCTION TO ELECTRIC VEHICLES (OE-4)

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

Remember and understand the differences between conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs. Analyze various EV configurations, parameters of EV systems and Electric vehicle dynaumics. Analyze the basic construction, operation and characteristics of fuel cells and battery charging techniques in HEV systems. Design and analyze the various control structures for Electric vehicle.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40274.1 To understand and differentiate between Conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs.

A40274.2 Understand Various dynamics of Electric Vehicles.

A40274.3 To remember and understand various configurations in parameters of EV system and dynamic aspects of EV.

A40274.4 To analyze fuel cell technologies in EV and HEV systems.

A40274.5 To analyze the battery charging and controls required of EVs.

3. Course Syllabus

UNIT I

Introduction to EV Systems and Energy Sources:

Past, Present and Future of EV - EV Concept- EV Technology- State-of-the Art of EVs- EV configuration- EV system- Fixed and Variable gearing- Single and multiple motor drive- In-wheel drives- EV parameters: Weight, size, force and energy, performance parameters. Electro mobility and the environment- History of Electric power trains- Carbon emissions from fuels- green houses and pollutants- Comparison of conventional, battery, hybrid and fuel cell electric systems.

UNIT II

EV Propulsion and Dynamics:

Choice of electric propulsion system- Block diagram- Concept of EV Motors- Single and multi- motor configurations- Fixed and variable geared transmission- In-wheel motor configuration- Classification - Electric motors used in current vehicle applications - Recent EV Motors- Vehicle load factors- Vehicle acceleration.

UNIT III

Fuel Cells:

Introduction of fuel cells- Basic operation- Model - Voltage, power and efficiency- Power plant system – Characteristics- Sizing - Example of fuel cell electric vehicle - Introduction to HEV- Brake specific fuel consumption - Comparison of Series-Parallel hybrid systems- Examples.

UNIT IV

Battery Charging and Control:

Battery charging: Basic requirements- Charger architecture- Charger functions- Wireless charging- Power factor correction. Control: Introduction- Modeling of electro mechanical system- Feedback controller design approach- PI controller 's designing- Torque-loop, Speed control loop compensation- Acceleration of battery electric vehicle.

UNIT V

Energy Storage Technologies:

Role of Energy Storage Systems- Thermal- Mechanical-Chemical- Electrochemical- Electrical - Efficiency of energy storage systems- Super Capacitors-Superconducting Magnetic Energy Storage (SMES)- SOC- SoH -fuel cells - G2V- V2G- Energy storage in Micro-grid and Smart grid- Energy Management with storage systems- Battery SCADA.

4. Books and Materials

Text Book(s)

1. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001,1st Edition
2. Ali Emadi, —Advanced Electric Drive Vehicles, CRC Press, 2017,1st Edition

Reference Book(s)

1. Electric and Hybrid Vehicles Design Fundamentals, Iqbal Husain, CRC Press 2021, 3rd Edition.
2. Francisco Díaz-González, Andreas Sumper, Oriol Gomis-Bellmunt, Energy Storage in Power Systems‖ Wiley Publication, ISBN: 978-1-118-97130-7, Mar 2016,1st Edition
3. A.G.Ter-Gazarian, —Energy Storage for Power Systems‖, the Institution of Engineering and Technology (IET) Publication, UK, (ISBN – 978-1-84919-219-4), Second Edition, 2011.
4. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, —Modern Elelctric, Hybrid Elelctric and Fuel Cell Vehicles: Fundamentals, Theory and Design‖, CRC Press, 2004,1st Edition
5. James Larminie, John Lowry, —Electric Vehicle Technology Explained, Wiley, 2003,2nd Edition.

5. Online Learning Resources

https://nptel.ac.in/courses/108/102/108102121/

https://nptel.ac.in/syllabus/108103009

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40374 – QUALITY MANAGEMENT (OE-4)

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

Familiarize the basic concepts of Total Quality Management.

Expose with various quality issues in Inspection.

Gain Knowledge on quality control and its applications to real time.

Understand the extent of customer satisfaction by the application of various quality concepts.

Demonstrate the importance of Quality standards in Production.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40374.1	Define and develop on quality Management philosophies and analyze quality costs frameworks.
A40374.2	Understanding of the historical development of Total Quality Management (TQM), implementation, and real-world applications through case studies.
A40374.3	Evaluate the cost of poor quality, process effectiveness and efficiency to analyze areas for improvement.
A40374.4	Apply benchmarking and business process reengineering to improve management processes.
A40374.5	Demonstrate the set of indications to evaluate performance excellence of an organization.

3. Course Syllabus

UNIT I

Introduction

Definition of Quality, Dimensions of Quality, Definition of Total quality management, Quality Planning, Quality costs – Analysis, Techniques for Quality costs, Basic concepts of Total Quality Management.

UNIT II

Historical Review

Historical Review: Quality council, Quality statements, Strategic Planning, Deming Philosophy, Barriers of TQM Implementation, Benefits of TQM, Characteristics of successful quality leader, Contributions of Gurus of TQM, Case studies.

UNIT III

TQM Principles

Customer Satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment teams, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, Kaizen, Supplier Partnership – Partnering, sourcing Supplier Selection, Supplier Rating, Relationship Development, Performance Measures Basic Concepts, Strategy, Performance Measure Case studies.

UNIT IV

TQM Tools

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA, The seven tools of quality, Process capability, Concept of Six Sigma, New Seven management tools, Case studies.

UNIT V

Quality Systems

Need for ISO 9000 and Other Quality Systems, ISO 9000: 2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits, Case Studies.

4. Books and Materials

Text Book(s)

1. Dale H Besterfield, Total Quality Management, Fourth Edition, Pearson Education, 2015.
2. Subburaj Ramaswamy, Total Quality Management, Tata Mcgraw Hill Publishing Company Ltd., 2005. 3.Joel E.Ross , Total Quality Management, Third Eition, CRC Press, 2017

Reference Book(s)

1. Narayana V and Sreenivasan N.S, Quality Management – Concepts and Tasks, New Age International, 1996.
2. Robert L.Flood, Beyond TQM, First Edition, John Wiley & Sons Ltd, 1993.
3. Richard S. Leavenworth & Eugene Lodewick Grant, Statistical Quality Control, Seventh Edition, Tata Mcgraw Hill, 2015
4. Samuel Ho , TQM – An Integrated Approach, Kogan Page Ltd, USA, 1995

5. Online Learning Resources

https://www.youtube.com/watch?v=VD6tXadibk0
https://www.investopedia.com/terms/t/total-quality-management-tqm.asp
https://blog.capterra.com/what-is-total-quality-management/
https://nptel.ac.in/courses/110/104/110104080/
https://onlinecourses.nptel.ac.in/noc21_mg03/preview
https://nptel.ac.in/courses/110/104/110104085/
https://nptel.ac.in/noc/courses/noc18/SEM2/noc18-mg39/

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40474 – TRANSDUCERS AND SENSORS (OE-4)

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

1. Course Description

Course Overview

To understand characteristics of Instrumentation System and the operating principle of motion transducers.

To explore working principles, and applications of different temperature transducers and Piezo-electric sensors.

To provide knowledge on flow transducers and their applications.

To study the working principles of pressure transducers.

To introduce working principle and applications of force and sound transducers.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40474.1 Understand characteristics of Instrumentation System and the operating principle of motion transducers.

A40474.2 Explore working principles, and applications of different temperature transducers and Piezo-electric sensors.

A40474.3 Gain knowledge on flow transducers and their applications.

A40474.4 Learn the working principles of pressure transducers

A40474.5 Understand the working principle and applications of force and sound transducers.

3. Course Syllabus

UNIT I
Introduction
General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification. Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

UNIT II
Temperature Transducers
Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics. Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo electric sensors.

UNIT III

Flow Transducers

Bernoulli's principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

UNIT IV

Pressure Transducers

Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

UNIT V

Force and sound transducers

Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

4. Books and Materials

Text Book(s)

1. A.K. Sawhney, ―A course in Electrical and Electronics Measurements and Instrumentation, Dhanpat Rai& Co. 3rd edition Delhi, 2010.
2. Rangan C.S, Sarma G.R and Mani V S V, ―Instrumentation Devices and Systems, TATA McGraw Hill publications, 2007.

Reference Book(s)

1. Doebelin. E.O, ―Measurement Systems Application and Design, McGraw Hill International, New York, 2004.
2. Nakra B.C and Chaudhary K.K , ―Instrumentation Measurement and Analysis‖, Second Edition, Tata McGraw-Hill Publication Ltd.2006.

COURSE STRUCTURE
A40578 – COMPUTER NETWORKS AND APPLICATIONS (OE-4)

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

1. Course Description

Course Overview

To introduce the fundamentals of the Internet, networking concepts, reference models, and transmission media.

To understand the data link layer design, error handling mechanisms, LAN technologies, and access networks.

To study the routing algorithms, internetworking concepts, and network layer functionalities.

To explore transport layer protocols such as UDP and TCP, and understand their mechanisms, including congestion control.

To introduce the principles behind network applications and protocols, and explore widely used application-layer services such as the Web, Email, DNS, peer-to-peer systems, and content distribution networks.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40578.1 Describe the architecture of the Internet, reference models, and explain different types of transmission media used in networking.

A40578.2 Apply error detection and correction techniques and analyze data link layer protocols and LAN technologies

A40578.3 Explain routing algorithms and the structure of the network layer, including internetworking.

A40578.4 Analyze the working of transport layer protocols like TCP and UDP, including concepts of connection management and congestion control.

A40578.5 Explain the principles of network applications and describe the functionality of protocols such as HTTP, SMTP, DNS, and peer-to-peer systems, including multimedia streaming and content delivery networks.

3. Course Syllabus

UNIT I

Computer Networks and the Internet

What Is the Internet? The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet Switched Networks (Textbook 2), Reference Models, Example Networks, Guided Transmission Media, Wireless Transmission (Textbook 1).

UNIT II

The Data Link Layer, Access Networks, and LANs

Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols (Textbook 1) Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks Link Virtualization: A Network as a Link Layer, Data

Center Networking, Retrospective: A Day in the Life of a Web Page Request (Textbook 2).

UNIT III

The Network Layer

Routing Algorithms, Internetworking, The Network Layer in The Internet (Textbook 1).

UNIT IV

The Transport Layer

Connectionless Transport: UDP (Textbook 2), The Internet Transport Protocols: TCP, Congestion Control (Textbook 1**)**

UNIT V

Principles of Network Applications

Principles of Network Applications, The Web and HTTP, Electronic Mail in the Internet, DNS—The Internet's Directory Service, Peer-to-Peer Applications Video Streaming and Content Distribution Networks (Textbook 2).

4. Books and Materials

Text Book(s)

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 5th Edition, PEARSON.
2. James F. Kurose, Keith W. Ross, —Computer Networking: A Top-Down Approach, 6th edition, Pearson, 2019.

Reference Book(s)

1. Forouzan, Data communications and Networking, 5th Edition, McGraw Hill Publication.
2. Youlu Zheng, Shakil Akthar, —Networks for Computer Scientists and Engineers, Oxford Publishers, 2016.

Online Learning Resources:

https://nptel.ac.in/courses/106105183/25

http://www.nptelvideos.in/2012/11/computer-networks.html https://nptel.ac.in/courses/106105183/3

COURSE STRUCTURE

A40579 – INTRODUCTION TO INTERNET OF THINGS (OE-4)

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

Understand the basics of Internet of Things and protocols.

Discuss the requirement of IoT technology

Introduce some of the application areas where IoT can be applied.

Understand the vision of IoT from a global perspective, understand its applications, determine its market perspective using gateways, devices and data management.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40579.1 Understand general concepts of Internet of Things.

A40579.2 Apply design concept to IoT solutions

A40579.3 Analyze various M2M and IoT architectures.

A40579.4 Evaluate design issues in IoT applications

A40579.5 Create IoT solutions using sensors, actuators and Devices

3. Course Syllabus

UNIT I

Introduction to IoT

Definition and Characteristics of IoT, physical design of IoT, IoT protocols, IoT communication models, IoT Communication APIs, Communication protocols, Embedded Systems, IoT Levels and Templates.

UNIT II

Prototyping IoT Objects using Microprocessor/Microcontroller

Working principles of sensors and actuators, setting up the board – Programming for IoT, Reading from Sensors, Communication: communication through Bluetooth, Wi-Fi.

UNIT III

IoT Architecture and Protocols

Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model, Protocols- 6LowPAN, RPL, CoAP, MQTT, IoT frameworks- Thing Speak.

UNIT IV

Device Discovery and Cloud Services for IoT

Device discovery capabilities- Registering a device, Deregister a device, Introduction to Cloud Storage models and communication APIs Web-Server, Web server for IoT.

UNIT V

UAV IoT

Introduction to Unmanned Aerial Vehicles/Drones, Drone Types, Applications: Defense, Civil, Environmental Monitoring; UAV elements and sensors- Arms, motors, Electronic Speed Controller (ESC), GPS, IMU, Ultra sonic sensors; UAV Software –Arudpilot, Mission Planner, Internet of Drones (IoD)- Case study FlytBase.

4. Books and Materials

Text Book(s)

1. Vijay Madisetti and Arshdeep Bahga, — Internet of Things (A Hands-on-Approach), 1st Edition, VPT, 2014.
2. Handbook of unmanned aerial vehicles, K Valavanis; George J Vachtsevanos, New York, Springer, Boston, Massachusetts : Credo Reference, 2014. 2016.

Reference Book(s)

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, — From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, 1st Edition, Academic Press, 2014.
2. Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
3. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.
4. Francis da Costa, —Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, 1st Edition, A press Publications, 2013
5. Cuno Pfister, Getting Started with the Internet of Things, O‟Reilly Media, 2011, ISBN: 9781 4493- 9357-1
6. DGCA RPAS Guidance Manual, Revision 3 – 2020
7. Building Your Own Drones: A Beginners' Guide to Drones, UAVs, and ROVs, John Baichtal

Online Learning Resources:

https://www.arduino.cc/
https://www.raspberrypi.org/
https://nptel.ac.in/courses/106105166/5
https://nptel.ac.in/courses/108108098/4

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40086 – FINANCIAL MATHEMATICS (OE-4)

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

1. Course Description

Course Overview

To provide mathematical foundations for financial modelling, risk assessment and asset pricing.

To introduce stochastic models and their applications in pricing derivatives and interest rate modelling.

To develop analytical skills for fixed-income securities, credit risk, and investment strategies.

To equip students with computational techniques for pricing financial derivatives.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40086.1 Explain fundamental financial concepts, including arbitrage, valuation, and risk.

A40086.2 Apply stochastic models, including Brownian motion and Stochastic Differential Equations (SDEs), in financial contexts.

A40086.3 Analyze mathematical techniques for pricing options and financial derivatives.

A40086.4 Evaluate interest rate models and bond pricing methodologies.

A40086.5 Utilize computational techniques such as Monte Carlo simulations for financial modeling.

3. Course Syllabus

UNIT I

Asset Pricing and Risk Management

Fundamental financial concepts: Returns, arbitrage, valuation, and pricing. Asset/Liability management, investment income, capital budgeting, and contingent cash flows. One-period model: Securities, payoffs, and the no-arbitrage principle. Option contracts: Speculation and hedging strategies, CAP Model, Efficient market hypothesis.

UNIT II

Stochastic Models in Finance

Random Walks and Brownian Motion. Introduction to Stochastic Differential Equations (SDEs): Drift and diffusion. Ito calculus: Ito's Lemma, Ito Integral, and Ito Isometry.

UNIT III

Interest Rate and Credit Modelling

Interest rate models and bond markets. Short-rate models: Vasicek, Cox-Ingersoll-Ross (CIR), Hull & White models, Credit risk modelling: Hazard function and hazard rate.

UNIT IV

Fixed-Income Securities and Bond Pricing

Characteristics of fixed-income products: Yield, duration, and convexity. Yield curves, forward rates, and zero-coupon bonds. Stochastic interest rate models and bond pricing PDE. Yield curve fitting and calibration techniques, Mortgage-Backed Securities.

UNIT V

Exotic Options and Computational Finance

Stochastic volatility models and the Feynman-Kac theorem. Exotic options: Barriers, Asians, and Lookbacks. Monte Carlo methods for derivative pricing, Black-Scholes-Merton model: Derivation and applications.

4. Books and Materials

Text Book(s)

1. Ales Cerny, Mathematical Techniques in Finance: Tools for Incomplete Markets, Princeton University Press.
2. S.R. Pliska, Introduction to Mathematical Finance: Discrete-Time Models, Cambridge University Press.

Reference Book(s)

1. Ioannis Karatzas & Steven E. Shreve, Methods of Mathematical Finance, Springer, New York.
2. John C. Hull, Options, Futures, and Other Derivatives, Pearson.

Online Learning Resources:

Web References:

MIT– Mathematics for Machine Learning https://ocw.mit.edu

Coursera – Financial Engineering and Risk Management (Columbia University) https://www.coursera.org/

National Stock Exchange (NSE) India – Financial Derivatives https://www.nseindia.com

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40087 – SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS (OE-4)

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

1. Course Description

Course Overview

To provide exposure to various kinds of sensors and actuators and their engineering applications.

To impart knowledge on the basic laws and phenomenon behind the working of sensors and actuators

To explain the operating principles of various sensors and actuators

To educate the fabrication of sensors

To explain the required sensor and actuator for interdisciplinary application.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40087.1 Classify different types of Sensors and Actuators along with their characteristics.

A40087.2 Summarize various types of Temperature and Mechanical sensors.

A40087.3 llustrate various types of optical and mechanical sensors.

A40087.4 Analyze various types of Optical and Acoustic Sensors.

A40087.5 Interpret the importance of smart materials in various devices.

3. Course Syllabus

UNIT I

Introduction to Sensors and Actuators

Sensors: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only), Deposition: Chemical Vapor Deposition, Pattern: photolithography and Etching: Dry and Wet Etching. Actuators: Functional diagram of actuators, Types of actuators and their basic principle of working: Pneumatic, Electromagnetic, Piezo-electric and Piezo-resistive actuators, Applications of Actuators.

UNIT II

Temperature and Mechanical Sensors

Temperature Sensors: Types of temperature sensors and their basic principle of working: Thermo resistive sensors: Thermistors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors Mechanical Sensors: Types of Mechanical sensors and their basic principle of working: Force sensors: Strain gauges, Tactile sensors, Pressure sensors: Piezoresistive, Variable Reluctance Sensor (VRP).

UNIT III

Optical and Acoustic Sensors

Optical Sensors: Basic principle and working of: Photodiodes, Phototransistors and Photo resistors based sensors, Photomultipliers, Infrared sensors: thermal, Passive Infra-Red, Fiber based sensors and Thermopiles Acoustic Sensors: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones.

UNIT IV

Magnetic and Electromagnetic Sensors

Motors as actuators (linear, rotational, stepping motors), magnetic valves, inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magnetostrictive sensors and actuators.

UNIT V

Chemical and Radiation Sensors

Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors. Radiation Sensors: Principle and working of Ionization detectors, Scintillation detectors, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission).

4. Books and Materials

Text Book(s)

1. Sensors and Actuators – Clarence W. de Silva, CRC Press, 2nd Edition, 2015
2. Sensors and Actuators, D.A.Hall and C.E.Millar, CRC Press, 1999.

Reference Book(s)

1. Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd. 2003
2. Measurement, Instrumentation, and Sensors Handbook-John G.Webster, CRC press 1999
3. Sensors – A Comprehensive Sensors- Henry Bolte, John Wiley.
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.

Online Learning Resources:

NPTEL course link: https://onlinecourses.nptel.ac.in/noc21_ee32/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40088 – CHEMISTRY OF NANOMATERIALS AND APPLICATIONS (OE-4)

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

1. Course Description

Course Overview

To understand basics and characterization of nanomaterials.

To understand synthetic methods of nanomaterials.

To apply various techniques for characterization of nanomaterials.

To understand Studies of Nano-structured Materials

To enumerate the applications of advanced nanomaterials in engineering.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40088.1 Classify nanostructure materials; describe scope of nanoscience and importance

A40088.2 Explain aerosol synthesis and plasma arc technique.

A40088.3 Discuss different technique for characterization of nanomaterial

A40088.4 Explain synthesis and properties and applications of nanomaterials.

A40088.5 Illustrate advance engineering applications of Water treatment, sensors, electronic devices.

3. Course Syllabus

UNIT I

Basics and Characterization of Nanomaterials

Introduction, Scope of nanoscience and nanotechnology, nanoscience in nature, classification of nanostructured materials, importance of nanomaterials.

UNIT II

Synthesis of nanomaterials

Top-Down approach, Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling method. Synthetic Methods: Bottom-Up approach, Sol-gel synthesis, microemulsions or reverse micelles, co precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT III

Techniques for characterization

Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT IV

Studies of Nano-structured Materials

Synthesis, properties and applications of the following nanomaterials -fullerenes, carbon nanotubes, 2D-nanomaterial (Graphene), core-shell, magnetic nanoparticles, thermoelectric materials, non-linear optical materials.

UNIT V

Advanced Engineering Applications of Nanomaterials

Applications of Nano Particle, nanorods, nano wires, Water treatment, sensors, electronic devices, medical domain, civil engineering, chemical engineering, metallurgy and mechanical engineering, food science, agriculture, pollutants degradation.

4. Books and Materials

Text Book(s)

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

Reference Book(s)

1. Concepts of Nano-chemistry; Ludovico-Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.
2. Nanostructures &Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College Press, 2007.

COURSE STRUCTURE

A40089 – LITERARY VIBES (OE-4)

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

1. Course Description

Course Overview

To inculcate passion for aesthetic sense and reading skills

To encourage respecting others 'experiences and creative writing

To explore emotions, communication skills and critical thinking

To educate how books serve as the reflection of history and society

To provide practical wisdom and duty of responding to events of the times.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40089.1 Identify genres, literary techniques and creative uses of language in literary texts

A40089.2 Explain the relevance of themes found in literary texts to contemporary, personal and cultural values and to historical forces.

A40089.3 Apply knowledge and understanding of literary texts when responding to other's problems and their own and make evidence-based arguments.

A40089.4 Analyze the underlying meanings of the text by using the elements of literary texts.

A40089.5 Evaluate their own work and that of others critically

3. Course Syllabus

UNIT I

Poetry

1. Ulysses- Alfred Lord Tennyson
2. Ain't I woman?-Sojourner Truth
3. The Second Coming-W.B. Yeats
4. Where the Mind is Without Fear-Rabindranath Tagore of Actuators.

UNIT II

Drama: Twelfth Night- William Shakespeare

1. Shakespeare -life and works
2. Plot & sub-plot and Historical background of the play
3. Themes and Criticism
4. Style and literary elements
5. Characters and characterization

UNIT III

Short Story

1. The Luncheon - Somerset Maugham
2. The Happy Prince-Oscar Wild
3. Three Questions – Leo Tolstoy

4. Grief –Antony Chekov.

UNIT IV

Prose: Essay and Autobiography

1. My struggle for an Education-Booker T Washington
2. The Essentials of Education-Richard Livingston
3. The story of My Life-Helen Keller
4. Student Mobs-JB Priestly.

UNIT V

Novel: Hard Times- Charles Dickens

1. Charles Dickens-Life and works
2. Plot and Historical background of the novel
3. Themes and criticism
4. Style and literary elements
5. Characters and characterization.

4. Books and Materials

Text Book(s)

1. Charles Dickens. Hard Times. (Sangam Abridged Texts) Vantage Press, 1983
2. DENT J C. William Shakespeare. Twelfth Night. Oxford University Press, 2016.

Reference Book(s)

1. WJ Long.History of English Literature, Rupa Publications India; First Edition (4 October 2015)
2. RK Kaushik & SC Bhatia. Essays, Short Stories and One Act Plays, Oxford University Press .2018.
3. Dhanvel, SP. English and Soft Skills, Orient Blackswan,2017.
4. New Horizon, Pearson publications, New Delhi 2014
5. Vimala Ramarao, Explorations Volume-II, Prasaranga Bangalore University,2014.
6. Dev Neira, Anjana & Co. Creative Writing: A Beginner's Manual. Pearson India, 2008.

Online Learning Resources:

https://www.litcharts.com/poetry/alfred-lord-tennyson/ulysses
https://www.litcharts.com/lit/ain-t-i-a-woman/summary-and-analysis
https://englishliterature.education/articles/poetry-analysis/the-second-coming-by-w-b-yeat
https://sirjitutorials.com/where-the-mind-is-without-fear-poem-notes-explanation/
https://www.litcharts.com/lit/twelfth-night/themes
https://smartenglishnotes.com/2021/11/28/the-luncheon-summary-characters-themes-and-irony

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40580 – QUANTUM COMPUTING

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

1. Course Description

Course Overview

- To introduce the principles and mathematical foundations of quantum computation.
- To understand quantum gates, circuits, and computation models.
- To explore quantum algorithms and their advantages over classical ones.
- To develop the ability to simulate and write basic quantum programs.
- To understand real-world applications and the future of quantum computing in AI, cryptography, and optimization.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

A40580.1 Explain the fundamental concepts of quantum mechanics used in computing

A40580.2 Construct and analyze quantum circuits using standard gates.

A40580.3 Apply quantum algorithms like Deutsch-Jozsa, Grover’s, and Shor’s.

A40580.4 Develop simple quantum programs using Qiskit or similar platforms

A40580.5 Analyze applications and challenges of quantum computing in real-world domains.

3. Course Syllabus

UNIT I

Fundamentals of Quantum Mechanics and Linear Algebra

Classical vs Quantum Computation, Complex Numbers, Vectors, and Matrices, Hilbert Spaces and Dirac Notation, Quantum States and Qubits, Superposition and Measurement, Tensor Products and Multi-Qubit Systems.

UNIT II

Quantum Gates and Circuits

Quantum Logic Gates: Pauli, Hadamard, Phase, Controlled Gates and CNOT, Unitary Operations and Reversibility, Quantum Circuit Representation, Quantum Teleportation, Simulation of Quantum Circuits.

UNIT III

Quantum Algorithms and Complexity

Quantum Parallelism and Interference, Deutsch and Deutsch-Jozsa Algorithms, Grover’s Search Algorithm, Shor’s Factoring Algorithm, Quantum Fourier Transform, Complexity Classes: BQP, P, NP, and QMA.

UNIT IV

Quantum Programming and Simulation Platforms

Introduction to Qiskit and IBM Quantum Experience, Writing Quantum Circuits in Qiskit, Measuring Qubits and Results, Classical-Quantum Hybrid Programs, Noisy Intermediate-Scale Quantum (NISQ) Systems, Limitations and Current State of Quantum Hardware

UNIT V

Applications and Future of Quantum Computing

Quantum Machine Learning: Basics and Models, Quantum Cryptography and Quantum Key Distribution, Quantum Algorithms in AI and Optimization, Quantum Advantage and Supremacy, Ethical and Societal Impact of Quantum Technologies, Future Trends and Research Directions.

4. Books and Materials

Text Book(s)

1. Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 10th Anniversary Edition, 2010.
2. Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
3. Chris Bernhardt, Quantum Computing for Everyone, MIT Press, 2019.

Reference Book(s)

1. David McMahon, Quantum Computing Explained, Wiley, 2008.
2. Phillip Kaye, Raymond Laflamme, Michele Mosca, An Introduction to Quantum Computing, Oxford University Press, 2007.
3. Scott Aaronson, Quantum Computing Since Democritus, Cambridge University Press, 2013.

COURSE STRUCTURE

VIII - SEMESTER

VIII SEMESTER (IV YEAR)									
Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
			L	T	P	C	Internal	External	Total
A40136a	Internship	PW	0	0	0	4	100	0	100
A40136b	Project	PW	-	-	-	8	30	70	100
TOTAL						12	130	70	200

HONOURS

HONOUR COURSES					
Course Code	Title of the Course	Periods per Week			Credits
		L	T	P	C
A40161	Soil Dynamics and Machine Foundation	3	0	0	3
A40162	Industrial Waste and Waste Water Management	3	0	0	3
A40163	Repair & Rehabilitation of Structures	3	0	0	3
A40164	Design and Drawing of Irrigation Structures	3	0	0	3
A40165	Road Safety Engineering	3	0	0	3
A40166	NDT Lab	0	0	4	2
A40167	ETABS/SAP Lab	0	0	4	2
TOTAL					19

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40161- SOIL DYNAMICS AND MACHINE FOUNDATION

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

- Understand the fundamentals of vibration and response of single/multiple-degree-of-freedom systems
- Analyze the wave propagation in soil deposits and evaluate dynamic soil properties.
- Perform vibration analyses for machine foundations, considering different loading conditions.
- Design block foundations for reciprocating and impact machines based on codal provisions.
- Analyze and design machine foundations on piles, considering different modes of vibration.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

- A40161.1: Explain the fundamentals of vibration and response of SDOF/MDOF systems
- A40161.2: Analyze seismic wave propagation and evaluate dynamic soil properties
- A40161.3: Perform vibration analyses of rigid foundation blocks using different models.
- A40161.4: Design machine foundations for reciprocating and impact-type machines.
- A40161.5: Analyze the response of pile-supported machine foundations and develop design solutions.

3. Course Syllabus

UNIT I

Fundamentals Of Vibration: Definitions, Simple Harmonic Motion, Response Of SDOF Systems Of Free And Forced Vibrations With And Without Viscous Damping, Frequency Dependent Excitation, Systems Under Transient Loads, Rayleigh's Method Of Fundamental Frequency, Logarithmic Decrement, Determination Of Viscous Damping, Transmissibility, Systems With Two And Multiple Degrees Of Freedom, Vibration Measuring Instruments.

UNIT II

Wave Propagation and Dynamic Soil Properties: Propagation of seismic waves in soil deposits - Attenuation of stress waves, Stress-strain behaviour of cyclically loaded soils, Strength of cyclically loaded soils, Dynamic soil properties - Laboratory and fieldtesting techniques, Elastic constants of soils, Correlations for shear modulus and damping ratio in sand, gravels, clays and lightly cemented sand. Liquefaction of soils: An introduction and evaluation using simple methods.

UNIT III

Vibration Analyses: Types, General Requirements, Permissible amplitude, Allowable soil pressure, Modes of vibration of a rigid foundation block, Methods of analysis, Lumped Mass models, elastic half space method, elasto-dynamics, effect of footing shape on vibratory response, dynamic response of embedded block foundation, Vibration isolation.

UNIT IV

Design of Machine Foundations: Analysis and design of block foundations for reciprocating engines, Dynamic analysis and design procedure for a hammer foundation, IS code of practice design procedure for foundations of reciprocating and impact type machines. Vibration isolation and absorption techniques.

UNIT V

Machine Foundations on Piles: Introduction, Analysis of piles under vertical vibrations, Analysis of piles under translation and rocking, Analysis of piles under torsion, Design procedure for a pile supported machine foundation.

4. Books and Materials

Text Book(s)

1.S. Prakash, Soil Dynamics, McGraw Hill, 1st Edition, 1981.

2.F. E. Richart, J. R. Hall, and R. D. Woods, Vibrations of Soils and Foundations, Prentice Hall Inc., 1st Edition, 1970.

Reference Book(s)

1. I. Chowdhary and S. P. Dasgupta, Dynamics of Structures and Foundation, 1st Edition, 2009.

2.S. D. Arya, M. O'Neil, and G. Pincus, Design of Structures and Foundations for Vibrating Machines, Gulf Publishing Co., 1st Edition, 1979.

3.S. Prakash and V. K. Puri, Foundation for Machines: Analysis and Design, John Wiley & Sons, 1st Edition, 1998.

4.N. S. V. Kameswara Rao, Vibration Analysis and Foundation Dynamics, Wheeler Publishing Ltd., 1st Edition,

5.Swami Saran, Soil Dynamics and Machine Foundation, Galgotia Publishing, 1st Edition, 1999.

6.S. L. Kramer, Geotechnical Earthquake Engineering, Prentice Hall, 1st Edition, 1996.

Online Resources :-

https://nptel.ac.in/courses/105101005

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE
A40162 - INDUSTRIAL WASTE AND WASTE WATER 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

- To understand the various sources and characteristics of industrial wastewater and its impacts on natural water bodies and sewer systems.
- To explain and differentiate primary and preliminary treatment methods for industrial effluents.
- To illustrate advanced treatment techniques including nutrient and heavy metal removal.
- To examine and summarize the characteristics and treatment needs of effluents from major industries like sugar, steel, petroleum, textiles, and tanneries.
- To develop awareness of common effluent treatment plants (CETPs), their design considerations, and operational challenges.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

- A40162.1: Identify sources and characteristics of industrial wastewaters, compare them with municipal water bodies.
- A40162.2: Apply suitable preliminary and primary treatment methods such as equalization, neutralization, and oil separation.
- A40162.3: Analyze various waste treatment methods like nitrification, phosphorous and heavy metal.
- A40162.4: Assess the composition of industrial effluents and recommend suitable treatment strategies.
- A40162.5: Design components of CETPs and address operational and maintenance problems considering economic

3. Course Syllabus

UNIT I

Sources of Pollution - Physical, Chemical, Organic & Biological properties of Industrial Wastes - Difference between industrial & municipal waste waters - Sources and Flow Rates of Municipal Wastewater - Characteristics of Municipal Wastewater - Effects of industrial effluents on sewers and Natural water Bodies**.**

UNIT II

Pre & Primary Treatment - Equalization, Proportioning, Neutralization, Oil separation by Floating-Waste Reduction-Volume Reduction-Strength Reduction. Waste Treatment Methods - Nitrification and De-nitrification-Phosphorous removal -Heavy metal removal - Membrane Separation Process - Air Stripping and Absorption Processes - Special Treatment Methods - Disposal of Treated Waste Water.

UNIT III

Manufacturing Process and liquid waste origin, Characteristics and Composition from Textiles, Paper and Pulp industries, Sugar Mills, Tanneries, Dairy and Oil Refineries.

UNIT IV

Manufacturing Process and liquid waste origin, Characteristics and Composition from Steel, Pharmaceutical Plants, Petroleum Refineries, Atomic Energy Plants and other Mineral Processing Industries.

UNIT V

Joint Treatment of Raw Industries waste water and Domestic Sewage – Common Effluent Treatment Plants(CETP) – Location, Design, Operation and Maintenance Problems – Economical aspects. Development of integrated treatment for waste water – zero polluting industry concept – Reuse and recycle of waste water..

4. Books and Materials

Text Book(s)

1.Rao, M.N. & Dutta, A.K. "Waste Water Treatment", 3rd Edition, IBH Publishers, 2020.

2.Patwardhan-" Industrial Waste Water Treatment"- PHI learning Pvt. Ltd, 2017.

Reference Book(s)

1.Metcalf, L., and Eddy, P. Wastewater Engineering; Treatment and Reuse. 5th Edition, Tata McGraw-Hill, New Delhi, 2013.

2.Arceivala, S. J. and Asolekar, S. R. Wastewater Treatment for Pollution Control. 3rd Edition, McGraw-Hill Education (India) Pvt. Ltd., New Delhi, 2006.

3.Bureau of Indian Standards for analysis of water and wastewater (IS3025)

4.Anil K. De. Environmental Chemistry, New Age International Ltd., New Delhi, 2003

5.Hammer, Mark J. Water and Wastewater Technology, Prentice Hall, New Jercy, 2001

Online Resources :-

1.https://onlinecourses.nptel.ac.in/noc24_ce53/preview

2.https://onlinecourses.nptel.ac.in/noc21_ce25/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40163 - REPAIR & REHABILITATION OF STRUCTURES

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

1. Course Description

Course Overview

• Understand the causes of deterioration and distress in concrete structures and the importance of rehabilitation

• Familiarize with condition/damage assessment and evaluation techniques using NDT and field/lab tests.

• Gain knowledge on the selection and application of suitable materials and techniques for concrete repair.

• Learn various rehabilitation and retrofitting methods including case studies and demolition techniques.

• Understand the importance of protection, maintenance, and structural health monitoring (SHM) for ensuring long-term durability.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

- A40163.1: Identify the causes and types of deterioration in structures and interpret the nature of cracks using IS 456 guidelines
- A40163.2: Explain the procedures for condition assessment and damage evaluation using both field and lab-based NDT techniques
- A40163.3: Select appropriate repair materials and techniques based on the type and severity of damage in concrete structures.
- A40163.4: Apply suitable retrofitting and rehabilitation strategies, including engineered demolition methods, with reference to case studies.
- A40163.5: Analyze the significance of corrosion mitigation, preventive maintenance, and SHM in enhancing of structures.

3. Course Syllabus

UNIT I

Introduction: Deterioration of structures with aging, Need for rehabilitation - Deterioration of concrete structures: Causes of distress Causes of distress in concrete structures, construction and design failures, Distress in concrete due to physical and chemical deterioration. Deterioration due to water leakage, fire – detection & mitigation of the same. Visual deterioration of structures- Types of cracks, causes & characteristics of cracking in various structural components. Measurement of cracks as per IS456 - interpretation of the cause of particular type of crack**.**

UNIT II

Wave Propagation and Dynamic Soil Properties: Conditional/damage assessment & Evaluation of structures: Condition assessment and distress-diagnostic techniques, Field & laboratory testing procedures for evaluating the structure for strength, corrosion activity, performance & integrity, durability by use of NDT equipments.

UNIT III

Materials for Repair materials - Criteria for durable concrete repair, Methodology, selection of repair materials, Preparatory stage of repairs, Different types of repair materials & their application, types of repair techniques . Corrosion damage of reinforced concrete - repair and prevention measures - Surface deterioration, Efflorescence, causes, prevention and protection Surface coatings and painting - Water proofing.

UNIT IV

Rehabilitation methods Retrofitting, RCC Jacketing, Fibre wrapping, Building and restoration of earthquake damaged masonry structure, Method for foundation rehabilitation; Case studies - Demolition techniques : Engineered demolition techniques for Dilapidated structures – case studies.

UNIT V

Protection & maintenance of structures - Deterioration due to ageing, inadequate maintenance Facets of Maintenance, importance of Maintenance various aspects of Inspection. Corrosion mitigation techniques to protect the structure from corrosion. Long term health monitoring / Structural health monitoring (SHM)– Definition maintenance of structures and motivation for SHM, Basic components of SHM and its working mechanism.

4. Books and Materials

Text Book(s)

1.B. Bhattacharjee, Concrete Structures-Repair, Rehabilitation and Retrofitting, CBS Publishers and Distributors Pvt Ltd, 2017

2.R. Dodge Woodson, Concrete Structures-Protection, Repair and Rehabilitation, Elsevier, 2009.

Reference Book(s)

1.CPWD, Handbook on Repair and Rehabilitation of RCC Buildings, Govt of India Press, New Delhi, 2014.

2. Allen, Harold Roper, and Denison Campbell, Concrete Structures: Materials, Maintenance and Repair, Longman Scientific and Technical, UK, 1st Edition, 1991.

3. R. Dodge Woodson, Concrete Structures: Protection, Repair and Rehabilitation, Elsevier, 1st Edition, 2009.

4.Kenneth and Carper, Forensic Engineering, CRC Press, 1st Edition, 2000.

5.W. H. Ranson, Building Failures – Diagnosis and Avoidance, E. & F.N. Spon, 1st Edition, 1981.

6.R. Holland, Appraisal and Repair of Reinforced Concrete, Thomas Telford Ltd., Edition and Year not specified.

Online Resources :-

https://onlinecourses.nptel.ac.in/noc20_ce26/preview

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40164 -DESIGN AND DRAWING OF IRRIGATION STRUCTURES

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

1. Course Description

Course Overview

- Impart fundamental knowledge on various irrigation systems, soil moisture concepts, and canal design principles
- Provide an understanding of the design aspects of diversion head works and their components.
- Introduce the functional and structural design of canal structures and cross-drainage works.
- Develop analytical skills in assessing the design and safety of storage head works, including gravity and earth dams.
- Explain the importance and design aspects of spillways and energy dissipation arrangements in hydraulic structures.

Course Pre/corequisites

Design of Reinforced concrete Structures, Design of Steel Structures

2. Course Outcomes (COs)

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

- A40164.1: Explain the principles and practices of various irrigation systems, soil moisture concepts, irrigation efficiencies, and canal design methods including silt and tractive force theories
- A40164.2: Describe the components and layout of diversion head works and apply design principles for weirs and silt control systems
- A40164.3: Design canal structures such as canal regulators, Sarda-type falls, and cross-drainage works for effective water conveyance.
- A40164.4: Analyze the structural stability and seepage characteristics of gravity dams and earth dams using appropriate design considerations
- A40164.5: Apply the principles of spillway hydraulics and energy dissipation mechanisms in the design of spillway systems.

3. Course Syllabus

UNIT I

Irrigation Systems: Types of irrigation systems, Soil moisture, Irrigation water requirements, Irrigation efficiencies, Methods of application of irrigation water, Water logging – Causes and remedial measures - Canal Systems: Types of canals, Principles of design of stable irrigation canals, Silt theories, Tractive force theory, Design of lined canal, Design of longitudinal section.

.

UNIT II

Design of diversion head works: Types of hydraulic structures, Layout of a diversion head work, Design of vertical drop weir, Silt control in head works.

UNIT III

Design of Canal Structures: Canal regulators, Types of canal falls, Design of Sarda type fall, Types of cross drainage works.

UNIT IV

Storage head works: Types of storage head works, Forces acting on gravity dams, Analysis of gravity dams, Profile of a gravity dam Earth dams: Types of earth dams, Causes of failure of earth dams, Seepage analysis, Seepage control, Stability analysis

UNIT V

Spillways and energy dissipation systems: Types of spillways, Ogee spillway, Principles of energy dissipators

4. Books and Materials

Text Book(s)

1. Modi, P. M., 2000, Irrigation Water Resources and Hydropower Engineering, Standard Book Publishing Company, New Delhi.
2. Asawa, G. L., 1996, Irrigation Engineering, New Age International Publishing Company, New Delhi

Reference Book(s)

1. Arora, K. L., 1996, Irrigation Water Resources Engineering, Standard Book Publishing Company, New Delhi.
2. Murthy, C. S. N., 2002, Water Resources Engineering – Principles and Practice, New Age International Publishing Company, New Delhi
3. C. Satyanarayana Murthy, Design of Minor Irrigation and Canal Structures, Wiley Eastern Ltd.,

Online Resources :-

https://www.udemy.com/course/irrigation-structures/?couponCode=LEARNNOWPLANS

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40165 - ROAD SAFETY 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

- Provide foundational knowledge about the causes and trends of road accidents and the impact of human, vehicle, and roadway factors on highway safety.
- Introduce statistical tools and procedures for interpreting and analyzing crash data including black spot and hotspot investigations.
- Explain the principles and components of road safety management systems and the role of audits and crash investigations.
- Impart understanding of crash reconstruction techniques using physical evidence, kinematic principles, and accident scenarios.
- Promote awareness of safety improvement measures in highway planning, design, operation, and enforcement including policy and stakeholder roles

Course Pre/corequisites

Highway Engineering

2. Course Outcomes (COs)

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

- A40165.1: Explain Road accident trends, human and vehicle factors affecting highway safety, and the Indian scenario of road safety
- A40165.2: Apply statistical methods for crash data analysis and conduct black spot and hotspot identification with case-based insights
- A40165.3: Describe the structure of a road safety management system, road safety audit process, and the data needs for improving intersection and vehicle safety.
- A40165.4: Analyze crash reconstruction cases using physical evidence and calculate speed, drag, and impact forces for different accident types
- A40165.5: Evaluate and recommend mitigation measures such as forgiving road design, road signs, public transport safety strategies, and road safety law enforcement

3. Course Syllabus

UNIT I

Basics of Road Safety: Road accidents, Trends, Global and Indian level, Crash Causation, Collision diagrams; Highway safety; Human factors and road user limitations; Speed and its effect on road safety; Vehicle factors; Highway safety in India**.**

.

UNIT II

Statistical Interpretation and Analysis of Crash Data: Before-after methods in crash analysis, Recording of crash data; Accident Investigation and Analysis; Statistical testing and the role of chance; Black Spot Identification and Investigations, Hot spot analysis, Case Studies.

UNIT III

Road Safety Management System: Multi-causal dynamic systems approach to safety; Crash Vs. Accident; Road safety improvement strategies; Elements of a road safety plan, Speed management, Safety data Needs; Intersection Safety, Safe vehicle design. Road Safety Audits: Key elements of a road safety audit, Road Safety Audits & Investigations, Work zone safety audit; Crash investigation and analysis, Methods for identifying hazardous road locations, Case Studies.

UNIT IV

Crash Reconstruction: Describe the basic information that can be obtained from the roadway surface, Basic physics related to crash reconstruction, speed for a various skid, friction, drag, and acceleration scenarios, variables involved in jump and flip crashes, variables involved in pedestrian crashes, Case Studies**.**

UNIT V

Mitigation Measures: Accident prevention by better planning, Accident prevention by better design of roads, Crash Countermeasures, Highway operation, and accident control measures, Highway Safety Measures during construction, Highway geometry, and safety; Design of Forgiving roads and self-explaining roads, Effective Road Signs and Street Lighting, Safety in urban areas; Public transport and safety; Road safety policy-making, Stakeholders involvement; Road safety law**.**

4. Books and Materials

Text Book(s)

1. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (Reprinted 2002).
2. M. Ohidul Haque, Road Safety: Data Collection, Analysis, Monitoring, And Countermeasure Evaluations with Cases, University Press of America, 2008

Reference Book(s)

1. IRC: SP: 88-2019 Manual on Road Safety Audit
2. Geetam Tiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 1st Edition, 2016.
3. Rune Elvik, Alena Hoye, and Truls Vaa, The Handbook of Road Safety Measures, Emerald Group Publishing, 2nd Edition, Sept 2009.
4. R. P. Roess, E. S. Prassa, and W. R. Mcshane, Traffic Engineering, Prentice Hall, 2011

Online Resources :-

https://ebrdelearning.com/road-safety-engineering-e-learning-course

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40166 - NDT LAB

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

• Understand the fundamental principles and significance of non-destructive testing (NDT) in concrete structures

• Apply various NDT techniques to evaluate the structural integrity and quality of concrete..

• Analyze data from NDT methods to detect cracks, voids, rebar position, corrosion, and other defects.

• Evaluate the durability and in-situ strength characteristics of concrete using advanced testing techniques.

• Develop competence in interpreting NDT results for effective decision-making in structural health monitoring.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

- A40166.1: Apply Rebound Hammer and Ultrasonic Pulse Velocity tests to assess surface hardness and detect internal concrete defects
- A40166.2: Analyze corrosion risk and carbonation depth using Half-Cell Potential and Carbonation Depth tests
- A40166.3: Evaluate compressive strength and integrity of concrete using Penetration Resistance and Impact Echo methods.
- A40166.4: Detect reinforcement layout, cover, and subsurface anomalies using Rebar Locator and Ground Penetrating Radar.
- A40166.5: Interpret results from advanced methods like Acoustic Emission and core testing for structural damage diagnosis.

3. Course Syllabus

1. To assess the surface hardness and compressive strength of concrete by using Rebound Hammer Test

2. To determine the quality, uniformity, and presence of cracks or voids in concrete by Ultrasonic Pulse Velocity Test

3. To evaluate the compressive strength of hardened concrete using probe penetration by Penetration Resistance Test

4. To measure the depth of carbonation in concrete this leads to corrosion of reinforcement by Carbonation Depth Test

5. To assess the corrosion potential of reinforcing steel in concrete by Half-Cell Potential Test

6. To detect reinforcement position, diameter, and concrete cover over rebars by Rebar Locator

7. To detect subsurface features, rebar locations, and voids in concrete structures by Ground Penetrating Radar

8. To monitor crack propagation and damage activity in structural components by Acoustic Emission Technique

9. To extract cores for testing and conduct visual and microscopic analysis of concrete quality.

10. To evaluate thickness, delaminations, and voids in concrete slabs or pavements by Impact Echo Test

11. To measure strain, temperature, or crack growth in structural components using embedded optical fibers.

12. To identify surface-breaking defects in non-porous materials BY Dye Penetrant Testing

G.PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL

COURSE STRUCTURE

A40167- ETABS/SAP LAB

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

1. Course Description

Course Overview

- To understand the interface, tools, and modeling environment of ETABS and SAP2000 for structural design
- To develop and analyze multi-storey buildings, shear walls, and frames under various loads using ETABS and SAP2000.
- To perform structural modeling, assign loads, and interpret analysis results for real-world building and infrastructure systems.
- To evaluate performance-based seismic behavior and nonlinear analysis techniques using advanced structural software.
- To design and optimize structural components like water tanks and bridges using advanced modeling tools.

Course Pre/corequisites

No pre requisites

2. Course Outcomes (COs)

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

- A40167.1: Understand and operate the ETABS and SAP2000 interface for modeling structural systems Analyze corrosion risk and carbonation depth using Half-Cell Potential and Carbonation Depth tests
- A40167.2: Apply ETABS for analysis of multi-story buildings and shear wall systems under lateral and gravity loads.
- A40167.3: Analyze and interpret the behavior of structural models including performance-based and nonlinear seismic analysis.
- A40167.4: Evaluate the design of structural elements such as frames, water tanks, and bridges using SAP2000.
- A40167.5: Create detailed structural models and conduct advanced simulations to support safe and economical design decisions

3. Course Syllabus

1. Determination of ETABS Interface and Structural Modeling Techniques
2. Analysis of a Multi-Story Building under Lateral Loads in ETABS
3. Development of Structural Analysis for a Shear Wall System in ETABS
4. Application of Performance-Based Seismic Analysis in ETABS
5. Determination of Structural Analysis of a Simple Frame using SAP2000
6. Development of a Bridge Model and Load Analysis in SAP2000
7. Analysis and Design of an Elevated Water Tank using SAP2000
8. Application of Nonlinear Analysis for a Structural System using SAP2000