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

G.Pullaiah College of Engineering and Technology

(Autonomous)

(Approved by AICTE|NAAC Accreditation with 'A' Grade | Accredited by NBA (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 year2025-2026)
&
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)

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

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 Councilis the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination with in 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 with in 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.

Back log 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), NewDelhi.

Choice Based Credit System: The credit-based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course contentand 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 under taken for the award of the degree as per the program.

Internal Examination: It is an examination conducted to wards 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.

CourseOutcomes: 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 timer equirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One creditis 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 attainmentof 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. Anelective 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 anumerical 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 specifiedinthe program will lead toa 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 toachieve a particular aim. It is a credit-based course and is tobe planned carefully by the student.

Registration: Process of enrolling in to a set of courses inasemester 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 studyconsistingof 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 Out comes: 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.

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

(Effective for the students admitted in to 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 the setwo years would in addition to the maximum period permitted for graduation (Eight years).

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

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 for feit their seatin 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:

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

(b) Academic Year: Two consecutive (oneodd+oneeven) 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 in to two semesters.
b. The summer term is for eightweeks during summervacation. Internship/ apprenticeship / work-based vocational education and training can be carried out during the summer term, especially by students who wish to exitafter 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 Under graduate Programme

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

S.No	Category	Breakupof Credits (Total163)	Percentage Of Total Credits	AICTE Recommendation (%)
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	CourseCategory	Description
1	Foundation Courses	Foundation Courses	Includes Mathematics, Physics and Chemistry; Fundamental Engineering courses; Humanities, Social Sciences and Management courses
2	Core Courses	Professional Core Courses(PC)	Includes subjects related to the parent discipline/ department/branch of engineering

3	Elective Courses	ProfessionalElective Courses(PE)	Include selective 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.ProjectorMajorProject
		Internships	Summer Internships – Community based and Industry Internships; Industry oriented Full Semester Internship
5	Audit Courses	Mandatory non-Creditcourses	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 in to 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 tolocal Areas,Familiarization to Dept./Branch & Innovations etc.,
- Health / Wellness / Yoga / Sports and NSS / Scouts & Guides / Community Service Activities are mandatory as creditcourses for all the under graduate programmes.
- Courses like Environmental Sciences, Indian Constitution, Technical Paper Writing & IPR are offered as non-creditmandatory 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 students specializing 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 under gomandatory summer internships, for a minimum of eight weeks duration at the end of second and third year of the programme. The internship attheend of second year shall be community oriented andindustry internshipatthe end of thirdyear.
- 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) whichprovide 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/careergrowth/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. SummerInternships shall be evaluated for 100 marks, Full Internship & Project work in final semester shall be evaluated for 100 marks, mandatory courses withno credits shall be evaluated for 30mid semester marks.

A student has to secure not lessthan 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 projectetc. Incase of amandatory 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 thatexamination 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% weightage 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 andremaining 10 marks shall be for DaytoDay 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 shortanswer 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: BasicElectrical & 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 (1mark each) compulsory shortanswer 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 evaluatedfor 15 marks by the concerned laboratory teacherbased on the day to day work / record, and 15marks 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:30marks
  Viva voce: 20 marks.
- Inapractical 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 marksobtained intwo parts.

There shall be no end examination for mandatory courses with zero credits. How ever, attend ances hall 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, are-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 andshall 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 there maining three skill courses, one shall be a soft skill course and there maining 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/Professionalbodies 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. Acommittee 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 equivalentmarks/grades. Marks/grades shall be assigned to the studentsby 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 attend ancerequirements 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 assimilar to that of Theory course or practical course based on the nature of Skill oriented course.

(d) Massive Open Online Courses (MOOCs):

The student can pursue 40% of total credits in a semester through MOOCS approved by institution. A student shall register for the course (Minimum of 12weeks) 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 endexamination (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 maximumof 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 design ateafaculty member as a Mentor for each course to guide the students from registration till completion of the credit course.
- ❖ The institution shall ensuren ooverlap 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 reviewits credittransfer policy in the lightof periodic changes broughtby 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% weight age 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 ofthe semester the candidate shallsubmit an internship

Completion certificate and a project report. A student shallal so 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 show cased at the department for the 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 Departmentand approved by the Principal andshall 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 repeatand complete the internship.

13 . Guidelines for Minor

- To promote inter disciplinary knowledge among the students, the students admitted in to B.Tech. in a major stream / programme are eligible toobtain degree in Minor inanother 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 bewaived for students who haved one 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 for the 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 inMajor Discipline (i.e.,163credits).
- 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 maximumtwo subjects per semester pertainingto 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 similarto 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.

a. Enrolment into Honors:

Students of a Department/Discipline are eligible toopt 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.

b. 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 toregister 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 off line 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 upto 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 attendanc erequirement 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), thenthe total attendance ofthe 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 tolower 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 andcorresponding percentage of marks shall be followed:
After each course is evaluated for 100 marks, the marks obtained in each course will be convertedtoa corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in The subject fall	Grade		Gradepoints Assigned
90 & above	S	Superior	10
80–89	A	Excellent	9
70–79	B	VeryGood	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 notbe 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 numberof credits with the grade point scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

SGPA=Σ(Ci×Gi)/ΣCi

Where, Ci is the number of credits of the it subject and Gi is the grade pointscored by the student in the it 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 ofa program,i.e.,

CGPA=Σ(Ci×Si)/ΣCi

Where "Si" is the SGPA of theith 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 inwhich the studentis awarded Zerograde points will also be included.

GradePoint: It is a numerical weight allotted to each letter grade on a10-point scale.

LetterGrade: 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 assessmentand 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 anon fail grade for clearing that course.
- To become eligible for the award of degree a student must obtain a minimum CGPA of4.0

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.

23 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 work force
- ❖ **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 work force.
- ❖ **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.

24 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

25 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

26 Minimum Instruction Days:

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

27 Medium of Instruction:

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

28 Student Transfers:

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

29 Award of Degree

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

a. The student joining with Intermediat equalification 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.
b. 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 with in a period of eight academic years (excluding Gap year) from the year of admission, failing whichhe / she shall be declared ineligible to pursue B.Tech degree programme.
c. 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.
d. 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.
e. 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.
f. A student is required to complete the B.Tech Programme of study satisfying the attendance and academic/ credit requirements in allthe 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.
g. The student must have satisfied the minimum academic requirements in the respective branch of engineering in each semester.
h. Students must register for all the courses and earn the credits specified
i. 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.
j. The student shall successfully complete non credit courses and mandatory Courses.
k. The student shall have no dues to the institution, library, hostels etc
l. The student shall have no disciplinary action pending against him/her.
m. 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

30 With holding of Results

The result of a candidate shall be with held if:

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

31 Exam Hall Culture

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

32 Amendment of Regulations

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

33 Ragging

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

34 Rules of Discipline

a. Use of mobile phones with camera on the campusis strictly prohibited.
b. Students shall behave and conduct themselves in a dignified and courteous manner on the campus/Hostels.
c. Students shall not bring outsiders to the institution or hostels.
d. Students shall not steal, deface, damage or cause any loss to the institution property.
e. Students shall not collect money either by requestor coercion from others with in the campus or hostels.
f. Students shall not resort to plagiarism of any nature/extent. Use of material, ideas, figures, codeor data with out appropriate acknowledgement or permission of theoriginal source shall be treated as cases of plagiarism. Submission of material, verbatim or paraphrased, that is authored by another person or published earlier by one self shall also be considered as cases of plagiarism.
g. Use of vehicles by the students inside the campus is prohibited.
h. Any conduct which leads to lowering the esteem of the institution is prohibited.
i. Any student exhibiting prohibited behavior 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
j. DressCode

   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

35 General Instructions:

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

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

The Institution may change or amend the academic regulations or syllabiat 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.

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

Punishment for Mal practice Cases

S. No	Natureof Mal practice/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 th eexamination (theory or practical) in which he is appearing but has not made use of (material shall includeanymarks onthe body of the student which canbe usedas an aid in thecourseofthe 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% ofthesubjects. (Incase 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 orwrites 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, duringvaluation or during special scrutiny.	Cancellation of the performance in that course and all other courses the candidate has appeared including practical examinations and project work of that Semester / year examinations.
4.	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any other student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that course only of all the students involved. Incase 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) inwhichthestudentis appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year.
6.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including Practical examinations and project work of

		That semester / year
7.	Smuggles in the answer book or takes out or arranges to send out the question paper during the examination or answer book during or after the examination	Expulsion from the examination hall and cancellation of performance in that course and all the other courses including practical examinations and project work of that semester/year. The student is also debarred for two consecutive semesters from class work and all examinations. The continuation ofthe course by the studentissubject to the academic regulations in connection with For feature 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 outor instigates others to walk out, orthreatens the officer-incharge 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 hisrelations, orindulges in any other act of misconductor mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair meansor misconductor 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 againstthem.
9.	Leaves the examhall taking away answer scriptorintentionally tearsup the script or any part there of insideor out side 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 for feature of seat.
10.	Possesses any lethal weapon or fire arm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses including practical examinations and project work of that semester/year. The student is also Debarred and forfeits the seat.
11.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in S.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 cases hall 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 imposterisan outsider, hewillbe 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 regulationsin Connection with for feature of seat.
13.	If any malpractice is detected which is not covered in the above S.No.1toS.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.	

G. PULLAIAH COLLEGE OFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

ACADEMIC REGULATIONS (Scheme 2023) FORB.TECH. (LATERAL ENTRY SCHEME)

(Effective for the students admitted in to 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 securesall 123credits.

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 Honorsisoptional.
- ❖ Honors is to be completed simultaneously with B.Tech.programme.

2. Students, who faith fulfil the requirement for the award of the degree with in six consecutive cademic 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 subjector projectif 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 promotedfrom 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 studentmay 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 academicregulations in force atthe 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 OFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

PROGRAMME CURRICULUM STRUCTURE UNDER R23 REGULATIONS

B. TECH–COMPUTER SCIENCE AND 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

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

PROGRAMME CURRICULUM STRUCTURE UNDER R23 REGULATIONS

B. TECH–COMPUTER SCIENCE AND ENGINEERING

	I SEMESTER(IYEAR)									
S.NO	Course Codes	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40001	Communicative English	BS&H	2	0	0	2	30	70	100
2	A40004	Chemistry	BS&H	3	0	0	3	30	70	100
3	A40002	Linear Algebra & Calculus	BS&H	3	0	0	3	30	70	100
4	A40101	Basic Civil & Mechanical Engineering	ES	3	0	0	3	30	70	100
5	A40501	Introduction to Programming	ES	3	0	0	3	30	70	100
6	A40005	Communicative English Lab	BS&H	0	0	2	1	30	70	100
7	A40007	Chemistry Lab	BS&H	0	0	2	1	30	70	100
8	A40302	Engineering Workshop	ES	0	0	3	1.5	30	70	100
9	A40502	Computer Programming Lab	ES	0	0	3	1.5	30	70	100
10	A40012	Health and wellness, Yoga and Sports	BS&H	-	-	1	0.5	---	---	---
	TOTAL			14	00	11	19.5	270	630	900

	II SEMESTER (I YEAR)									
S.NO	Course Codes	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40003	Engineering Physics	BS&H	3	0	0	3	30	70	100
2	A40009	Differential Equations & Vector Calculus	BS&H	3	0	0	3	30	70	100
3	A40201	Basic Electrical & Electronics Engineering	ES	3	0	0	3	30	70	100
4	A40301	Engineering Graphics	ES	1	0	4	3	30	70	100
5	A40504	Data Structures	PC	3	0	0	3	30	70	100
6	A40503	IT Workshop	ES	0	0	2	1	30	70	100
7	A40006	Engineering Physics Lab	BS&H	0	0	2	1	30	70	100
8	A40202	Electrical Electronics Engineering Workshop	ES	0	0	3	1.5	30	70	100
9	A40505	Data Structures Lab	PC	0	0	3	1.5	30	70	100
10	A40011	NSS/NCC/Scouts & Guides/Community Ser	BS&H	-	-	1	0.5	---	---	---
	TOTAL			13	00	15	20.5	270	630	900

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	III SEMESTER (II YEAR)									
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40017	Discrete Mathematics & Graph Theory	BS	3	0	0	3	30	70	100
2	A40018	Universal Human Values– Understanding Harmony & Human Ethical Conduct	HSMC	2	1	0	3	30	70	100
3	A40406	Digital Logic & Computer Organization	ES	3	0	0	3	30	70	100
4	A40506	Advanced Data Structures & Algorithm Analysis	PC	3	0	0	3	30	70	100
5	A40507	Database Management Systems	PC	3	0	0	3	30	70	100
6	A40508	Advanced Data Structures and Algorithm AnalysisLab	PC	0	0	3	1.5	30	70	100
7	A40509	Database Management Systems Lab	PC	0	0	3	1.5	30	70	100
8	A40510	Python Programming	SEC	0	1	2	2	30	70	100
9	A40031	Environmental Science	MC	2	0	0	-	100*	-	100*
	TOTAL			16	02	8	20	240	560	800

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

	IV SEMESTER (II YEAR)									
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme ofExamination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40022	**Management Course-I** Managerial Economics and Financial Analysis	HSMC	2	0	0	2	30	70	100
2	A40020	Probability Statistics	BS	3	0	0	3	30	70	100
3	A40511	Operating Systems	PC	3	0	0	3	30	70	100
4	A40512	Object Oriented Programming Through Java	PC	3	0	0	3	30	70	100
5	A40513	Software Engineering	PC	3	0	0	3	30	70	100
6	A40514	Operating Systems Lab	PC	0	0	3	1.5	30	70	100
7	A40515	Object Oriented Programming Through Java Lab	PC	0	0	3	1.5	30	70	100
8	A40516	Full Stack Development–I	SEC	0	1	2	2	30	70	100
9	A40023	Design Thinking & Innovation	ES	1	0	2	2	30	70	100
	TOTAL			15	01	10	21	270	630	900
	Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation									

	V SEMESTER (III YEAR)									
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40517	Introduction to Artificial Intelligence	PC	3	0	0	3	30	70	100
2	A40518	ComputerNetworks	PC	3	0	0	3	30	70	100
3	A40519	Automata Theory and Compiler Design	PC	3	0	0	3	30	70	100
4	A40520a A40520b A40520c A40520d A40520e	**Professional Elective-I** Software Testing Methodologies Soft Computing Micro processors & Micro controllers Data Ware housing & Data Mining Privacy and security in online social media	PE	3	0	0	3	30	70	100
5		**Open Elective-I**	OE	3	0	0	3	30	70	100
6	A40521	Introduction to Artificial Intelligence Lab	PC	0	0	3	1.5	30	70	100
7	A40522	Computer Networks Lab	PC	0	0	3	1.5	30	70	100
8	A40523	Full Stack Development -II	SEC	0	1	2	2	30	70	100
9	A40032	Tinkering Lab	BS & H	0	0	2	1	30	70	100
10	A40524	Evaluation of Community Service Internship	PW	-	-	-	2	100	-	100
11	A40536	Introduction To Quantum Technologies and Applications	SEC	3	0	0	3	30	70	100
	TOTAL			18	01	10	26	400	700	1100

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

Open Elective – I

Course Code	Title of the Course	L-T-P	Credits	Offered by
A40171	Green Buildings	3-0-0	3	CE
A40172	Construction Technology and Management	3-0-0	3	CE
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
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 and AI	3-0-0	3	H&S
A40091	Entrepreneurship	3-0-0	3	H&S

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

		VI SEMESTER (III YEAR)								
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A43102	Introduction to Machine Learning	PC	3	0	0	3	30	70	100
2	A40525	CloudComputing	PC	3	0	0	3	30	70	100
3	A40526	Cryptography&NetworkSecurity	PC	3	0	0	3	30	70	100
4	A40527a A40527b A40527c A40527d A40527e A40527f	Professional Elective-II 1. Object Oriented System Development Using UML, Java And Patterns 2. Introduction to Cyber Security 3. DevOps 4. Embedded Systems Design 5. Human Computer Interaction 6. Social Networks	PE	3	0	0	3	30	70	100
5	A40528a A40528b A40528c A40528d	Professional Elective-III 1. Software Project Management 2. Mobile Adhoc Networks 3. Natural Language Processing 4. Distributed Operating System	PE	3	0	0	3	30	70	100
6		OpenElective–II	OE	3	0	0	3	30	70	100
7	A40529	Introduction to Machine Learning Lab	PC	0	0	3	1.5	30	70	100
8	A40530	Cryptography & Network Security Lab	PC	0	0	3	1.5	30	70	100
9	A40021	Soft skills ORIELTS	SEC	0	1	2	2	30	70	100
10	A40033	Technical Paper Writing & IPR	MC	2	0	0	-	100*	-	100*
		TOTAL		**20**	**01**	**08**	**23**	**270**	**630**	**900**
Mandatory Industry Internship of 08 weeks duration during summer vacation										

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

Open Elective–II

Course Code	Title of the Course	L-T-P	Credits	Offered by
A40173	Disaster Management	3-0-0	3	CE
A40174	Sustainability In Engineering Practices	3-0-0	3	CE
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
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
A40275	Non-conventional energy Resources	3-0-0	3	EEE

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		VII SEMESTER (IV YEAR)								
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme ofExamination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40531	Deep Learning	PC	3	0	0	3	30	70	100
2	A40034 A40035 A40036	**Management Course- II** 1. Business Ethics and Corporate Governance 2. E-Business 3. Management Science	HSMC	2	0	0	2	30	70	100
3	A40532a A40532b A40532c A40532d	**Professional Elective-IV** 1.Software Architecture & Design Patterns 2. Block chainTechnology 3. Augmented Reality & Virtual Reality 4. Internet of Things	PE	3	0	0	3	30	70	100
4	A40533a A40533b A40533c A40533d	**Professional Elective-V** 1. Agile methodologies 2. Metaverse 3. Computer Vision 4. Cyber Physical Systems	PE	3	0	0	3	30	70	100
5		**Open Elective-III**	OE	3	0	0	3	30	70	100
6		**Open Elective-IV**	OE	3	0	0	3	30	70	100
7	A43121	Prompt Engineering	SEC	0	1	2	2	30	70	100
8	A40037	Gender Sensitization	MC	2	0	0	-	100*	-	100*
9	A40534	Evaluation of Industry Internship	PW	-	-	-	2	100	-	100
		TOTAL		19	01	02	21	310	490	800

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

Open Elective – III

CourseCode	Title of the Course	L-T-P	Credits	Offered by
A40175	Building Materials and Services	3-0-0	3	CE
A40176	Environmental Impact Assessment	3-0-0	3	CE
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
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

CourseCode	Title of the Course	L-T-P	Credits	Offered by
A40177	Geo-Spatial Technologies	3-0-0	3	CE
A40178	Solid Waste Management	3-0-0	3	CE
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
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

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
A40535a	Internship	PW	-	-	-	4	100	-	100
A40535b	Project	PW	-	-	-	8	30	70	100
TOTAL			-	-	-	12	130	70	200

SEMESTER - I

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

	I SEMESTER(I YEAR)									
S.NO	Course Codes	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40001	Communicative English	BS&H	2	0	0	2	30	70	100
2	A40004	Chemistry	BS&H	3	0	0	3	30	70	100
3	A40002	Linear Algebra & Calculus	BS&H	3	0	0	3	30	70	100
4	A40101	Basic Civil & Mechanical Engineering	ES	3	0	0	3	30	70	100
5	A40501	Introduction to Programming	ES	3	0	0	3	30	70	100
6	A40005	Communicative English Lab	BS&H	0	0	2	1	30	70	100
7	A40007	Chemistry Lab	BS&H	0	0	2	1	30	70	100
8	A40302	Engineering Workshop	ES	0	0	3	1.5	30	70	100
9	A40502	Computer Programming Lab	ES	0	0	3	1.5	30	70	100
10	A40012	Health and wellness, Yoga and Sports	BS&H	-	-	1	0.5	---	---	---
	TOTAL			14	0	11	19.5	270	630	900

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

COURSE STRUCTURE
A40001-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

CourseDescription

Course Objectives:

The main objective of introducing this course, *Communicative English,* is to facilitate effective elistening, Reading, Speaking andWriting skillsamong thestudents. 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/corequisites:

The course has no specific pre/co-requisites

CourseOutcomes (COs)

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

- A40001.1 Remember the concepts which the student has learn to previously and identify connection
- A40001.2 Understand the structure of the sentence.
- A40001.3 Apply grammatically correct structures in oral and written communication.
- A40001.4 Analyze complex technical ideas with precision to interpret facts in a given text
- A40001.5 Write summaries and essays based on global comprehension of the texts.
- A40001.6 Write Official letters,Resume and E-mails.

UNIT I

Lesson:HUMAN VALUES: Gift of Magi **(ShortStory)**

- **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 one self, exchanging personal information, remembering childhood and asking about 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.NIT II**.**

UNIT II

Lesson:NATURE: The Brook by AlfredTennyson (Poem)

- **Listening:** Answering a series of questions about main ideas and supporting ideas after listen to a description of a transportation system.
- **Speaking:** Discussion in pairs/small groups on specific topics followed by short structure talks-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 link the 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:ElonMusk

- **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 at extin detail by making basic inferences -recognizing and interpreting specific 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 Intra personal 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 and usage (articles, prepositions, tenses, subject verb agreement)
- **Vocabulary:** Technical Jargons

Text books:

1. Path finder:Communicative English for Undergraduate Students, 1st Edition,Orient BlackSwan, 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, ShamJi & Co.English for Engineers,Vikas Publishers,2020
2. Bailey, Stephen. Academic writing: Handbook for International Students. Routledge, 2014.
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman.Word Power Made Easy- The Complete Handbook for Building aSuperior Vocabulary. Anchor, 2014.

Web Resources:

GRAMMAR:

www.bbc.co.uk/learningenglishhttps://dictionary.cambridge.org/grammar/british-grammar/www.eslpod.com/index.htmlhttps://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/videoshttps://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

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

A40005-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

CourseDescription

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 Out comes(COs)

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

- A40005.1: Understand the different aspects of the English language proficiency with emphasison LSRW skills.
- A40005.2: Apply communication skills through various language learning activities.
- A40005.3 : Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- A40005.4: Evaluate and exhibit professionalism in participating in debates and group discussions.
- A40005.5: 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 Film

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, (2ndEd),Kindle,2013

Web Resources:

SpokenEnglish:

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)

A40002-Linear Algebra and 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 isa branch of applied mathematics concerning mathematical methodsand 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 interdisciplinarysubject motivated by engineers needs both forpractical,theoretical and other considerations outside their specialization, and to deal with constraints to be effective in their work.

2. Course Outcomes (COs)

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

- A40002.1: Develop and use of matrix algebra techniques that are needed by engineers for practical applications.
- A40002.2: Utilize mean value theorem store all life problems.
- A40002.3: Familiarize with functions of several variables which useful optimization.
- A40002.4: Learn important tools of calculus in higher dimensions.
- A40002.5: 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

Matrices

Rank of a matrix by echelon form, normal form. Cuchy-Binet Formula (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

Eigen values, Eigen vectors and Orthogonal Transformation

Eigenvalues, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (withoutproof), finding inverse and power of a matrix by Cayley-Hamilt on Theorem,Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT III

Calculus

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 remainder (with out prof),problems and applications on the above theorems.

UNIT IV

Partial differentiation and Applications (Multi variable calculus)

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

UNITV

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).

Books and Materials

TextBook(s):

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

Reference Book(s):

1. Thomas Calculus, GeorgeB. Thomas, Maurice D.Weirand Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5thEdition.
4. Advanced Engineering Mathematics, Micheael Greenberg,, Pearson publishers, 9thedition
5. Higher Engineering Mathematics, H.KDas, Er.RajnishVerma, S.Chand Publications, 2014, Third Edition (Reprint 2021)

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

A40004-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

Course Description

To familiarize engineering chemistry and its applications To train the students on the principles and applications of electrochemistry and polymers.

To introduce instrumental methods, molecular machines and switches.

Course Pre/co-requisites

Bridge Course

Course Outcomes(COs)

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

- A40004.1: Compare the materials of construction for battery and electrochemical sensors.
- A40004.2: Explain the preparation, properties, and applications of thermoplastics & thermo setting & elastomers conducting polymers.
- A40004.3: Explain the principles of spectrometry, slcin separation of solid and liquid mixtures.
- A40004.4: Apply the principle of Band diagrams in the application of conductors and semi conductors.
- A40004.5: Summarize the concepts of Instrumental methods.

UNIT I

Structure and Bonding Models:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2, particle in onedimensional box,molecular orbital theory–bonding in homo-and heteronuclear diatomic molecules– energy level diagrams of O2 and CO, etc. π-molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II

Modern Engineering materials

Semiconductors–Introduction, basicconcept, application Super Conductors-Introduction basic concept, applications. Super capacitors: Introduction, Basic Concept – Classification – Application. Nano materials: Introduction, classification, properties and applications of Fullerenes, carbon nanotubes and Graphene's nanoparticles.

UNIT III

Electro chemistry and Applications

Electrochemical Cell, Nernst Equation, cell potential calculations and numerical problems, potentiometry-potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors –potentiometric sensors with examples, amperometry sensors with examples. Primary cells –Zinc-air battery, Secondary cells –lithium-ion batteries-working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cellworking of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

UNIT IV

Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation.

Plastics –Thermon and Thermosetting plastics, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibers.Elastomers–Buna-S, Buna-N–preparation, properties and applications. Conducting polymers– polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

UNIT V

Instrumental Methods and Applications

Electro magnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV- Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. Chromatography - BasicPrinciple, Classification - HPLC: Principle, Instrumentation and Applications.

Textbooks:

Jainand Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Reference Books:

Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007. J.D.Lee, ConciseInorganic Chemistry, 5thEdition, Wiley Publications, Feb.2008 Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition.

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

A40007-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

Verify the fundamental concepts with experiments

Course Pre/co-requisites

BridgeCourse

Course Out comes(COs)

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

- A40007.1: Determine the cell constant and conductance of solutions.
- A40007.2: Prepare advanced polymer Bakelite materials.
- A40007.3: Measure the strength of an acid present in secondary batteries.
- A40007.4: Analyze the IR spectra of some organiccompounds.
- A40007.5: Calculate strength of acid in Pb-Acid battery.

List of Experiments:

1. Measurement of 10Dq by spectrophotometric method
2. Conductometric titration of strongacid vs.strong base
3. Conductometric titration of weakacid vs.strong base
4. Determination of cell constant and conductance of solutions
5. Potentiometry-determination of redox potentials and emfs
6. Determination of Strength of an acid in Pb-Acidbattery
7. Preparation of a Bakelite
8. Verify Lambert-Beer'slaw
9. Wavelength measurement of sample through UV-Visible SpectroscopyIdentification of simple organic compounds by IR
10. Preparation of nanomaterials by precipitation method
11. Estimation of FerrousIron by Dichrometry

Reference:

Vogel's Quantitative Chemical Analysis 6th Edition 6thEdition"Pearson Publications by J.Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar

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

A40501-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 learningandteamworkincodingprojects

2. Course Outcomes:

A student after completion of the course will be able to:

- A40501.1: Understand basics of computers, the concept of algorithm and algorithmic thinking.
- A40501.2: Analyse a problem and develop an algorithm to solve it.
- A40501.3: Implement various algorithms using the C programming language
- A40501.4: Understand more advanced features of C language.
- A40501.5: Develop problem-solving skills and the ability to debugand 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, programcounter, Introduction to Programming Languages, Basics of a ComputerProgram-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 Datatypes

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

UNITV

Functions &File Handling Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and 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, ByronS Gottfried, McGraw-Hill Education,1996

5. ReferenceBooks:

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

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

A40502-COMPUTER PROGRAMMING LAB

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	1.5	30	70	100

1.Course Objectives:

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

2. Course Outcomes:

- **A40502.1:** Read, understand, and trace the execution of programs written in C language.
- **A40502.2**: Select the right control structure for solving the problem.
- **A40502.3**: Develop C programs which utilize memory efficiently using programming constructs like pointers.
- **A40502.4**: Develop, Debug and Execute programs to demonstrate the applications of arrays, functions, basic concepts of pointers in C.

Course Syllabus

UNIT III

WEEK 1

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

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

Lab1: Familiarization With Programming Environment

a) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
b) Exposure toTurbo C, gcc
c) Writing simple programs using print f(), 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 Flowcharts.

Lab1: Converting algorithms /flowcharts into C Source code.
Developing the algorithms/flow charts for the following sample programs

a) Sum and average of 3 numbers
b) Conversion of Fahren heitto Celsius and vice versa
c) 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:
Tutorial3: Variable types and type conversions:

Lab3: Simple computational problems using arithmetic expressions.
a) Finding the square root of a given number
b) Finding compound interest
c) Area of a triangle using heron's formula
d) Distance Travelled By An Object

UNIT II

WEEK 4
Objective: Explore the full scope of expressions, type-compatibility of variables & constant sand operators used in the expression and how operator precedence works.

Suggested Experiments/Activities:
Tutorial 4: Operators and the precedence and as associativity:

Lab4: Simple computational problems using the operator' precedence and associativity
a) Evaluate the following expressions.
    - A+B*C+(D*E)+F*G
    - A/B*C-B+A*D/3
    - A+++B---A
    - J=(i++)+(++i)
b) Find the maximum of three numbers using conditional operator
c) 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:

Lab5: Problems involving if-then-else structures.
a) Write a C program to find the max and min off our numbers using if-else.
b) Write a C program to generate electricity bill.
c) Find the roots of the quadratic equation.
d) Write a C program to simulate a calculator using switch case.
e) 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 each of 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
a) Find The Factorial Of Given Number Using any loop.
b) Find The Given Number Is A Prime Or Not.
c) Compute Sine And Cos Series
d) Checking Number Palindrome
e) Construct a pyramid of numbers.

UNIT III

WEEK 7:
Objective: Explore the fullscope of Arrays construct namely defining and initializing 1-D and 2-D andmore generically n-D arrays and referencing individual array elements from the defined array. Usinginteger 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:
Tutorial 7: 1D Arrays: searching.

Lab7: 1D Array manipulation, linear search
a) Find the min and max of a 1-D integer array.
b) Perform linear search on 1D array.
c) The reverse of a 1D integer array
d) Find 2's Complement Of The Given Binary Number.
e) Eliminate Duplicate Elements In An Array.

WEEK8:
Objective: Explore the difference between other array and character arrays that can be used a 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:
Tutorial8: 2d Arrays, sorting Strings.

Lab8: Matrix Problems, String Operations, Bubble Sort
a) Addition Of Two Matrices
b) Multiplication Two Matrices
c) Sort Array Elements Using Bubble Sort
d) Concatenate Two Strings Without Built-in functions
e) 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 deallocation using malloc (), calloc (), realloc () and free () functions. Gain experience 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.

a) Write a C program to find the sum of a 1array using malloc
b) Write a C program to find the total, average students using structures
c) Entern students data using calloc()and display failed students list
d) Read student name and marks from the command line and display the student details along with the total.
e) 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:
Tutorial10: Bit fields, Self-Referential Structures, Linked lists.

Lab10: Bitfields, linked lists:
Read and print date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields

a) Create and display a singly linked list using self-referential structure.
b) Demonstrate the differences between structures and unions using a C program.
c) Write a C program to shift/rotate using bit fields.
d) 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 Euler's theorem.

a) Write a C function to calculate NCR value.
b) Write a C function to find the length of a string.
c) Write a C function transpose of a matrix.
d) Write a C function to demonstrate numerical integration of differential equations using Euler's method.

WEEK 12:
Objective: Explore how recursive 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

Lab12: Recursive functions
a) Write a recursive function to generate Fibonacci series.
b) Write a recursive function to find the lcm of two numbers.
c) Write a recursive function to find the factorial of a number.
d) Write a C Program to implement Ackermann function using recursion.
e) 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:
Tutorial13: Call by reference, dangling pointers

Lab13: Simple functions using Call by reference, Dangling pointers.
a) Write a C program to swap two numbers using call by reference.
b) Demonstrate Dangling pointer problem using a program.
c) Write a C program copies one string into another using a pointer.
d) Write a C program to find no of lowercase, uppercase, digits and other characters using pointers.

WEEK 14:
Objective: To understand data files and file handling with various file I /O functions.Explore the differences between text and binary files.

Suggested Experiments/Activities:
Tutorial 14: File handling

Lab 14: File operations

a) Write a C program to write and read text into a file.
b) Write a C program to write and read text into a binary file using fread() and fwrite()
c) Copy the contents of one file to another file.
d) Write a C program to merge two files into the third file using command- line arguments.
e) Find no. of lines, words and characters in a file
f) Write a C program to print last n characters of a given file.

I. Text books:
- Ajay Mittal, Programming in C:A Practical Approach,Pearson.
- ByronGottfried, Schaum ' Outline of Programming with C, McGrawHill

II. Reference Books:
- BrianW. Kernighan and DennisM. Ritchie, TheC Programming Language, Prentice- Hall of India
- CProgramming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40302-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:

- A40302.1: Identify workshop tools and their operational capabilities.
- A40302.2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
- A40302.3: Apply fitting operations in various applications.
- A40302.4: 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 tyr
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) Go down lighting d)Tubelight e)Three Phase Motor)Soldering Wire.
6. **Foundry Trade:** Demonstration And practice of Moulding tools and processes, Preparation Of Green Sand Moulds for given Patterns.
7. **Welding Shop:** Demonstration and practice on Arc Welding and Gaswelding. Preparation of Lap joint and Butt joint.
8. **Plumbing:** Demonstration Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.

4.Laboratory Equipment/Software/Tools Required:

1. Fitting Bench Vise
2. Hacksaw Frame
3. Carpentry Bench Vise
4. Jack Plane
5. Snip Tool
6. Nose player
7. Cope Drag
8. Sprue
9. Welding Machine
10. House wiring setup
11. Plumbing Setup

5. Books and Materials:

Text Book(s) :

Basic Work shop Technology: Manufacturing Process, FelixW.; Independently Published, 2019. Workshop Processes, Practices and Materials; BruceJ. Black, Routledge publishers, 5thEdn.2015.
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 byS. 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.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40101-PARTA: 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:

- Get familiarized with the scope and importance of Civil Engineering subdivisions.
- Introduce The preliminary concepts of surveying.
- Acquire preliminary knowledge on Transportation and its importance in the 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 Description:

After Completion The Course, the learner will be able to:

- A40101.1: Understand various subdivisions of Civil Engineering and to appreciate their role in ensuring better society.
- A40101.2: Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.
- A40101.3: Realize the importance of Transportation in the nation's economy and the engineering measures related to Transportation.
- A40101.4: Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.
- A40101.5: Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT I

Basics of Civil Engineering: Role of Civil Engineers inSociety- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering - Hydraulics and Water ResourcesEngineering -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.

WaterResources 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).

Text books:

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, Nem chand and Brothers Publications 2019. 10th Edition.
5. IndianStandard DRINKINGWATER—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:

- A40101.1: Understand The Different Manufacturing Processes.
- A40101.2: Explain The Basics Of Thermal Engineering And Its applications.
- A40101.3: Describe the working of different mechanical power transmission systems and power plants.
- A40101.4: 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/CIEngines, 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)

Text books:

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

Reference Books:

1. AppuKuttan, Robotics, I.K. International Publishing House Pvt.Ltd.Volume-I
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, PulakM Pandey, Springer publications
3. Thermal Engineering by Mahesh M Rathore Tata McGrawHill 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.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40012 - 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
-	-	1	0	0	16	0.5	-	-	100

1.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

2. Course Out comes(COs)

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

- A40012.1: Understand the importance of yoga and sports for Physical fitness and sound health.
- A40012.2:Demonstrate an understanding of health-related fitness components.
- A40012.3: Compare and contrast various activities that help enhance their health.
- A40012.4: Assess current personal fitness levels.
- A40012.5: 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:

a) Organizing Health Awareness Programmes In Community.
b) Preparation Of Health Profile.
c) Preparation Of Chart For balanced 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 Common wealth games.

Activities:

a) 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.

b) Practicing cardio respiratory fitness, treadmill, run test, 9 minwalk, 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 ThomasHanlon.--3rded.Human Kinetics, Inc.2014

General Guidelines:

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

SEMESTER - II

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

	II SEMESTER (I YEAR)									
S.NO	Course Codes	Title of the Course	Category	Periods per Week			Credits	Sheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40003	Engineering Physics	BS&H	3	0	0	3	30	70	100
2	A40009	Differential Equations & Vector Calculus	BS&H	3	0	0	3	30	70	100
3	A40201	Basic Electrical & Electronics Engineering	ES	3	0	0	3	30	70	100
4	A40301	Engineering Graphics	ES	1	0	4	3	30	70	100
5	A40504	Data Structures	PC	3	0	0	3	30	70	100
6	A40503	IT Workshop	ES	0	0	2	1	30	70	100
7	A40006	Engineering Physics Lab	BS&H	0	0	2	1	30	70	100
8	A40202	Electrical Electronics Engineering Workshop	ES	0	0	3	1.5	30	70	100
9	A40505	Data Structures Lab	PC	0	0	3	1.5	30	70	100
10	A40011	NSS/NCC/Scouts & Guides/Community Service	BS&H	.	.	1	0.5	---	---	---
			TOTAL	13	00	15	20.5	270	630	900

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40003 - 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

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 Out comes (COs)

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

- A40003.1: Interpret the properties of light waves and its interaction of energy with the matter.
- A40003.2: Apply the concepts of crystallography for the determination of crystal structures.
- A40003.3: Identify the suitable dielectric and magnetic material for Engineering.
- A40003.4: Apply the fundamentals of Quantum Mechanics to one dimensional motion ofparticles.
- A40003.5: Determine the type of semiconductor.
- A40003.6: Interpret the difference normal conductor and Superconductor

3. Course Syllabus

UNIT-I

Wave Optics Interference: Introduction-Principle of superposition –Interference of light-Interference 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

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

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 polarization (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

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

Semi conductors & Super conductors

Semi conductors: Formation of energy bands – classification of crystalline solids – Intrinsic semi conductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic Semi conductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature-Drift and diffusion currents –Einstein's equation –Halleffectandits applications.

Superconductors: Super conductors-Properties-Meissner effect-BCS Theory-AC & DC Josephson Effect-Types of Superconductors-High T superconductors- Applications

Books and Materials

Text Book(s):

1. P.K.Palani swamy, "Engineering Physics" Scitech Publications, 2011.
2. B.K.Pandey and S.Chaturvedi, "Engineering Physics", C engage Learning, 2012.
3. K.Thyagarajan, "Applied Physics", Mcgraw Hill Education (India) Private Limited, 2020.

Reference Book(s):

1. Satendra Sharma, Jyotsna Sharma, "Engineering Physics" Pearson Education, 2018.
2. M.N. Avadhanulu, P.G.Kshirsagar TVS Arun Murthy "A Textbook of Engineering Physics"- S.Chand Publications, 11th Edition 2019.

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

A40006 - 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:

- A40006.1: Operate optical instruments like Travelling microscope and spectrometer
- A40006.2: Understand the concepts of interference by finding thickness of paper, radius of curvature of Newton's rings
- A40006.3: Interpret the concept of diffraction by the determination of wavelength of different colors of white light and dispersive power of grating
- A40006.4: Plot the intensity of the magnetic field of circular coil carrying current with varying distance and B-H curve
- A40006.5: Evaluate the accept angle of an optical fiber and numerical aperture
- A40006.6: Determine the resistivity of the given semiconductor using four probe method, the bandgap 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 Curvature of the lens by Newton's ring method.
3. Determination of wave lengths 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 lines of Circular coil carrying current
7. Study the variation of B versus H by magnetizing the magnetic material (B-Hcurve)
8. Determination Of Energy gap of a semiconductor in gp-junction diode.
9. Determination of temperature coefficients of at her mistor.

10. LASER: Determination of wave length 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 for ky Melde's experiment.
15. Determination of Numerical Aperture and Acceptance angle of an optical fiber.

Laboratory Equipment/Software/Tools Required

- Spectrometer
- Travelling Microscope
- Stewart-Gee's Apparatus
- Singleslit
- Melde's Apparatus
- B-H Curve
- Torsional pendulum
- Sonometer
- Energy gap kit
- Thermistor

Books and Materials Text

Book(s):

S.Bala subramanian, M.N.Srinivas "*ATextbook Practical Physics*" -S.Chand Publishers, 2017

Reference Book(s)

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

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

A40301 – 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:

- A40301.1: Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
- A40301.2: Draw and interpret orthographic projections of points, lines, planes and solids in front ,top and side views.
- A40301.3: Understand and draw projection of solids invarious positions in first quadrant.
- A40301.4: Explain principles behind development of surfaces.
- A40301.5: Prepare isometric and perspective sections of simple solids.

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 & 3Ddrawings of objects including PCB and Transformations using Auto CAD (Not for end examination).

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.Shahand B.C.Rana, Pearson Education Inc, 2009.
3. Engineering Drawing with an Introduction to Auto CAD, Dhananjay Jolhe, Tata McGrawHill,201

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40201-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	42	0	0	3	30	70	100

1. CourseDescription

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:

- A40201.1: Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.
- A40201.2: 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.
- A40201.3: 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.
- A40201.4: Analyse different electrical circuits, performance of machines and measuring instruments.
- A40201.5: Evaluate different circuit configurations, Machine performance and Power systems operation.

3. Course Syllabus

UNIT I

DC & AC Circuits

DC Circuits: Electrical circuit elements (R,LandC), Ohm'sLaw 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, RMSvalue, formfactor, peakfactor, 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

Machine 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,FirstEdition
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, McGrawHill, 2019, Fourth Edition
2. Principles of Power Systems, V.K.Mehtha, S.Ch and Technical Publishers, 2020
3. Basic Electrical Engineering, T.K.Nagsarkar and M.S.Sukhija, Oxford University Press, 2017
4. Basic Electrical and ElectSonics Engineering, S. K. Bhatacharya, Person Publications, 2018, SecondEdition.

Web Resources:

1. https://nptel.ac.in/courses/1081050532.https://nptel.ac.in/courses/108108076

PART B: BASIC ELECTRONICS ENGINEERING

1. Course Description

Course Overview

This course overs 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 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.

1. Course Syllabus

UNIT I

SEMI CONDUCTOR DEVICES

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

UNIT II

BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION

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.

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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, Flipflops, Registers and counters (Elementary Treatment only)

1. Books and Materials

Text books:

1. R.L.Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education,2021.
2. R.P. Jain,Modern Digital Electronics,4thEdition,TataMcGrawHill,2009

Reference Books:

1. R.S.Sedha, A Text book of Electronic Devices and Circuits, S.Chand &Co, 2010.
2. SantiramKal, 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.

A40202 - 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	42	0	0	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 Machine 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/corequisites.

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:

- A40202.1: Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.
- A40202.2: 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.
- A40202.3: Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.
- A40202.4: Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.
- A40202.5: 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, desoldering pump etc.

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

3. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
4. Provide some exercises so that measuring instrument sare learned to be used by the students.
5. Components: Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
6. 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 Wheats tone Bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power Factor using Single-phase watt meter
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, Multimeters, DC Ammeters, DCVoltmeters, AC Voltmeters, CROs, all the required active devices.

References:

1. R.L.Boylestad & Louis Nashlesky, ElectronicDevices & CircuitTheory, Pearson Education,2021.
2. R.P.Jain, Modern Digital Electronics, 4thEdition, Tata McGrawHill, 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.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40504-DATA STRUCTURES

(COMMON TO CSE & CAI)

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 provide the knowledge of basic data structures and their implementations.
- To understand importance of data structures in context of writing efficient programs.
- To develop skills to apply appropriate data structures in problem solving.

2. Course Outcomes:

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

- A40504.1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
- A40504.2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
- A40504.3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
- A40504.4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges.
- A40504.5: Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.
- A40504.6: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

3. Course Syllabus

UNIT I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques: Bubble sort, Selection sort, Insertion Sort

UNIT II

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

UNIT IV

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

UNIT V

Trees: Introduction to Trees, Binary SearchTree–Insertion, Deletion & Traversal

Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.

Text books:

1. Data Structures and algorithm analysis in C,Mark Allen Weiss, Pearson, 2nd Edition
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by KurtMehlhorn and Peter Sanders
2. C Data Structures and Algorithms byAlfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures"byBradMiller andDavid Ranum
4. Introduction to Algorithms by ThomasH.Cormen, CharlesE.Leiserson, RonaldL. Rivest, and Clifford Stein
5. Algorithms in C,Parts 1-5(Bundle): Fundamentals,DataStructures,Sorting, Searching,and Graph Algorithms" by Robert Sedgewick

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A40504 - DATA STRUCTURES LAB

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

1. Course Objectives:

The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures.

2. Course Outcomes:

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

- A40504.1: Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
- A40504.2: Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
- A40504.3: Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
- A40504.4: Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.
- A40504.5: Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

3.Course Syllabus

List of Experiments:

Exercise 1: Array Manipulation

a. Write A Program To Reverse An Array.
b. C Programs to implement the Searching Techniques–Linear & Binary Search
c. C Programs to implement Sorting Techniques–Bubble,Selection and Insertion Sort

Exercise 2: Linked List Implementation

a. Implement a singly linked list and perform insertion a deletion operations.
b. Develop a program to reverse a linked list iteratively and recursively.
c. Solve problems involving linked list traversal and manipulation.

Exercise 3: Linked List Applications

a. Create a program to detect and remove duplicates from a linked list.
b. Implement a linked list to represent polynomials and perform addition. Implement a double-ended queue (deque) with essential operations.

Exercise 4: Double Linked List Implementation

a. Implement a doubly linked list and perform various operations to understand its properties and applications.
b. Implement a circular linked list and perform insertion, deletion,and traversal.

Exercise 5: Stack Operations

a. Implement a stack using arrays and linked lists.
b. Write a program to evaluate a postfix expression using a stack.
c. Implement a program to check for balanced parentheses using a stack.

Exercise 6: Queue Operations

a. Implement a queue using arrays and linked lists.
b. Develop A Program To Simulate A Simple Printer Queue System.
c. Solve problems involving circular queues.

Exercise 7: Stack and Queue Applications

a. Use a stack to evaluate an in fix expression and convert it to postfix.
b. Create a program to determine whether a given string is a palindrome or not.
c. Implement a stack or queue to perform comparison and check for symmetry.

Exercise 8: Binary SearchTree

a. Implementing a BSTusing Linked List.
b. Traversing of BST.

Exercise 9: Hashing

a. Implement a hash table with collision resolution techniques.
b. Write A Program To Implement A Simple Cache Using Hashing.

3. Text books:

a. Data Structures and algorithm analysis in C,MarkAllen Weiss, Pearson, 2nd Edition.
b. Fundamentals of data structures inC, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures:The Basic Toolbox by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms byAlfred V. Aho, Jeffrey D. Ullman, and John E. Hopcroft
3. Problem Solving with Algorithms and Data Structures"byBradMiller and David Ranum
4. Introduction to Algorithms by Thomas H.Cormen, Charles E.Leiserson, RonaldL. Rivest, and Clifford Stein
5. Algorithms in C,Parts 1-5 (Bundle): Fundamentals,DataStructures,Sorting, Searching,and Graph Algorithms by Robert Sedgewick.

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40009-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

Engineering Mathematics is a branch of applied mathematicsconcerning 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:

- A40009.1: Solve the differential equations related to various engineering fields.
- A40009.2: Identify solution methods for partial differential equations that model physical processes.
- A40009.3: Interpret the physical meaning of different operators such as gradient, curl and divergence.
- A40009.4: 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, complementary 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 identities.

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.

Text books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna Publishers,2017, 44thEdition
2. Advanced Engineering Mathematics, ErwinKreyszig, JohnWiley & Sons, 2018, 10th Edition.

Reference Books:

1. Thomas Calculus, GeorgeB. Thomas, Maurice D.Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, DennisG. Zill andWarrenS. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering MathematicsGlynJames, Pearsonpublishers, 2018, 5thEdition.
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.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40011-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
-	-	1	0	0	16	0.5	-	-	100

1.Course Description

Course Overview

The objective of introducing this course is to impart discipline, character, fraternity, team work, 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:

- A40011.1: Understand the importance of discipline, character and service motto.
- A40011.2: Solve some societal issues by applying acquired knowledge, facts, and techniques. A40011.3: Explore human relationships by analyzing social problems.
- A40011.4: Determined to extend their help for the fellow beings and down trodden people. A40011.5: Develop leadership skills and civic responsibilities..

1. Course Syllabus

UNIT I

Orientation

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

Activities:

a. Conducting–ice breaking sessions-expectations from course-knowingpersonal talents and skills
b. Conducting orientation programs for the students –future plans- activities -releasing road map etc.
c. Displaying success stories -motivational biopics -award winning movies on societal issues etc.
d. Conducting talent show in singing patriotic songs-paintings-any other contribution.

UNIT II

Nature & Care Activities:

a. Be stout of waste competition.
b. Poster and signs making competition to spread environmental awareness.
c. Recycling and environmental pollution article writing competition. Organising Zero-waste day.
d. Digital Environmental awareness activity via various social media platforms.
e. Virtual Demonstration Of Different Eco-friendly approaches for sustainable living.
f. Write a summary on any book related to environmental issues.

UNIT II

Community Service Activities:

a. Conducting One Day Special Camp in a village contacting village-are a leaders- Survey in the village, identification of problems- helping them to solve via media- authorities-experts-etc.
b. Conducting awareness programs on Health -related issues such as General Health,Mental health, Spiritual Health, HIV/AIDS,
c. Conducting consumer Awareness. Explaining various legal provisions etc.
d. Women Empowerment Programmes- Sexual Abuse, Adolescent Health and Population Education.
e. Any other programmes in collaboration with local charities, NGOsetc.

Reference Books:

a. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme
b. Vol;.I, Vidya Kutir Publication,2021(ISBN 978-81-952368-8-6)
c. RedBook-NationalCadetCorps–StandingInstructionsVolI&II, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
d. DavisM.L. and Corn well D.A. , “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
e. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007
f. Ram Ahuja. Social Problems inIndia, Rawat Publications, NewDelhi.

General Guidelines:

1. Institutes must assigns lots in the Time table 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, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40503-IT WORK SHOP

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	40	60	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, Multi media and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

Course Outcomes:

- A40503.1: Perform Hardware trouble shooting.
- A40503.2: Understand Hardware components and inter dependencies.
- A40503.3: Safeguard computer systems from viruses/worms.
- A40503..4: Document/ Presentation preparation.
- A40503..5: Perform calculations using spreadsheets

PC Hardware

- **Task1:** 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.
- **Task3:** Every student should individually install MSwindows on the personal computer .Lab instructors should verify the installation and follow it up with a Viva.
- **Task4:** 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.
- **Task2:** Web Browsers, Surfing the Web: Students customize their web browsers with the LANproxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.
- **Task3:** Search Engines & Netiquette: Students should know what search engines are and how to use these archengines. 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 popups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

- **Task1:**Word Orientation:The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeXand MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word –Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.
- **Task 2:** Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Capin word, Applying Text effects,Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.
- **Task 3:** Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, ChangingText Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.
- **Task4:** Creating a News letter:Features to be covered:-Table of Content,News paper 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,Usinghelp and resources

- **Task1:**Creating a Scheduler-Features to be covered: Gridlines, FormatCells, Summation, auto fill, Formatting Text
- **Task2:**Calculating GPA - .Features to be covered:-Cell Referencing, Formulae in excel – average, std.deviation, Charts, Renaming and Inserting worksheets, Hyperlinking, Count function,

LOOKUP/VLOOKUP

Task1: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting

Powerpoint

- **Task1:** Students will be working on basic powerpoint 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 andArrows in PowerPoint.
- **Task2:** Interactive presentations Hyperlinks, Inserting Images, ClipArt, Audio, Video, Objects, Tables and Charts.

- **Task3:** Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting–Background, textures, DesignTemplates, Hidden slides.

AI Tools–Chat GPT

- **Task1:** Prompt Engineering: Experiment with different types of prompts to see how the model responds.Try asking questions, starting conversations, or even providing in complete 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"
- **Task4:** 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?'"
- **Task5:** Summarization: Provide along 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.Askit 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 InformationTechnology course toolk it Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Chery lASchmidt, WILEY Dream tech
3. Introduction to Information Technology, ITL Education Solutions limited,Pearson Education.
4. PC Hardware-AHandbook–KateJ.Chase PHI(Microsoft)
5. LaTeX Companion–Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

SEMESTER - III

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

PROGRAMME CURRICULUM STRUCTURE UNDER R23 REGULATIONS

B.TECH–COMPUTER SCIENCE AND ENGINEERING

	III SEMESTER (II YEAR)									
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40017	Discrete Mathematics & Graph Theory	BS	3	0	0	3	30	70	100
2	A40018	Universal Human Values–Understanding Harmony & Human Ethical Conduct	HSMC	2	1	0	3	30	70	100
3	A40406	Digital Logic & Computer Organization	ES	3	0	0	3	30	70	100
4	A40506	Advanced Data Structures & Algorithm Analysis	PC	3	0	0	3	30	70	100
5	A40507	Database Management Systems	PC	3	0	0	3	30	70	100
6	A40508	Advanced Data Structures and Algorithm Analysis Lab	PC	0	0	3	1.5	30	70	100
7	A40509	Database Management Systems Lab	PC	0	0	3	1.5	30	70	100
8	A40510	Python Programming	SEC	0	1	2	2	30	70	100
9	A40031	Environmental Science	MC	2	0	0	0	100*	-	100*
	TOTAL			16	02	08	20	240	560	800

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

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40017–DISCRETE MATHEMATICS & GRAPH THEORY

Hours Per 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

This course introduces the fundamental concepts of discrete mathematics and graph theory that are essential for computer science, engineering, and mathematical problem-solving. Students will explore topics in logic, set theory, combinatorics, relations, functions, and algebraic structures, with an emphasis on rigorous reasoning and practical applications. The graph theory portion focuses on the study of graphs and networks, including modeling, traversal algorithms, connectivity, trees, and optimization problems. Through a combination of theoretical foundations and real-world examples, the course builds critical skills in mathematical thinking, problem formulation, and algorithmic analysis.

2. Course Pre/corequisite

- Mathematics
- Programming Fundamentals
- Data Structures

3. Course Outcomes:

After successful completion of this course, the students should be able to:

COs	Statements	Blooms level
CO1	Apply mathematical logic to solve problems.	L2, L3
CO2	Understand the concepts and perform the operations related to sets, lations and functions. Gain the conceptual background needed and identify structures of algebraic nature.	L3, L5
CO3	Apply basic counting techniques to solve combinatorial problems.	L3
CO4	Formulate problems and solve recurrence relations.	L2, L3
CO5	Apply Graph Theory in solving computer science problems	L3, L5

UNIT I Mathematical Logic

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.

UNIT II Set theory

The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

UNIT III Elementary Combinatorics

Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

UNITIV: Recurrence Relations

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations.

UNIT V Graphs

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.

Textbooks:

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill, 2002.
2. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.

Reference Books:

1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science

Online Learning Resources:

1. http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

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
2	1	0	42	0	0	3	30	70	100

1. Course Description

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 HumanValues 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 behaviour and mutually enriching interaction with Nature.

2. Course Pre/corequisite

The course has nospecific prerequisite and co-requisite

3.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.
- A40018.5Justifytheneedforuniversal human values and harmonious existence.

4.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 asCo- existence at All Levels, The Holistic Perception of Harmony in Existence.

UNIT V

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

5. Books and References

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
- RRGaur, RAsthana,GPBagaria,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

- JeevanVidya: EkParichaya, ANagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- Human Values, A.N.Tripathi, NewAgeIntl. Publishers, NewDelhi, 2004.
- The Story of Stuff (Book).
- TheStory of My Experiments with Truth –by Mohandas Karamchand Gandhi
- Smallis Beautiful -E.FSchumacher.
- Slow is Beautiful-Cecile Andrews
- Economy of Permanence-JC Kumarappa
- Bharat Mein Angreji Raj–Pandit Sunderlal
- Rediscovering India-by Dharampal
- Hind Swaraj or Indian Home Rule-by Mohandas K. Gandhi
- India Wins Freedom-Maulana Abdul Kalam Azad
- Vivekananda-Romain Rolland (English)
- Gandhi-Romain Rolland (English)

Online Resources:

1. https://fdp-si.aicte-india.org/UHV II%20Class%20Notes%20&%20 Handouts/ UHV%20 Handout %201- Introduction%20to%20Value%20Education.pdf
2. https://fdp-si.aicte-india.org/UHV -II%20 Class%20 Notes %20&%20 Handouts/ UHV%20 Hand out% 202-Harmony%20in%20the%20Human%20Being.pdf
3. https://fdp-si.aicte-india.org/UHV-II%20Class%20 Notes%20&%20Handouts/ UHV%20 Handout % 203-Harmony%20in%20the%20Family.pdf
4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20 Respect% 20July %2023.pdf
5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes% 20&%20Handouts /UHV%20 Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf
6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20 UHV%20 Teaching%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%20 Ethics%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/62490385https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

A40506–Digital Logic & Computer Organization

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	40	70	100

1. Course Description

The course provides students with a comprehensive understanding of digital logic design principles and computer organization fundamentals. Describe memory hierarchy concepts. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

2. Course Outcomes (COs)

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

- A40506.1: Differentiate between combinational and sequential circuits based on their characteristics and functionalities. (L2)
- A40506.2: Demonstrate an understanding of computer functional units.(L2)
- analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems.(L3)
- A40506.3: Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage,and evaluate their impact on system performance and scalability.(L3)
- A40506.4: Explain input/output(I/O) systems and their interaction with the CPU,memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques. (L3)

Course Syllabus

UNIT I

Data Representation: Binary Numbers, Fixed Point Representation.Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

Digital Logic Circuits-I: BasicLogicFunctions, Logicgates, universal logicgates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

UNIT–II

Digital Logic Circuits-II: Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations,Von-Neumann Architecture

UNIT–III

Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

UNIT–IV

The Memory Organization: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

UNIT–V

Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

3. Text Books and References

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, SafwatZaky, 6th edition, McGraw Hill
2. Digital Design, 6thEdition, M.Morris Mano, Pearson Education.

Reference Books:

1. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson.
2. Computer Systems Architecture, M.Moris Mano, 3rdEdition, Pearson
3. Computer Organization and Design, David A.Paterson, JohnL. Hennessy, Elsevier
4. Fundamentals of Logic Design,Roth, 5thEdition, Thomson

Online Learning Resources:

1. https://nptel.ac.in/courses/106/103/106103068/

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40506–Advanced Data Structures & Algorithm 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

This course provides an in-depth understanding of algorithm analysis, essential data structures, and advanced problem-solving techniques. The course begins with foundational concepts in algorithm analysis, focusing on space and time complexity and asymptotic notations. It progresses to explore various advanced data structures such as AVL trees, B-trees, and heap trees, along with their operations and applications. The course delves into graph theory, discussing terminology, representations, and essential algorithms for graph traversal and connectivity. Additionally, it covers fundamental algorithm design paradigms such as divide and conquer, the greedy method, dynamic programming, backtracking, and branch and bound, applying these techniques to classic problems like sorting, shortest paths, and the knapsack problem.

2.Course Outcomes(COs)

After completion of the course, students will be able to

A40506.1: Illustrate the working of the advanced tree data structures and their applications(L2)

A40506.2: Understand the Graph data structure, traversals and apply them in various contexts. (L2)

A40506.3: Use various data structures in the design of algorithms (L3)

A40506.4: Recommend appropriate data structures based on the problem being solved(L5)

A40506.5: Analyze algorithm with respect to space and time complexities(L4)

3.Course Syllabus

UNIT I

Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations. AVL Trees – Creation, Insertion, Deletion operations and Applications B-Trees–Creation, Insertion, Deletion operations and Applications.

UNIT–II

Heap Trees (Priority Queues)–Min and Max Heaps,Operations and Applications **Graphs** – Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications **Divide and Conquer:** The General Method, QuickSort, MergeSort, Strassen's matrix multiplication, Convex Hull

UNIT–III

Greedy Method: General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths.

Dynamic Programming: General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

UNIT–IV

Back tracking: General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

Branch and Bound: The General Method, 0/1 Knapsack Problem, Travelling Sales person problem

UNIT–V

NP Hard and NP Complete Problems: Basic Concepts, Cook's theorem

NP Hard Graph Problems: Clique Decision Problem(CDP), Chromatic Number Decision Problem (CNDP), Travelling Salesperson Decision Problem (TSP)

NP Hard Scheduling Problems: Scheduling Identical Processors, Job Shop Scheduling

Text books:

1. Fundamentals of Data Structures in C++, Horowitz , Ellis; Sahni, Sartaj; Mehta, Dinesh, 2nd Edition Universities Press
2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press

Reference Books:

1. Data Structures and program design in C,Robert Kruse, Pearson Education Asia
2. An introduction to Data Structures with applications,Trembley & Sorenson, McGrawHill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms, Donald E Knuth, Addison- Wesley,1997.
4. Data Structures using C & C++:Langsam, Augenstein & Tanenbaum, Pearson,1995
5. Algorithms + DataStructures & Programs:,N.Wirth,PHI
6. Fundamentals of DataStructures in C++: Horowitz Sahni & Mehta, Galgottia Pub.
7. Data structures in Java:, Thomas Standish, Pearson Education Asia

Online Learning Resources:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html
https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40507–Database Management Systems

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

1. Course Description:

This course provides a comprehensive understanding of database concepts, architectures, and applications. It starts with foundational knowledge about database systems, highlighting their characteristics, advantages, and differences from traditional file systems. The course covers various data models with a particular focus on the Entity-Relationship (ER) model and relational model, including essential concepts like schemas, instances, and three-tier architecture. Students will learn SQL for database manipulation and querying, and delve into schema refinement through normalization techniques.

2. Course Outcomes:

After completion of the course, students will be able to

- A40507.1:Understand the basic concepts of database management systems (L2)
- A40507.2:Analyze a given database application scenario to use ER model for conceptual design of the database (L4)
- A40507.3: Utilize SQL proficiently to address diverse query challenges (L3).
- A40507.4Employ normalization methods to enhance database structure (L3)
- A40507.5:Assess and implement transaction processing, concurrency control and database recovery protocols in databases.(L4)

3. Course Syllabus:

UNIT I

Introduction: Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models, Concepts of Schema, Instance and data independence, Three tier schema architecture for data independence, Database system structure, Centralized and Client Server architecture for the database.

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

UNIT II

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

UNIT III

SQL: Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

UNIT IV

Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency, Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

UNIT V

Transaction Concept: Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Testing for Serializability, lock based, time stamp based, optimistic concurrency protocols, Deadlocks, Recovery and Atomicity, Recovery algorithm.

Introduction to Indexing Techniques: B+ Trees, operations on B+Trees, Hash Based Indexing. **Introduction to NoSQL:** Definition and Introduction, Characteristics of NoSQL Databases, Types of NoSQL Databases: Column-Oriented Stores, Key/ValueStores, Document Databases , Graph Databases.

Books and Materials:

Text Books:

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts, 5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter1 and
3. Chapter 5)

Reference Books:

1. Introduction to Database Systems, 8^{th} edition, CJ Date, Pearson.
2. Database Management System, 6th edition, Ramez Elmasri, Shamkant B.Navathe, Pearson
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Web-Resources:

1.https://nptel.ac.in/courses/106/105/106105175/
2.https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012758066672820224
56_shared/overview

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40508–Advanced Data Structures and Algorithm Analysis Laboratory

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

1. Course Description:

Course Overview:

This course provides an in-depth exploration of complex data structures and algorithms, focusing on practical implementation and problem-solving techniques. The course covers advanced tree structures such as AVLtrees, B-Trees,and Heap Trees, and includes graph traversal methods,sorting techniques,and algorithms for minimum cost spanning trees and shortest paths. Students will tackle classic problems like the 0/1 Knapsack Problem, Travelling Salesperson Problem, and N-Queens Problem, using various strategies including dynamic programming, greedy algorithms, and backtracking. The course also covers optimal binary search trees and job sequencing. Through hands-on experiments and sample programs, students will gain proficiency in implementing and analysing advanced algorithms, enhancing their problem-solving skills and understanding of algorithmic efficiency.

2. Course Outcomes:

After completion of the course, students will be able to

- A40508.1: Design and develop programs to solve real world problems with the popular algorithm design methods. (L5)
- A40508.2:Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs.(L2)
- A40508.3: Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications. (L5)
- A40508.4: Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems. (L3)
- A40508: Compare the performance of different of algorithm design strategies(L4)

Experiments covering the Topics:

- Operations on AVL trees,B-Trees,HeapTrees
- Graph Traversals
- Sorting techniques
- Finding Biconnected components in a graph
- Shortest path algorithms using greedy Method
- 0/1 Knapsack Problem using Dynamic Programming and Backtracking
- Travelling Sales person problem using Branch and Bound
- N-Queens Problem using Backtracking
- Job Sequencing using Branch and Bound

Sample Programs:

1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array.Implement searching, insertion and deletion operations.
3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by
   a) Adjacency Matrix b) Adjacency Lists
5. Write a program for finding the biconnected components in a given graph.
6. Implement Quicksort and Mergesort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8. Implement Job Sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound Approach.

Reference Books:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sahni Sartaj, Mehta, Dinesh, 2ndEdition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni ,Sanguthevar Rajasekaran, 2ndEdition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications,Tremblay& Sorenson,McGraw Hill

Online Learning Resources:

1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40509–Database Management Systems Laboratory

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

1. Course Description:

This course focuses on Database Management Systems (DBMS) and SQL programming, covering essential concepts, SQL commands, and advanced database operations. It Includes practical sessions on SQL queries, PL/SQL programming, stored procedures, functions, triggers, and database connectivity using JDBC/ODBC. Students will learn how to design databases, manipulate data, and manage database objects effectively.

Course Outcomes:

After completion of the course, students will be able to

- A40509.1:Populate and query a database using SQL DDL/DML Commands
- A40509.2:Declare and enforce integrity constraints on a database
- A40509.3:Writing Queries using advanced concepts of SQL
- A40509.4:Programming PL/SQL including procedures,functions,cursors and triggers

2. Course Syllabus:

Experiments covering the topics:

- DDL,DML,DCL commands
- Queries,nested queries,built-in functions,
- PL/SQL programming-control structures
- Procedures, Functions, Cursors, Triggers,
- Database connectivity-ODBC/JDBC

Experiments:

1. Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.
2. Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION,INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.
3. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.
4. Queries using Conversion functions(to_char,to_numberandto_date),string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substrand
5. instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)
6. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for

those who secured first class and an exception can be raised if no records were found).Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

7. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
8. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.
9. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
10. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
11. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
12. Develop Programs using BEFORE and AFTER Triggers,Row and Statement Triggers and INSTEAD OF Triggers
13. Create a table and perform the search operation on table using indexing and non-indexing techniques.
14. Design ER diagram

3. Books and Materials:

Text Books/Suggested Reading:

- Oracle: The Complete Reference by Oracle Press
- Nilesh Shah,"Database Systems Using Oracle", PHI,2007
- RickF Vander Lans,"Introduction to SQL", Fourth Edition, Pearson Education, 2007

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL (AUTONOMOUS)

A40510–Python Programming (Skill Enhancement Course)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	1	2	42	0	0	2	30	70	100

1. Course Description:

This course offers a thorough introduction to the Python programming language, emphasizing both theoretical understanding and practical application. The course begins with the history and fundamentals of Python, including installation and basic programming constructs. Students will learn to work with control flow statements, functions, strings, lists, dictionaries, tuples, and sets. The course also covers file handling, object-oriented programming, and an introduction to data science with modules like NumPy and Pandas. Through hands-on experiments, students will gain proficiency in writing Python programs to solve real-world problems, manipulating data,and creating structured and efficient code. This course is designed to provide a strong foundation in Python, preparing students for more advanced topics in data science and software development.

2. Course Objectives:

The main objectives of the course are to

- A40510.1:Introduce core programming concepts of Python programming language.
- A40510.2: Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries.
- A40510.3: Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

3. Course Syllabus:

UNIT I:

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, DataTypes, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type() Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers with in an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.

i)Arithmetic Operators ii)Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators

5. Write A Program To Add And Multiply Complex numbers
6. Write a program to print a multiplication table of a given number.

UNIT-II

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function,return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments. **Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations,Indexing and SlicinginLists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:

1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list: i)Addition ii)Insertion iii)slicing
6. Write a program to perform any 5 built-in functions by taking any list.

UNIT-III:

Dictionaries: Creating Dictionary,Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement. **Tuples and Sets:** Creating Tuples,Basic Tuple Operations,tuple()Function,Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:

1. Write a program to create tuples (name, age, address, college) for atleast two members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to add a new key-value pair to an existing dictionary.
5. Write a program to sum all the items in a given dictionary.

UNIT-IV:

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to sort words in a file and put the min another file.The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a program to add, transpose and multiply two matrices.

6. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter.Implement subclasses for different shapes like circle, triangle, and square.

UNIT-V:

Introduction to Data Science: Functional Programming, JSON and XML in Python, NumPy with Python, Pandas.

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array() function.Python program to demonstrate use of n dim,shape,size,dtype.
3. Python program to demonstrate basic slicing, integer and Boolean indexing.
4. Python program to find min,max,sum,cumulative sum of array
5. Create a dictionary with at least five keys and each key represent value as a list where this list contains atleast ten valuesand convert this dictionary as ap and as data frame and explore the data through the data frame as follows:
6. a)Apply head() function to the pandas data frame
7. b)Perform various data selection operations on DataFrame
8. Select any two columns from the above dataframe, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib.

4. Books and Materials:

Reference Books:

1. GowrishankarA, VeenaA., Introduction to Python Programming,CRC Press.
2. Python Programming, SSridhar, J.Indumathi, VM Hariharan, 2ndEdition, Pearson,2024
3.Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

OnlineLearningResources/VirtualLabs:

https://www.coursera.org/learn/python-for-applied-data-science-ai
https://www.coursera.org/learn/python?specialization=python#syllabus

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

A40031-ENVIRONMENTAL SCIENCE

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	42	0	0	-	100	-	100

1. Course Description

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, biodiversity 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 Influence society in proper utilization of goods

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 a mega-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, rainwater 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. – EnvironmentProtectionAct. –Air (Preventionand Controlof 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.

1. Books and Materials

Textbooks:

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharuch a for University Grants Commission, Universities Press.
2. Palaniswamy,“Environmental Studies”,Pearson education
3. S.AzeemUnnisa,“Environmental Studies”Academic Publishing Company
4. K.RaghavanNambiar,“Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

References:

1. Deeksha Dave and E.SaiBaba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Textbook 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 Wendel lP.Ela, “Introduction to Environmental Engineering and Science, Prentice Hall of India Private limited.

SEMESTER - IV

PROGRAMME CURRICULUM STRUCTURE UNDER R23 REGULATIONS

B. TECH–COMPUTER SCIENCE AND ENGINEERING

	IV SEMESTER (II YEAR)									
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40022	**Management course- I** Managerial Economics and Financial Analysis	HSMC	2	0	0	2	30	70	100
2	A40020	Probability Statistics	BS	3	0	0	3	30	70	100
3	A40511	Operating Systems	PC	3	0	0	3	30	70	100
4	A40512	Object Oriented Programming Through Java	PC	3	0	0	3	30	70	100
5	A40513	Software Engineering	PC	3	0	0	3	30	70	100
6	A40514	Operating Systems Lab	PC	0	0	3	1.5	30	70	100
7	A40515	Object Oriented Programming Through Java Lab	PC	0	0	3	1.5	30	70	100
8	A40516	Full Stack Development–I	SEC	0	1	2	2	30	70	100
9	A40023	Design Thinking & Innovation	BS&H	1	0	2	2	30	70	100
	TOTAL			15	01	10	21	270	630	900
	Mandatory Community Service Project Internship of 08 weeks duration during summer vacation									

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

Course Description

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.

1. Course Outcomes (COs)

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

i) Define the concepts related to Managerial Economics, financial accounting and management

ii) Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets

iii) Apply the Concept of Production cost and revenues for effective Business decision

iv) Analyse how to invest their capital and maximize returns

v) Evaluate the capital budgeting techniques

2. 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 LossAccount and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

3. 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.HI Managerial Economics SChand.
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-59565396https://www.slideshare.net/ashu1983/financial-accounting

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A40020-Probability & Statistics

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

1. Course Description:

This course introduces the fundamental concepts of probability theory and statistical methods used for data analysis and decision-making under uncertainty. Topics include basic probability principles, random variables, probability distributions (discrete and continuous), mathematical expectation, and variance. The course also covers statistical techniques such as sampling methods, estimation theory, hypothesis testing, correlation and regression analysis. Emphasis is placed on applying probabilistic and statistical tools to solve engineering, scientific, and real-world problems.

2. Course Outcomes:

After successful completion of this course, the students should be able to:

- CO1 Acquire knowledge in finding the analysis of the data quantitatively or categorically and various statistical elementary tools. L2, L3
- CO2 Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems. L3, L5
- CO3 Apply the theoretical probability distributions like binomial, Poisson, and Normal in the relevant application areas.L3
- CO4 Analyze to test various hypotheses included in theory and types of errors for large samples. L2,L3
- CO5 Apply the different testing tools like t-test,F-test,chi-square test to analyze the relevant real-life problems.L3,L5

3. Course Syllabus

UNIT I:

Descriptive statistics Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines.

UNIT II

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

UNITIII

Probability distributions Probability distributions: Binomial, Poisson and Normal-their properties (Chebyshev's inequality). Approximation of the binomial distribution to normal distribution.

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

UNITV

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

Reference Books:

1. S.Ross, a First Course in Probability, Pearson Education India, 2002.
2. W.Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. B.V.Ramana, Higher Engineering Mathematics, McGraw Hill Education. Online

Learning Resources:

1. https://onlinecourses.nptel.ac.in/noc21_ma74/preview
2. https://onlinecourses.nptel.ac.in/noc22_mg31/preview

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

A40511–Operating Systems

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

1. Course Description

The course is used to understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection. Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. Illustrate different conditions for deadlock and their possible solutions.

2. Course Outcomes

After completion of the course, students will be able to

1. Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication. (L1)
2. Understand the basic concepts and principles of operating systems ,including process management, memory management, file systems, and Protection. (L2)
3. Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system. (L3)
4. Illustrate different conditions for deadlock and their possible solutions.(L2)
5. Analyze the memory management and its allocation policies. (L4)

3. Course Syllabus

UNIT - I

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

UNIT-II

Processes: Process Concept, Process scheduling, Operationson processes,Inter-process communication.

Threads and Concurrency: Multithreading models, Thread libraries, Threading issues. CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multipleprocessor scheduling.

UNIT–III

Synchronization Tools: The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.
Deadlocks: system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

a) Sequential b)Indexed c)Linked

Reference Books:

1. Operating System Concepts, Silberschatz, Galvin P, Gagne, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum, 4thEdition, Pearson, 2016
3. Operating Systems-Internals and Design Principles, StallingsW, 9th edition,Pearson, 2018
4. Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

Online Learning Resources:

1. https://www.cse.iitb.ac.in/~mythili/os/
2. http://peterindia.net/OperatingSystems.html

G.PULLAIAHCOLLEGEOFENGINEERINGANDTECHNOLOGY, KURNOOL
(AUTONOMOUS)

A40515–Object Oriented Programming through Java Lab

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

1. Course Description:

This course provides a comprehensive introduction to Java, focusing on both foundational concepts and practical applications. Through a series of structured experiments, students will learn to write and execute Java programs, understand object-oriented programming principles, and develop skills in exception handling, multithreading, and graphical user interfaces. The course covers essential topics such as data types, control structures, classes and objects, inheritance, polymorphism, interfaces, and JDBC for database connectivity. Additionally, students will gain hands-on experience with JavaFX for building graphical applications. By the end of the course, students will be proficient in Java programming and capable of developing robust and efficient applications.

2. Course Objectives:

The aim of this course is to

1. Practice object oriented programming in the Java programming language.
2. Implement Classes, Objects, Methods,Inheritance, Exception, Runtime Polymorphism ,User defined Exception handling mechanism
3. Illustrate inheritance, Exception handling mechanism, JDBCconnectivity
4. Construct Threads,Event Handling,implement packages,JavaFX GUI

3. Course Syllabus:

Experiments covering the Topics:

Object Oriented Programming fundamentals- datatypes,control structures Classes, methods, objects, Inheritance, polymorphism, Exception handling, Threads, Packages, Interfaces Files, I/O streams, JavaFX GUI

Sample Experiments:

Exercise–1:

a) Write a JAVA program to display default value of all primitive datatype of JAVA.
b) Write a java program that display the roots of aquadratic equation ax2+bx=0.Calculate the discriminateD and basing on value of D, describe the nature of root.

Exercise-2

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
c) Write a JAVA program using String Buffer to delete, remove character.

Exercise-3

a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.

b) Write a JAVA program implement method overloading.

c) Write a JAVA program to implement constructor.

d) Write a JAVA program to implement constructor overloading.

Exercise-4

a) Write a JAVA program to implement Single Inheritance

b) Write a JAVA program to implement multilevel Inheritance

c) Write a JAVA program for abstract class to find areas of different shapes

Exercise-5

a) Write a JAVA program give example for “super” keyword.

b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?

c) Write a JAVA program that implements Runtime polymorphism

Exercise-6

a) Write a JAVA program that describes exception handling mechanism

b) Write a JAVA program Illustrating Multiple catch clauses

c) Write a JAVA program for creation of Java Built-in Exceptions

d) Write a JAVA program for creation of User Defined Exception

Exercise-7

a) Write a JAVA program that creates threads by extending Thread class. First thread display “Good Morning “ every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds, (Repeat the same by implementing Runnable)

b) Write a program illustrating is Alive and join

c) Write a Program illustrating Daemon Threads.

d) Write a JAVA program Producer Consumer Problem

Exercise–8

a) Write a JAVA program that import and use the user defined packages

b) Without writing any code, build a GUI that display text in label and image in an ImageView (useJavaFX)

c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

Exercise–9

a) Write a java program that connects to a database using JDBC

b) Write a java program to connect to a database using JDBC and insert values into it.

c) Write a java program to connect to a database using JDBC and delete values from it

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A40516–Full Stack Development–1(Skill Enhancement Course)

HoursPerWeek			HoursPerSemester			Credits	AssessmentMarks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	1	2	42	0	0	2	30	70	100

1. CourseDescription:

The course Make use of HTML elements and their attributes for designing static web pages. Build a web page by applying appropriate CSS styles to HTML elements. Experiment with JavaScript to develop dynamic web pages and validate forms

2. Course Outcomes(CO's):

1. Design Websites. (L6)
2. Apply Styling to webpages.(L3)
3. Make Web pages interactive.(L3)
4. Design Forms for applications. (L6)
5. Choose Control Structure based on the logic to be implemented. (L4)

Experiments covering the Topics:

- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript-internal and external, I/O, TypeConversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events

Sample Experiments:

1. Lists, Links and Images

a. Write a HTML program, to explain the working of lists.

Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.

b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target attributes.

c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles.

d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full size dversion of the image. Create an image gallery using this technique

2. HTML Tables, Forms and Frames

a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)
b. Write a HTML program, to explain the working of tables by preparing a timetable.(Note:Use <caption>tag to set the caption they able & also use cellspacing, cellpadding, border, rowspan, colspan etc.).
c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Usetables to provide a better view).
d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction.(Note: first frame image, second frame paragraph,third frame hyperlink.And also make sure of using“no frame”attribute such that frames to be fixed).

3. HTML5 and Cascading Style Sheets,Types of CSS

a. Write a HTML program, that makes use of<article>, <aside>,<figure>,<figcaption>,<footer>, <header>,<main>,<nav>,<section>,<div>,<span> tags.
b. Write a HTML program,to embed audio and video into HTML webpage.
c. Write a program to apply different types(or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).

4. Selector forms

a. Write a program to apply different types of selector forms
i. Simple selector(element, id, class, group, universal)
ii. Combinator selector(descendant, child, adjacent sibling, general sibling)
iii. Pseudo-classselector
iv. Pseudo-element selector
v. Attribute selector

5. CSS with Color, Background, Font,Text and CSS Box Model

a. Write a program to demonstrate the various ways you can reference a color in CSS.
b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally.The image should remain in place when the user scrolls up or down.
c. Write a program using the following terms related to CSS font and text:
i.font-size ii.font-weight iii.font-style iv.text-decoration
v.text-transformation vi.text-alignment
d. Write a program, to explain the importance of CSSBox model using
i. Content ii.Border iii.Margin iv. padding

6. Applying Java Script-internal and external, I/O, Type Conversion

a. Write a program to embed internal and external JavaScript in a webpage.
b. Write a program to explain the different ways of displaying output.
c. Write a program to explain the different ways for taking input.
d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

7. JavaScript Pre-defined and User-defined Objects

a. Write a program using document object properties and methods.
b. Write a program using window object properties and methods.
c. Write a program using array object properties and methods.
d. Write a program using math object properties and methods.
e. Write a program using string object properties and methods.
f. Write a program using regex object properties and methods.
g. Write a program using date object properties and methods.
h. Write a program to explain user-defined object by using properties,methods,accessors, constructors and display.

8. JavaScript Conditional Statements and Loops

a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words “LARGER NUMBER” in an information message dialog. If the numbers are equal, output HTML text as “EQUAL NUMBERS”.
b. Write a program to display weekdays using switch case.
c. Write a program to print1 to10 numbers using for, while and do-while loops.
d. Write a program to print data in object using for-in, for-eachandfor-of loops
e. Develop a program to determine whether a given number is an ‘ARMSTRONG NUMBER’ or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e.,13 + 53+ 33 = 153]
f. Write a program to display the denomination of the amount deposited in the bank in terms of 100’s, 50’s, 20’s, 10’s, 5’s, 2’s & 1’s. (Eg: If deposited amount is Rs.163, the output should be 1- 100’s, 1-50’s, 1- 10’s, 1-2’s & 1-1’s)

9. JavaScript Functions and Events

a. Design a appropriate function should be called to display
   i. Factorial of that number
   ii. Fibonacci series up to that number
   iii. Prime numbers up to that number
   iv. Is It Palindrome Or Not

b. Design a HTML having a textbox and four buttons named Factorial,Fibonacci,Prime,and Palindrome.
   When a button is pressed an appropriate function should be called to display
   i. Factorial of that number
   ii. Fibonacci series up to that number
   iii. Prime numbers up to that number
   iv. Is it palindrome or not
c. Write a program to validate the following fields in a registration page
   i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
   ii. Mobile(only numbers and length 10 digits)
   iii. E-mail(should contain format likexxxxxxx@xxxxxx.xxx)

Text Books:

1. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.

ReferenceBooks:

1. Programming the World Wide Web, 7thEdition, Robert W Sebesta, Pearson,2013.
2. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.

Online Learning Resources:

1. https://www.w3schools.com/html
2. https://www.w3schools.com/css
3. https://www.w3schools.com/js/
4. https://www.w3schools.com/nodejs
   https://www.w3schools.com/typescript

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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

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:

- Define The Concepts Related To Design Thinking.
- Explain The Fundamentals of Design Thinking and innovation
- Apply the design thinking techniques for solving problems in various sectors
- Analyze to work in a multidisciplinary environment
- 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 ,HarperBollins(2009)
2. IdrisMootee, DesignThinking for Strategic Innovation, 2013, JohnWiley&Sons.

Reference Book(s)

1. DavidLee, Design Thinking in the Classroom, Ulysses Press
2. Shrutin Shetty, Design the Future, Norton Press
3. WilliamLidwell, Universal Principles of Design-Kritina Holden, JillButter.
4. Chesbrough.H, The Era of Open Innovation–2013

SEMESTER- V

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
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		V SEMESTER (III YEAR)								
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40517	Introduction To Artificial Intelligence	PC	3	0	0	3	30	70	100
2	A40518	ComputerNetworks	PC	3	0	0	3	30	70	100
3	A40519	AutomataTheoryandCompilerDesign	PC	3	0	0	3	30	70	100
4	A40520a A40520b A40520c A40520d A40520e	**Professional Elective-I** Software Testing Methodologies Soft Computing Micro processors & Micro controllers Data Warehousing & Data Mining Privacy and security in online social media	PE	3	0	0	3	30	70	100
5		**Open Elective-I**	OE	3	0	0	3	30	70	100
6	A40521	Introduction To Artificial Intelligence Lab	PC	0	0	3	1.5	30	70	100
7	A40522	Computer Networks Lab	PC	0	0	3	1.5	30	70	100
8	A40523	Full Stack Development -II	SEC	0	1	2	2	30	70	100
9	A40032	Tinkering Lab	BS &H	0	0	2	1	30	70	100
10	A40524	Evaluation of Community Service Internship	PW	-	-	-	2	100	-	100
11	A40536	Introduction To Quantum Technologies and Applications	SEC	3	0	0	3	30	70	100
		TOTAL		18	01	10	26	400	770	1100

12-week MOOC Swayam/NPTEL course recommended by the BoS

OpenElective–I

Course Code	Title of the Course	L-T-P	Credits	Offered by
A40171	Green Buildings	3-0-0	3	CE
A40172	Construction Technology and Management	3-0-0	3	CE
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
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 and AI	3-0-0	3	H&S
A40091	Entrepreneurship	3-0-0	3	H&S

Note:

1. A student is permitted to register for Honours or a Minor 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 their Minor from V Semester onwards.
2. A student shall not be permitted to take courses as Open Electives/Minor/Honours with content substantially equivalent to the courses pursued in the student's primary major.
3. A student is permitted to select a Minor program only if the institution is already offering a Major degree program in that discipline.

A40517- INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Hours Per 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 Objectives:

This course is designed to:

- Introduce Artificial Intelligence
- Teach about the machine learning environment
- Present the searching Technique for Problem Solving
- Introduce Natural Language Processing and Robotics

2.Course Outcomes:

After completion of the course, students will be able to

- Apply searching techniques for solving a problem
- Design Intelligent Agents
- Develop Natural Language Interface for Machines
- Design mini robots
- Summarize past, present and future of Artificial Intelligence.

UNIT-I Introduction Lecture 9Hrs

Introduction: What is AI, Foundations of AI, History of AI, The State of Art.

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

UNIT-II Solving Problems by searching Lecture 9 Hrs

Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

UNIT-III Reinforcement Learning & Natural Language Processing Lecture 8Hrs

Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL

Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

UNIT-IV Natural Language for Communication Lecture 8 Hrs

Natural Language for Communication: Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition

Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

UNIT-V Robotics Lecture 10Hrs

Robotics: Introduction, Robot Hardware, Robotic Perception, planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains

Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right direction, What if AI does succeed.

Textbooks:

1.Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

Reference Books:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 3039.

Online Learning Resources:

http://peterindia.net/AILinks.html
http://nptel.ac.in/courses/106106139/
https://nptel.ac.in/courses/106/105/106105152/

A40518-COMPUTER NETWORKS

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

1.Course Objectives: The main objectives of the course is to

- To understand the different types of networks
- To discuss the software and hardware components of a network
- To develop an understanding the principles of computer networks.
- To familiarize with OSI model and the functions of layered structure.
- To explain networking protocols, algorithms and design perspectives

2. Course Outcomes: After completion of the course, students will be able to

- Identify the software and hardware components of a Computer network. (L1)
- Explain the functionality of each layer of a computer network. (L2)
- Identify and analyze flow control, congestion control, and routing issues. (L4)
- Analyze and interpret the functionality and effectiveness of the routing protocols. (L4)
- Choose the appropriate transport protocol based on the application requirements. (L3)

UNIT I:

Introduction: Types of Computer Networks, Broadband Access Networks, Mobile and Wireless Access Networks, Content Provider Networks, Transit networks, Enterprise Networks, Network technology from local to global, Personal Area Networks, Local Area Networks, Home Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks, Network Protocols, Design Goals, Protocol Layering, Connections and Reliability, Service Primitives, The Relationship of Services to Protocols ,Reference Models, The OSI Reference Model, The TCP/IP Reference Model, A Critique of the OSI Model and Protocols, A Critique of the TCP/IP Reference Model and Protocols.

UNIT II:

The Data Link Layer: Guided Transmission Media, Persistent Storage, Twisted Pairs, Coaxial Cable, Power Lines, Fiber Optics, Data Link Layer Design Issues, Services Provided To The Network Layer, Framing Error Control, Flow Control, Error Detection And Correction, Error-Correcting Codes, Error-Detecting Codes, Elementary Data Link Protocols, Initial Simplifying Assumptions Basic Transmission And Receipt, Simplex Link-Layer Protocols, Improving Efficiency, Bidirectional Transmission, Multiple Frames In Flight, Examples Of Full-Duplex, Sliding Window Protocols, The Channel Allocation Problem, Static Channel Allocation, Assumptions For Dynamic Channel Allocation, Multiple Access Protocols, Aloha, Carrier Sense Multiple Access Protocols, Collision-Free Protocols, Limited-Contention Protocols, Wireless LAN Protocols, Ethernet, Classic Ethernet Physical Layer, Classic Ethernet Mac Sublayer Protocol, Ethernet Performance, Switched Ethernet, Fast Ethernet, Gigabit Ethernet, 10-Gigabit Ethernet,40- And 100-Gigabit Ethernet, Retrospective On Ethernet.

UNIT III:

The Network Layer: Network Layer Design Issues, Store-And-Forward Packet Switching, Services Provided To The Transport Layer, Implementation Of Connectionless Service, Implementation Of Connection-Oriented Service, Comparison Of Virtual-Circuit And Datagram Networks, Routing Algorithms In A Single Network, The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing Within a Network, Broadcast Routing, Multicast Routing, Anycast Routing, Traffic Management at The Network Layer, The Need for Traffic Management: Congestion, Approaches To Traffic Management, Internetworking, Internetworks: An Overview, How Networks differ, Connecting Heterogeneous Networks, Connecting Endpoints Across Heterogeneous Networks, Internetwork Routing: Routing Across Multiple Networks Supporting Different Packet Sizes: Packet Fragmentation, The Network Layer In The Internet, The IP Version 4 Protocol, IP Addresses, IP Version 6, Internet Control Protocols, Label Switching and MPLS, OSPF—An Interior Gateway Routing Protocol, BGP—The Exterior Gateway Routing Protocol, Internet Multicasting.

UNIT IV:

The Transport Layer: The Transport Service, Services Provided To The Upper Layers, Transport Service Primitives, Berkeley Sockets, An Example Of Socket Programming: An Internet File Server, Elements Of Transport Protocols, Addressing, Connection Establishment, Connection Release, Error Control And Flow Control, Multiplexing, Crash Recovery, Congestion Control, Desirable Bandwidth Allocation, Regulating The Sending Rate, Wireless Issues, The Internet Transport Protocols: UDP, Introduction To UDP, Remote Procedure Call, Real-Time Transport Protocols, The Internet Transport Protocols: TCP, Introduction To TCP, The TCP Service Model, The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release.

UNIT V:

The Application Layer: Electronic Mail, Architecture and Services, The User Agent, Message Formats, Message Transfer, Final Delivery, The World Wide Web, Architectural Overview, Static Web Objects, Dynamic Web Pages and Web Applications, HTTP and HTTPS, Web Privacy, Content Delivery, Content and Internet Traffic, Server Farms and Web Proxies, Content Delivery Networks, Peer-To-Peer Networks, Evolution of The Internet.

Textbooks:

Andrew Tanenbaum, Feamster Wetherall, Computer Networks, 6th Edition, Global Edition.

Reference Books:

1 Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, McGraw Hill Publication, 2017.
2 James F. Kurose, Keith W. Ross, “Computer Networking: A Top-Down Approach”, 6th edition, Pearson, 2019.
3 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

A40519-AUTOMATA THEORY AND COMPILER DESIGN

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

1.**Course Objectives:**

1. Able to understand the concept of abstract machines, construct FA, Regular Expressions for the regular languages and equivalent FSMs.
2. Able to construct pushdown automata equivalent to Context free Grammars, construct Turing Machines and understand undecidability.
3. Emphasize the concepts learnt in phases of compiler, lexical analyser and Top-down parser.
4. Able to understand the concepts of Bottom-up parser, Intermediate Code Generation.
5. Able to understand the concepts of Code optimizer and Code Generation.

2.Course Outcomes:

1 Demonstrate knowledge on Automata Theory, Regular Expression and Analyze and Design of finite automata, and prove equivalence of various finite automata.
2 Demonstrate knowledge on context free grammar, Analyze and design of PDA and TM.
3 Understand the basic concept of compiler design, and its different phases which will be helpful to construct new tools like LEX, YACC, etc.
4 Ability to implement semantic rules into a parser that performs attribution while parsing and apply error detection and correction methods.
5 Apply the code optimization techniques to improve the space and time complexity of programs while programming and Ability to design a compiler.

Unit-I: Introduction to Automata and Regular Expressions 12 Hrs

Introduction, Alphabets, Strings and Languages, Chomsky Hierarchy, Automata and Grammars, Regular Grammar and Language, Finite Automata, Deterministic finite Automata (DFA), Nondeterministic finite Automata (NFA), Equivalence of NFA and DFA, Minimization of Finite Automata, Regular Expressions, Converting Regular Grammar and Expression into Finite Automata, Pumping lemma for regular sets, Closure properties of regular sets (Without proof).

UNIT-II: Context Free Grammars and Pushdown Automata 12 Hrs

Context Free Language, Context Free Grammar, Derivation and Parse tree, Ambiguity, Simplification of CFG’s, Chomsky Normal Form, Greibach Normal Form, Push Down Automat (PDA), Design of PDA, Equivalence of PDA and CFL/CFG

UNIT-III: Turing Machines and Introduction to Compilers 12 Hrs

Turing Machine, TM Model, Language acceptance, Design of Turing Machine, Compilers, Phases of Compiler, The role of Lexical Analyzer, Input Buffering.

UNIT-IV: Parsers and Intermediate Code Generation **12 Hrs**

Parser, Top-Down parsers: Recursive Descent Parsers, Predictive Parsers
Bottom–up Parsers: Shift-Reduce Parsing, LR parsers, Intermediate Code Generation: Three address codes.

UNIT-V: Code Optimization and Code Generation **12 Hrs**

Code Optimization: Peephole optimization, Basic blocks and flow graphs, DAG, Principles of Source Code Optimization, Code Generation: Issues in Design of Code Generation, Simple Code Generator.

Text Books:

1 Introduction to Automata theory languages and Computation, Hopcroft H.E. and Ullman Jeffrey.D, 3/e, 2006, Pearson Education, New Delhi, India.
2 Mishra K L P and Chandrasekaran N, “Theory of Computer Science - Automata, Languages and Computation”, 2/e, 2007, PHI, New Delhi, India.
3 Compilers: Principles, Techniques, and Tools, Updated 2e July 2023 Alfred V. Aho , Monica S. Lam, Ravi Sethi , Jeffrey D. Ullman , Sorav Bansal

Reference Books:

1. Introduction to Languages and Theory of Computation, John C Martin, 1/e, 2009, Tata McGraw Hill Education, Hyderabad, India.
2. Introduction to Theory of Computation, Sipser, 2/e, 2005, Thomson, Australia.
3. Compiler Construction: Principles And Practice, Kenneth C. Louden, Thomson/ Delmar Cengage Learning, 2006.
4. Lex & yacc, Doug Brown, John Levine and Tony Mason, 2 nd Edition, O’reilly Media
5. Engineering a compiler, Keith Cooper and Linda Torczon, 2 nd Edition, Morgan Kaufmann, 2011.

A40520a- SOFTWARE TESTING METHODOLOGIES

(Professional Elective –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 Objectives:

To study the fundamental concepts of software testing which includes objectives, process, criteria, strategies, and methods.

To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.

It also helps to learn the types of bugs, testing levels with which the student canvery well identify a bug and correct as when it happens.

It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.

To learn the domain testing path testing and logic based testing to explore the testing process easier.

2.CourseOutcomes:

1 Know the basic concepts of software testing and its essentials.

2 Able to identify the various bugs and correcting the mafter knowing the consequences of the bug.

3 Use of program‘s control flow as a structural modelis the corner stone of testing.

4 Performing functional testing using control flow and transaction flow graphs.

UNIT-I9Hrs

Introduction:-Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs, Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II **8Hrs**

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III **8Hrs**

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-IV **9Hrs**

Paths, Path products and Regular expressions:- path products &path expression, reduction procedure, applications, regular expressions & flow anomaly detection. Logic Based Testing:- over view, decision tables, path expressions, kv charts, specifications.

UNIT-V **9Hrs**

State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips. Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools

TEXTBOOKS

1. Software Testing techniques–BorisBeizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

REFERENCESBOOKS:

1. The craft of software testing – Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World –Edward Kit, Pearson.
4. EffectivemethodsofSoftwareTesting,Perry,JohnWiley.
5. Art of Software Testing – Meyers, John Wiley.

A40520b-SOFT 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 Objectives:

- Familiarize with soft computing concepts
- Introduce and use the idea of fuzzy logic and use of heuristics based on human experience
- Familiarize the Neuro-Fuzzy modelling using Classification and Clustering techniques
- Learn the concepts of Genetic algorithm and its applications
- Acquire the knowledge of Rough Sets.

2. Course Outcomes:

- Identify the difference between Conventional Artificial Intelligence to Computational Intelligence.
- Understand fuzzy logic and reasoning to handle and solve engineering problems Apply the Classification techniques on various applications.
- Perform various operations of genetic algorithms and Rough Sets.

UNIT - I

Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.

UNIT- II

Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based Systems

UNIT- III

Fuzzy Decision Making, Particle Swarm Optimization.

UNIT- IV

Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

UNIT- V

Rough Sets, Rough Sets, Rule Induction, and Discernibility Matrix, Integration of Soft Computing Techniques.

TEXT BOOK:

1. Soft Computing – Advances and Applications - Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

REFERENCE BOOKS:

1. S. N. Sivanandam & S. N. Deepa, “Principles of Soft Computing”, 2nd edition, Wiley India, 2008.
2. David E. Goldberg, “Genetic Algorithms-In Search, optimization and Machine learning”, Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, Pearson Education, 2004.
4. G.J. Klir & B. Yuan, “Fuzzy Sets & Fuzzy Logic”, PHI, 1995.
5. Melanie Mitchell, “An Introduction to Genetic Algorithm”, PHI, 1998.
6. Timothy J. Ross, “Fuzzy Logic with Engineering Applications”, McGraw- Hill International editions, 1995.

A40520c- MICROPROCESSORS AND MICROCONTROLLERS

Hours Per 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 Objectives:

1. To comprehend the architecture, operation, and configurations of the 8086 microprocessors.
2. To get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
3. To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.
4. To learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

2.Course Outcomes:
At the end of this course, the students will be able to

1. Gain knowledge on the architecture, operation, and configurations of the 8086 microprocessors.
2. Get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
3. Know the interfacing of 8086 with memory, peripherals, and controllers for various applications.
4. Learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. Understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

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 - Architecture of 8051 – Special Function Registers (SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT-V

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

Textbooks:

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rdEdition,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.

References:

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.

A40520d-DATA WAREHOUSING &DATA MINING

Hours Per 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 Objective:**

- Familiarize with mathematical foundations of data mining tools.
- Introduce classical models and algorithms in data warehouses and data mining.
- Investigate the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Explore data mining techniques in various applications like social, scientific and environmental context.

2. **Course Outcomes:**

Upon completion of the course, the students should be able to:

- Design a Data warehouse system and perform business analysis with OLAP tools (L6).
- Apply suitable pre-processing and visualization techniques for data analysis (L3)
- Apply frequent pattern and association rule mining techniques for data analysis (L3)
- Design appropriate classification and clustering techniques for data analysis (L6)
- Infer knowledge from raw data (L4)

UNIT- I: 9Hr

Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

UNIT- II: 9Hrs

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

UNIT- III: 8 Hrs

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.

UNIT- IV: **9Hrs**

Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines –– Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis - outlier detection methods.

UNIT- V: WEKA TOOL **8Hrs**

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

TEXT BOOK:

1.Jiawei Han and Micheline Kamber, —Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.

REFERENCES:

1.Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAP‖, Tata McGraw – Hill Edition, 35th Reprint 2016.

2.K.P. Soman, Shyam Diwakar and V. Ajay, —Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.

3.Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.

A40520e-Privacy and Security in Online social media

HoursPerWeek			HoursPerSemester			Credits	AssessmentMarks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1.Course Description:

This course explores the privacy and security challenges in online social media, focusing on data collection, user protection, ethical issues, and strategies to safeguard personal information and digital identities.

CourseOutcomes(COs):

CO1: Understand the Privacy Risks in Social Media

CO2: Recognize the Security Threats in Social Media

CO3: Assess Social Media Privacy Settings

CO4: Understand Legal and Ethical Aspects of Online Privacy

CO5: Recognize and Prevent Social Media Scams and Phishing

CO6: Learn to Safeguard Personal Data

2. Course Syllabus:

UNIT 1: What is Online Social Networks, data collection from social networks, challenges, opportunities, and pitfalls in online social networks, APIs

UNIT-2: Collecting data from Online social media, Trust, credibility, and reputations in social systems

UNIT-3: Trust, credibility, and reputations in social systems, online social media and Policing

UNIT-4: Information privacy disclosure, revelation and its effects in OSM and online social networks

UNIT-5: Phishing in OSM & Identifying fraudulent entities in online social networks

Books and references:

1."Privacy and Security for Online Social Networks" by Vijay Varadharajan, Xiaodong Li, and Yung-Hsiang Lu

2."Social Media Privacy: A Guide for Users" by Andrew T. McCallister, Karen Scarfone, and Peter Mell

3."The Privacy and Security of Personal Health Information: Privacy, Security, and Trust in Health Informatics" by George W. Ashford

4."Social Media Security: Protecting Your Privacy and Identity Online" by Kevin L. S. Byrnes

5."The Ethics of Social Media" by Jennifer C. B. Squires

6."The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power" by Shoshana Zuboff

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

A40521-INTRODUCTION TO ARTIFICIAL INTELLIGENCE LAB

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

1.Course Objectives:

- To teach the methods of implementing algorithms using artificial intelligence techniques
- To illustrate search algorithms

  To demonstrate the building of intelligent agents

2. Course Outcomes:

After completion of the course, students will be able to

- Implement search algorithms
- Solve Artificial intelligence problems
- Design chatbot and virtual assistant

3. List of Experiments:

1. Write a program to implement DFS and BFS
2. Write a Program to find the solution for traveling salesman Problem
3. Write a program to implement Simulated Annealing Algorithm
4. Write a program to find the solution for the wumpus world problem
5. Write a program to implement 8 puzzle problem
6. Write a program to implement Towers of Hanoi problem
7. Write a program to implement A* Algorithm
8. Write a program to implement Hill Climbing Algorithm
9. Build a Chatbot using AWS Lex, Pandora bots.
10. Build a bot that provides all the information related to your college.
11. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python
12. The following is a function that counts the number of times a string occurs in another string:

```
# Count the number of times string s1 is found in string s2 defcountsubstring(s1,s2):
count = 0
for   i   in   range(0,len(s2)-
len(s1)+1):     if     s1     ==
s2[i:i+len(s1)]:
count   +=
1   return
count
```

For instance, count substring (’ab’,’cabalaba’) returns 2.

Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).

13. Higher order functions. Write a higher-order function count that counts the number of elements in a list that satisfy a given test. For instance: count (lambda x: x>2, [1, 2, 3, 4, 5]) should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher order function.

14. Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of items containing N items that each have a unique name, a random size in the range 1 .... 5 and a random value in the range 1..... 10.

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should perform at least 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a backpack size of 2:5 x N for each value problem size N. Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding.

How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer?

Try running the above tests again with a backpack size of 1 x N and with 4:0 x N.

15. Assume that you are organising a party for N people and have been given a list L of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have C tables (that are infinitely large).

Write a function layout (N,C,L) that can give a table placement (i.e. a number from 0 : : :C -1) for each guest such that there will be no social mishaps.

For simplicity we assume that you have a unique number 0 ......N-1 for each guest and that the list of restrictions is of the form [(X, Y) ...] denoting guests X, Y that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer False.

References:

1 David Poole, Alan Mack worth, Randy Goebel," Computational Intelligence: a logical approach", Oxford University Press, 2004.
2 G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
3 J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.
4 Artificial Neural Networks, B. Yagna Narayana, PHI
5 Artificial Intelligence, 2nd Edition, E.Rich and K.Knight, TMH.
6 Artificial Intelligence and Expert Systems, Patterson, PHI.

Online Learning Resources/Virtual Labs:

https://www.tensorflow.org/https://pytorch.org/ https://github.com/pytorch https://keras.io/
https://github.com/kerasteam http://deeplearning.net/software/theano/
https://github.com/Theano/Theanohttps://caffe2.ai/ https://github.com/caffe2
https://deeplearning4j.org/Scikit-learn:https://scikit-learn.org/stable/
https://github.com/scikit-learn/scikit-learn
https://www.deeplearning.ai/https://opencv.org/
https://github.com/qqwweee/keras-yolo3 https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/
https://developer.nvidia.com/cuda-math-library
http://vlabs.iitb.ac.in/vlabs-dev/labs/machine_learning/labs/index.php

A40522- COMPUTER NETWORKS LAB

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

1.Course Objectives:

- To understand the different types of networks
- To discuss the software and hardware components of a network
- To enlighten the working of networking commands supported by operating system
- To impart knowledge of Net work simulator2/3
- To familiarize the use of networking functionality supported by JAVA
- To familiarize with computer networking tools.

2.Course Outcomes:

- Understand working of wired and wireless networks. (L2)
- Develop scripts for Simulating Wired and wireless Networks. (L3)
- Analyze the data traffic using tools. (L4)
- Develop JAVA programs for client-server communication. (L3)
- Utilize networking commands proficiently to diagnose and troubleshoot the network issues (L5)

List of Activities/Experiments:

1. Study different types of Network cables (Copper and Fiber) and prepare cables (Straight and Cross) to connect Two or more systems. Use crimping tool to connect jacks. Use LAN tester to connect the cables.
    a. Install and configure Network Devices: HUB, Switch and Routers. Consider both manageable and non-manageable switches. Do the logical configuration of the system. Set the bandwidth of different ports.
    b. Install and Configure Wired and Wireless NIC and transfer files between systems in Wired LAN and Wireless LAN. Consider both adhoc and infrastructure mode of operation.
2. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag, and Nslookup
3. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network.
4. Use Packet tracer software to build network topology and configure using Distance vector routing protocol.
5. Use Packet tracer software to build network topology and configure using Link State routing protocol.
6. Using JAVA RMI Write a program to implement Basic Calculator.

7. Implement a Chatting application using JAVA TCP and UDP sockets.
8. Hello command is used to know whether the machine at the other end is working or not. Echo command is used to measure the round-trip time to the neighbor. Implement Hello and Echo commands using JAVA.

9. Using Wireshark perform the following operations:
    a. Inspect HTTP Traffic
    b. Inspect HTTP Traffic from a Given IP Address,
    c. Inspect HTTP Traffic to a Given IP Address,
    d. Reject Packets to Given IP Address,
    e. Monitor Apache and MySQL Network Traffic.
10. Install Network Simulator 2/3. Create a wired network using dumbbell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metrics throughput, delay, jitter and packet loss.
11. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.
12. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

Reference Books:

1. ShivendraS.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, “TCP/IP Essentials:A Lab-Based Approach”, Cambridge University Press, 2004.
2. Cisco Networking Academy, “CCNA1 and CCNA2 Companion Guide”, Cisco Networking Academy Program, 3rd edition, 2003.
3. Elloitte Rusty Harold, “Java Network Programming”, 3rd edition, O’REILLY, 2011.

Online Learning Resources:

https://www.netacad.com/courses/packet-tracer - Cisco Packet Tracer.
Ns Manual, Available at: https://www.isi.edu/nsnam/ns/ns-documentation.html, 2011.
https://www.wireshark.org/docs/wsug_html_chunked/ -Wireshark.
https://nptel.ac.in/courses/106105183/25
http://www.nptelvideos.in/2012/11/computer-networks.html
https://nptel.ac.in/courses/106105183/3
http://vlabs.iitb.ac.in/vlabs-dev/labs_local/computer-networks/labs/explist.php

A40523-FULL STACK DEVELOPMENT – II (Skill Enhancement Course)

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	1	2	42	0	0	2	30	70	100

1. Course Objectives: The main objectives of the course are to

- Make use of Modern- day JavaScript with ES6 standards for designing Dynamic web pages
- Building robust & responsive User Interfaces using popular JavaScript library '**React.js**'. Building robust backend APIs using '**Express. js**'
- Establishing the connection between frontend (React) User interfaces and backend APIs (Express) with Data Bases(My SQL)
- Familiarize students with GitHub for remote repository hosting and collaborative development.

2.Course Outcomes:

- CO1: Building fast and interactive UIs
- CO2: Applying Declarative approach for developing web apps
- CO3: Understanding ES6 features to embrace modern JavaScript
- CO4: Building reliable APIs with Express. Js
- CO5: Create and manage Git repositories, track changes, and push code to GitHub.

Experiments covering the Topics:

- Introduction to DOM (Document Object Model), Ecma Script (ES6) standards and features like Arrow functions, Spread operator, Rest operator, Type coercion, Type hoisting, String literals, Array and Object Destructuring.
- Basics of React. js like React Components, JSX, Conditional rendering Differences between Real DOM and Virtual DOM.
- Important React.js concepts like React hooks, Props, React forms, Fetch API, Iterative rendering using JavaScript map() function.
- JavaScript runtime environment node. js and its uses, Express. js and Routing, Micro-Services architecture and MVC architecture, database connectivity using (My SQL)
- Introduction to My SQL, setting up MySQL and configuring, Databases, My SQL queries, subqueries, creating My SQL driver for database connectivity to Express. js server.
- Introduction to Git and GitHub and upload project& team collaboration

Sample Experiments:

1. **Introduction to Modern JavaScript and DOM**

a. Write a JavaScript program to link JavaScript file with the HTML page
b. Write a JavaScript program to select the elements in HTML page using selectors
c. Write a JavaScript program to implement the event listeners
d. Write a JavaScript program to handle the click events for the HTML button elements

e. Write a JavaScript program to With three types of functions

i. Function declaration

ii. Function definition

iii. Arrow functions

2. Basics of React. js

a. Write a React program to implement a counter button using react class components

b. Write a React program to implement a counter button using react functional components

c. Write a React program to handle the button click events in functional component

d. Write a React program to conditionally render a component in the browser

e. Write a React program to display text using String literals

3. Important concepts of React. js

a. Write a React program to implement a counter button using React use State hook

b. Write a React program to fetch the data from an API using React use Effect hook

c. Write a React program with two react components sharing data using Props.

d. Write a React program to implement the forms in react

e. Write a React program to implement the iterative rendering using map() function.

4. Introduction to Git and GitHub

a. **Setup**

- Install Git on local machine.
- Configure Git (user name, email).
- Create GitHub account and generate a personal access token.

b. **Basic Git Workflow**

- Create a local repository using git init
- Create and add files → git add .
- Commit files → git commit -m "Initial commit"
- Connect to GitHub remote → git remote add origin <repo_url>
- Push to GitHub → git push -u origin main

c. **Branching and Collaboration**

- Create a branch → git checkout -b feature1
- Merge branch to main → git merge feature1
- Resolve merge conflicts (guided)

5. Upload React Project to GitHub

- Create a new React app using npx create-react-app myapp
- Initialize a git repo and push to GitHub
- Use .gitignore to exclude node_modules
- Create multiple branches: feature/navbar, feature/form
- Practice merge and pull requests (can use GitHub GUI)

6. Introduction to Node. js and Express. js

a. Write a program to implement the 'hello world' message in the route through the browser using Express

b. Write a program to develop a small website with multiple routes using Express. js

c. Write a program to print the 'hello world' in the browser console using Express. js

d. Write a program to implement the CRUD operations using Express. js

e. Write a program to establish the connection between API and Database using Express – My SQL driver

7. Introduction to My SQL

a. Write a program to create a Database and table inside that database using My SQL Command line client

b. Write a My SQL queries to create table, and insert the data, update the data in the table

c. Write a My SQL queries to implement the subqueries in the My SQL command line client

d. Write a My SQL program to create the script files in the My SQL workbench

e. Write a My SQL program to create a database directory in Project and initialize a database. sql file to integrate the database into API

8. Team Collaboration Using GitHub

- Form groups of 2–3 students
- Create a shared GitHub repo
- Assign tasks and work in branches
- Use Issues, Pull Requests, and Code Reviews
- Document code with README.md

Textbooks:

1. Web Design with HTML, CSS, JavaScript and JQuery Set Book by Jon Duckett Professional JavaScript for Web Developers Book by Nicholas C. Zakas
2. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.
3. Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node, Vasan Subramanian, 2nd edition, APress, O'Reilly.
4. Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites by Robin Nixon
5. AZAT MARDAN, Full Stack Java Script: Learn Back bone. js, Node.jsand Mongo DB.2015

Reference Books:

1. Full-Stack JavaScript Development by Eric Bush.
2. Programming the World Wide Web, 7th Edition, Robet W Sebesta, Pearson, 2013.
3. Tomasz Dyl ,KamilPrzeorski , MaciejCzarnecki, Mastering Full Stack React Web Development 2017

Online Learning Resources:

1. https://ict.iitk.ac.in/product/full-stack-developer-html5-css3-js-bootstrap-php-4/
2. https://www.w3schools.com/html
3. https://www.w3schools.com/css
4. https://www.w3schools.com/js/
5. https://www.w3schools.com/nodejs
6. https://www.w3schools.com/typescript
7. https://docs.github.com/
8. https://education.github.com/git-cheat-sheet-education.pdf

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	42	0	0	1	30	70	100

1.Course Description

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 objectives: Theobjectives of the courseareto	
1	Encourage Innovation and Creativity
2	Provide Hands-on Learning and Impart Skill Development
3	Foster Collaboration and Teamwork
4	Enable Interdisciplinary Learning, Prepare for Industry and Entrepreneurship
5	Impart Problem-Solving mind-set

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

2.Course Outcomes:

The students will be able to experiment, innovate, and solve real-world challenges.

List of experiments:

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 Tinkercad.
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.

Students need to refer to the following links:

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

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A40536-INTRODUCTION TO QUANTUM TECHNOLOGIES AND APPLICATIONS

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

1.Course Objectives :

- 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.

2.Course Outcomes :

- Explain core quantum principles in a non-mathematical manner.
- Compare classical and quantum information systems.
- Identify theoretical issues in building quantum computers.
- Discuss quantum communication and computing concepts.
- Recognize applications, industry trends, and career paths in quantum technology.

Unit 1: 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 2: 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 3: 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 4: 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 5: 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

Textbooks:

- Michael A. Nielsen, Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press, 10th Anniversary Edition, 2010.
- Eleanor Rieffel and Wolfgang Polak, Quantum Computing: A Gentle Introduction, MIT Press, 2011.
- Chris Bernhardt, Quantum Computing for Everyone, MIT Press, 2019.

Reference Books:

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

SEMESTER- VI

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		VI SEMESTER (III YEAR)								
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A43102	Introduction To Machine Learning	PC	3	0	0	3	30	70	100
2	A40525	Cloud Computing	PC	3	0	0	3	30	70	100
3	A40526	Cryptography & Network Security	PC	3	0	0	3	30	70	100
4	 A40527a A40527b A40527c A40527d A40527e A40527f	**Professional Elective-II** Object Oriented system Development using UML, Java and Patterns Cyber Security DevOps Embedded Systems Design Human Computer Interaction Social Networks	PE	3	0	0	3	30	70	100
5	 A40528a A40528b A40528c A40528d	**Professional Elective-III** Software Project Management Mobile Adhoc Networks Natural Language Processing Distributed Operating System	PE	3	0	0	3	30	70	100
6		OpenElective–II	OE	3	0	0	3	30	70	100
7	A40529	Introduction to Machine Learning Lab	PC	0	0	3	1.5	30	70	100
8	A40530	Cryptography & Network Security Lab	PC	0	0	3	1.5	30	70	100
9	A40021	Soft skills ORIELTS	SEC	0	1	2	2	30	70	100
10	A40033	Technical Paper Writing & IPR	MC	2	0	0	-	100*	-	100*
		TOTAL		20	01	08	23	270	630	900

12 week MOOCs Swayam/NPTEL courser commended by the BoS

OpenElective–II

Course Code	Title of the Course	L-T-P	Credits	Offered by
A40173	Disaster Management	3-0-0	3	CE
A40174	Sustainability In Engineering Practices	3-0-0	3	CE
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
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
A40275	Non-conventional energy Resources	3-0-0	3	EEE

A43102- Introduction To Machine Learning

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

Course Objectives:

- To introduce the fundamental concepts and types of machine learning.
- To develop a deep understanding of supervised and unsupervised learning algorithms.
- To understand mathematical foundations of learning models and algorithms.
- To evaluate model performance using appropriate statistical and analytical tools.
- To apply machine learning techniques to solve real-world problems using tools such as Scikit-learn.

Course Outcomes:

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

- Understand and distinguish among different types of learning methods.
- Apply supervised and unsupervised learning algorithms to datasets.
- Analyze model performance using cross-validation and error metrics.
- Build, test, and improve machine learning models for classification and prediction.
- Use Python-based libraries (e.g., Scikit-learn) to implement ML algorithms.

UNIT I: Introduction to Machine Learning and Linear Models

Definition and Scope of Machine Learning, Applications and Types of Learning: Supervised, Unsupervised, Reinforcement, Linear Regression: Least Squares, Cost Function, Gradient Descent, Polynomial Regression and Overfitting, Evaluation Metrics: RMSE, MAE, R^2 Score, Bias-Variance Trade off.

UNIT II: Classification Algorithms

Classification Overview and Decision Boundaries, Logistic Regression: Sigmoid Function and Cost, K-Nearest Neighbors (KNN), Naïve Bayes Classifier, Decision Trees and Random Forests, Model Evaluation: Confusion Matrix, Precision, Recall, F1-Score.

UNIT III: Support Vector Machines and Ensemble Methods

Support Vector Machines: Concepts, Kernels, Hyperplane and Margin Concepts, Kernel Tricks: RBF and Polynomial, Ensemble Learning: Bagging, Boosting, and Voting, Gradient Boosting, AdaBoost, and XGBoost, Model Tuning and Hyperparameter Optimization.

UNIT IV: Unsupervised Learning Techniques

Clustering Overview: Applications, K-Means Clustering Algorithm, Hierarchical Clustering, DBSCAN and Density-Based Methods, Principal Component Analysis (PCA) for Dimensionality Reduction, Silhouette Score, Davies-Bouldin Index for Cluster Validation.

UNIT V: Advanced Topics and Applications

Reinforcement Learning Basics and Markov Decision Processes, Introduction to Neural Networks and Deep Learning, Cross-Validation Techniques: k-Fold, Leave-One-Out, Feature Engineering and Feature Selection, Deployment of ML Models (Flask, Streamlit, etc.), Case Studies: Medical Diagnosis, Spam Detection, Credit Scoring.

***Textbooks*:**

1. Tom Mitchell, **Machine Learning**, McGraw-Hill Education.
2. Aurélien Géron, **Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow**, O'Reilly Media.
3. Ethem Alpaydin, **Introduction to Machine Learning**, MIT Press.

***Reference Books*:**

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, **The Elements of Statistical Learning**, Springer.
2. Kevin P. Murphy, **Machine Learning: A Probabilistic Perspective**, MIT Press.
3. Christopher Bishop, **Pattern Recognition and Machine Learning**, Springer.

***Online Learning Resources*:**

1. Coursera – Machine Learning by Andrew Ng (Stanford University)
2. Scikit-learn Documentation
3. Kaggle Learn – Machine Learning
4. Google's Machine Learning Crash Course
5. YouTube – StatQuest with Josh Starmer

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A40525- CLOUD 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

Course Objectives:

- To explain the evolving computer model called cloud computing.
- To introduce the various levels of services that can be achieved by cloud.
- To describe the security aspects in cloud.
-

Course Out comes (CO):

- After completion of the course, students will be able to
- Ability to create cloud computing environment
- Ability to design applications for Cloud environment
- Design & develop back up strategies for cloud data based on features.
- Use and Examine different cloud computing services.
- Apply different cloud programming model as perneed.
-

UNIT I Basics of Cloud computing Lecture 8Hrs

Introduction to cloud computing: Introduction, Character is tics of cloud computing, Cloud Models, Cloud Services Examples, Cloud Based services and applications

Cloud concepts and Technologies: Virtualization, Load balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined, Network function virtualization, Map Reduce, Identity and Access Management, services level Agreements, Billing.

Cloud Services and Plat forms: Compute Services, Storage Services, Data, base Services, Application services, Content delivery services Analytics Services, Deployment and Management Services, Identity and Access Management services, Open Source Private Cloud software.

UNIT II Hadoop and Python Lecture 9Hrs

Hadoop Map Reduce: Apache Hadoop, Hadoop Map Reduce Job Execution, Hadoop Schedulers, Hadoop Clusterset up.

Cloud Application Design: Reference Architecture for Cloud Applications, Cloud Application Design Methodologies, Data Storage Approaches.

Python Basics: Introduction, Installing Python, Python data Types & Data Structures,Controlflow,Function,Modules,Packages,Filehandling,Date/TimeOperations,Classes.

UNIT III Python for Cloud computing Lecture 8Hrs

Python for Cloud: Python for Amazon web services, Python for Google Cloud Platform, Python for windows Azure, Python for Map Reduce, Python packages of Interest, Python web Application Frame work, Designing a REST ful web API.

Cloud Application Developmentin Python: Design Approaches, Image Processing APP, Document Storage App, Map Reduce App, Social Media Analytics App.

UNIT IV Big data, multimedia and TuningLecture8Hrs

Big Data Analytics: Introduction, Clustering Big Data, Classification of Big data Recommendation of Systems.

Multimedia Cloud: Introduction, Case Study: Live video Streaming App, Streaming Protocols, case Study: Video Trans coding App.

Cloud Application Bench marking and Tuning: Introduction, Work load Character is tics, Application Performance Metrics, Design Considerations for a Bench marking Methodology, Bench marking Tools, Deployment Prototyping, Load Testing & Bottleneck Detection case Study, Hadoop bench marking caseStudy.

UNIT V Applications and Issues in Cloud Lecture 9Hrs

Cloud Security: Introduction, CSA Cloud Security Architecture, Authentication, Authorization, Identity Access Management, Data Security, Key Management, Auditing.

Cloud for Industry, Health care & Education: Cloud Computing for Health care, Cloud computing for Energy Systems, Cloud Computing for Transportation Systems, Cloud Computing for Manufacturing Industry, Cloud computing for Education.

Migrating in to a Cloud: Introduction, Broad Approaches to migrating into the cloud, the seven– step model of migration in to a cloud.

Organizational readiness and Change Management in The Cloud Age: Introduction, Basic concepts of Organizational Readiness, Drivers for changes: A frame work to comprehend the competitive environment, common change management models, change management maturity models, Organizational readiness self– assessment.

Legal Issues in Cloud Computing: Introduction, Data Privacy and security Issues, cloud contracting models, Jurisdictional issues raised by virtualization and at a location, commercial and business considerations, Special Topics.

Text books:

1. Cloud computing Ahands - on Approach ||By Arshdeep Bahga, Vijay Madisetti, Universities Press, 2016
2. Cloud Computing Principles and Paradigms: By RajKumar Buyya, James Broberg, Andrzej Goscinski, Wiley, 2016

Reference Books:

1. Masterin g Cloud Computing by Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi, TMH
2. Cloud computing AHands-On Approach by Arshdeep Bahga and Vijay Madisetti.
3. Cloud Computing: A Practical Approach, Anthony T.Velte, To by J.Velte, Robert Elsenpeter, Tata Mc Graw Hill, rp 2011.
4. Enterprise Cloud Computing, Gautam Shroff, Cambridge University Press, 2010.
5. Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, George Reese, O'Reilly, SPD, rp 2011.
6. Essentials of Cloud Computing by K.Chandrasekaran. CRC Press.

Online Learning Resources:

Cloud computing – Course (nptel.ac.in)

A40526-CRYPTOGRAPHY & NETWORK SECURITY

Hours Per 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

Course Objectives:

This course aim sat training students to master the:

- The concepts of classical encryption techniques and concepts of finite fields and number theory
- Working principles and utilities of various crypto graphic algorithms including secret key crypto graphy, hashes, and message digests, and public key algorithms
- Design issues and working principles of various authentication protocols, PKI standards
- Various secure communication standards including Kerberos, I Psec, TLS and email
- Concepts of crypto graphic utilities and authentication mechanisms to design secure applications

Course Out comes:

- After completion of the course, students will be able to
- Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts off in it fields and number theory
- Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication
- Apply the knowledge of crypto graphic check sums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
- Demonstrate the ability to apply **user authentication principles** including **Kerberos** for secure authentication
- Gain proficiency in securing web communications using **TLS** and **HTTPS**, manage secure remote access with **SSH**, and design **firewall policies**

UNIT-I **9Hrs**

Computer and Network Security Concepts: Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Classical Encryption Techniques: Sym metric Cip her Model, Substitution Techniques, Transposition Techniques, Steganography, Block Ciphers: Traditional Block Cipher Structure, The Data Encryption Standard, Advanced Encryption Standard: AES Structure, AES Transformation Functions

UNIT II **9Hrs**

Number Theory:
The Euclidean Algorithm, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder Theorem, Discrete Logarithms, Finite Fields: Finite Fields of the Form GF(p), Finite Fields of the Form GF(2n) .
Public Key Cryptography: Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie Hellman Key Exchange, Elliptic Curve Cryptography.

UNIT-III **9Hrs**

Cryptographic Hash Functions: Application of Cryp to graphic Hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC &CMAC. **Digital Signatures**: NIST Digital Signature Algorithm, Distribution of Public Keys, X.509 Certificates, Public- Key Infrastructure

UNITIV **9Hrs**

User Authentication: Remote User Authentication Principles, Kerberos. Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME.

IP Security: IP Security Overview, IP Security Policy, Encapsulating Security Payload, Combining Security Associations, Internet Key Exchange.

UNIT V **8Hrs**

Transport Level Security: Web Security Requirements, Transport Layer Security (TLS), HTTPS, Secure Shell (SSH)

Fire walls: Fire wall Character is tics and Access Policy, Types of Fire walls, Fire wall Location and Configurations.

Text books:

1) Cryptography and Network Security – William Stallings, Pearson Education, 8th Edition.
2) Cryptography, Network Security and Cyber Laws–Bernard Menezes, Cengage Learning, 2010 edition.

Reference Books:

1) Cryptography and Network Security-BehrouzA Forouzan, Debdeep Mukhopadhyaya, Mc- Graw Hill, 3rdEdition, 2015.
2) Network Security Illustrated, Jason Albanese and Wes Sonnenreich, MGH Publishers, 2003.

Online Learning Resources:

1) https://nptel.ac.in/courses/106/105/106105031/lecture
2) https://nptel.ac.in/courses/106/105/106105162/lecturebyDr.SouravMukhopadhyayIITKharagpur[VideoLecture]
3) https://www.mitel.com/articles/web-communication-cryptography-and-network-security web articles by Mitel Power Connections

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A40527a-OBJECT ORIENTED ANALYSIS AND DESIGN
(Professional Elective-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

Course Objectives:

1. Describe the activities in the different phases of the object-oriented development life cycle.
2. Understand the concepts of object-oriented model with the E-Rand EER models.
3. Modelareal-worldapplication by usingUML diagram.
4. Design architectural modelling.
5. Describing an application of UML.

Course Outcomes:

At the end of the course, student will be able to

1. TheimportanceofmodellinginUML.
2. Compare and contrast the object –or iented model with the E-RandEER models.
3. Design use case diagram. Design an application using deployment diagram.
4. Apply UML diagrams to build library application.

UNIT–I

Introduction to UML: Importance of modelling, principles of modelling, object-oriented modelling, conceptual model of the UML, Architecture, Software Development Life Cycle.

UNIT–II

Basic Structural Modelling: Classes, Relationships, common Mechanisms, and diagrams.

Advanced Structural Modelling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Class & Object Diagrams: Terms, concepts, modelling techniques for Class & Object Diagrams.

UNIT–III

Basic Behavioural Modelling-I: Interactions, Interaction diagrams.
Basic Behavioural Modelling-II: Use cases, Use case Diagrams, Activity Diagrams.

UNIT–IV

Advanced Behavioral Modelling: Events and signals, state machines, processes and Threads, time and space, state chart diagrams. Architectural Modelling: Component, Deployment, Component diagrams and Deployment diagrams.

UNIT–V

Patterns and Frameworks, Artifact Diagrams. Case Study: The Unified Library application.

TextBooks:

Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modelling Language User Guide, Pearson Education 2nd Edition.

Object-Oriented Analysis and Design with the Unified Process By John W. Satzinger,RobertB Jackson and Stephen D Burd, Cengage Learning.

ReferenceBooks:

1. MeilirPage-Jones: Fundamentals of Object- Oriented Designin UML, Pearson Education.

2. PascalRoques: Modelling Software Systems Using UML2, WILEY- Dreamtech India Pvt. Ltd.

3. AtulKahate: Object Oriented Analysis & Design, The McGraw- Hill Companies.

4. MarkPriestley: Practical Object-Oriented Design withUML,TMH.

Appling UM Land Patterns: An introduction to Object–Oriented Analysis and Design

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A40527b- CYBER SECURITY Professional Elective-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

Course Objectives:

The course is designed to provide awareness on different cyber crimes, cyber offenses, tools and methods used in cybercrime.

Course Outcomes:

After completion of the course, students will be able to

- Classify the cybercrimes and understand the Indian ITA 2000
- Analyse the vulnerabilities in any computing system and find the solutions
- Predict the security threats of the future
- Investigate the protection mechanisms
- Design security solutions for organizations

UNIT I Introduction to Cybercrime 8Hrs

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 Offenses: How Criminals Plan Them 9Hrs

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: Mobile and Wireless Devices 9Hrs

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 an Measures in Mobile Computing Era, Laptops.

UNIT IV Tools and Methods Used in Cybercrime 8Hrs

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 8Hrs

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.

Text books:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA.

Reference Books:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan- Hwa(john) Wu,J. David Irwin.CRC Press T&F Group

Online Learning Resources:

http://nptel.ac.in/courses/106105031/40
http://nptel.ac.in/courses/106105031/39 , http://nptel.ac.in/courses/106105031/38

A40527c-DevOps Professional Elective-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

Pre-requisite:
Fundamentals of software development and maintenance

Course Objectives:
- Understand collaboration and productivity by automating infrastructure and workflows
- Familiarize with continuous measuring applications performance

Course Outcomes: After completion of the course, students will be able to
- Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT serviceability
- Describe Dev Ops &Dev Sec Ops methodologies and their key concepts
- Illustrate the types of version control systems, continuous integration tools, continuous monitoring tools, and cloud models
- Set up complete private infrastructure using version control systems and CI/CD tools

UNIT I 8 Hrs
Dev Ops: An Overview, Dev Ops: Origins, Dev Ops: Roots, Dev Ops: Practices Dev Ops: Culture.
Adopting Dev Ops: Developing the Playbook. Developing a Business Case for a Dev Ops: Developing the Business Case
UNIT II9 Hrs
Completing the Business Model Canvas, Customer Segments, Value Segments, Value Propositions, Channels, Customer Relationships, Revenue Streams, Key Resources, Key Activities, Key Partnerships, Cost Structures. Dev Ops Plays for Optimizing the delivery Pipeline: Dev Ops as an optimization Exercise, Core Themes, The Dev Ops Plays, Specializing Core Plays

UNIT III8Hrs
Dev Ops Plays for Driving Innovation: Optimize to Innovate, The Uber Syndrome, Innovation and the Role of Technology, Core Themes, play: Build a Dev Ops Platform, play: Deliver Micro services Architectures, play: DevOps an API Economy, play: Organizing for Innovation.

UNIT IV10 Hrs
Scaling Dev Ops for the Enterprise: Core Themes, play: Dev Ops Center of Competency, play: Developing Culture of Innovation at Scale, play: Developing a Culture of continuous Improvement, play: Team Models for Dev Ops, play: Standardization of Tools and Process, play: Security Considerations for Dev Ops, Play: Dev Ops and Outsourcing.

UNIT V10 Hrs
Leading Dev Ops Adoption in the Enterprise: Play: Dev Ops as a transformation Exercise, play: Developing a Culture of Collaboration and Trust, play: Dev Ops Thinking for the Line of Business, play: starting with Pilot Projects, Play: Rearing Unicorns on an Aircrafts Carrier. Appendix Case Study: Example Dev Ops Adoption Roadmap Organization Background, Roadmap Structure, Adoption Roadmap.

Text books:

1. Sanjeev Sharma, The Dev Ops Adoption Playbook, Published by John Wiley & Sons, Inc.2017

Reference Books:

1. Sanjeev Sharma & Bernie Coyne, Dev Ops for Dummies, Published by John Wiley & Sons, Inc.
2. Michael Huttermann, Dev Ops for Developers, Apress publishers, 2012.

Online Learning Resources:

Learning Dev Ops with Terra form Infrastructure Automation Course | Udemy

A40527d-EMBEDDED SYSTEM DESIGN
Professional Elective-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

Course Objectives:

1. To understand the history, classification, and design process of embedded systems.
2. To explore the core components of embedded systems, including processors, memory, and I/O components.
3. To introduce onboard and external communication interfaces used in embedded systems.
4. To explain different firmware design approaches and programming techniques for embedded systems.
5. To provide an understanding of real-time operating systems and task management in embedded systems.

Course Outcomes:

After completing the course, the student will be able to,

1. Classify embedded systems based on their purpose, generation, and complexity.
2. Identify and select appropriate hardware components for an embedded system design.
3. Differentiate and implement various communication protocols like I2C, SPI, and CAN.
4. Develop firmware using assembly and high-level programming languages.
5. Analyze and apply RTOS-based task scheduling and synchronization techniques.

UNIT I Introduction to Embedded Systems

History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, The embedded system design process-requirements, specification, architecture design, designing hardware and software, components, system integration, Applications of embedded systems, and characteristics of embedded systems.

UNIT II Typical Embedded System

Core of the embedded system-general purpose and domain specific processors, ASICs, PLDs, COTs; Memory-ROM, RAM, memory according to the type of interface, memory shadowing, memory selection for embedded systems, Sensors, actuators, I/O components: seven segment LED, relay, piezo buzzer, push button switch, other sub-systems: reset circuit, brownout protection circuit, oscillator circuit real time clock, watch dog timer.

UNIT III Communication Interface

Onboard communication interfaces-I2C, SPI, CAN, parallel interface; External communication interfaces-RS232 and RS485, USB, infrared, Bluetooth, Wi-Fi, ZigBe, GPRS, GSM.

UNIT IV Embedded Firmware Design and Development

Embedded firmware design approaches-super loop based approach, operating system based approach; embedded firmware development languages-assembly language based development, high level language based development.

UNIT V RTOS based Embedded System Design

Operating system basics, types of operating systems, tasks, process and threads, multiprocessing and multitasking, task scheduling: non-pre-emptive and pre-emptive scheduling; task communication-shared memory, message passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/ Synchronization Issues, Task Synchronization Techniques

Text books:

1. Introduction to Embedded Systems - Shibu KV, Mc Graw Hill Education.
2. Computers as Components –Wayne Wolf, Morgan Kaufmann (second edition).

References:

1. Embedded System Design -Frank Vahid, Tony Grivargis, john Wiley.
2. Embedded Systems- An integrated approach - Lyla b das, Pearson education 2012.
3. Embedded Systems – Raj Kamal, TMH

A40528a-SOFTWARE PROJECT MANAGEMENT
(Professional Elective-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

Course Objective:

This course is designed to enable the students to understand the fundamental principles of Software Project management &will also have a good knowledge of the responsibilities of a project manager and how to handle them.

Course Out comes:

After completion of the course, students will be able to

- Describe the fundamentals of Project Management
- Recognize and use Project Scheduling Techniques
- Familiarize with Project Control Mechanisms
- Under stand Team Management
- Recognize the importance of Project Documentation and Evaluation

UNIT-I **Lecture9Hrs**

Conventional Software Management: The water fall model, conventional software Management performance Evolution of Software Economics: software Economics. Pragmatic Software Cost Estimation Improving Software Economics: Reducing Software Product Size, Improving Software Processes, Improving Team Effectiveness, Improving Automation, Achieving Required Quality ,Peer Inspections.

UNIT-II **Lecture9Hrs**

The old way and the new: The principles of convention al software Engineering, principles of modern software management, transitioning to aniterative process.

Lifecycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts

UNIT-III **Lecture 9Hrs**

Work Flows of the process: Software process work flows, Inter Trans work flows.Check points of the Process: Major Mile Stones, Minor Milestones, Periodic status assessments. Iterative Process Planning: work break down structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning

UNIT-IV **Lecture9Hrs**

Process Automation: Automation Building Blocks, The Project Environment.

Project Control and Process instrumentation: The sevencore Metrics, Management indicators, quality indicators Tailoring the Process: Process discriminants. Managing people and organizing teams.

UNIT-V **Lecture9Hrs**

Project Organizations and Responsibilities: Line - of-Business Organizations, Project Organizations, evolution of Organizations.

Future Software Project Management: modern Project Profiles, Next generation Software economics, modern process stransitions.

Case Study: The Command Center Processing and Display System-Replacement (CCPDS-R)

Text books:

1. Software Project Management, Walker Royce,Pearson Education,2012
2. BobHughes, Mike Cotterell and RajibMall “Software Project Management”, 6thEdition, Mc Graw Hill Edition, 2017

Reference Books:

1. PankajJalote, “Software Project Management in practice”, 5th Edition, Pearson Education, 2017.
2. Murali K.Chemuturi,Thomas M.Cagley Jr.”Mastering Software Project Management: Best Practices, Tools and Techniques”, J.Ross Publishing, 2010
3. SanjayMohapatra, “Software Project Management”, Cengage Learning, 2011

Online Learning Resources:

http://nptel.ac.in/courses/106101061/29

A40528b-MOBILE ADHOC NETWORKS
(Professional Elective-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

Course Objective:

- Knowledge of mobile ad hoc networks, design and implementation issues, and available solutions.
- Knowledge of routing mechanisms and the three classes of approaches: proactive, on-demand, and hybrid.
- Knowledge of clustering mechanisms and the different schemes that have been employed, e.g., hierarchical, flat, and leaderless.
- Knowledge of the 802.11 Wireless Lan (WiFi) and Bluetooth standards.

Course Outcomes:

- Describe the unique issues in ad-hoc/sensor networks.
- Describe current technology trends for the implementation and deployment of wireless ad-hoc/sensor networks.
- Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc/sensor networks.
- Discuss the challenges in designing routing and transport protocols for wireless Adhoc/sensor networks.
- Comprehend the various sensor network Platforms, tools and applications

UNIT- I

Introduction to Ad Hoc Networks:

Characteristics of MANETs, Applications of MANETs and challenges ofMANETs -Routing in MANETs: Criteria for classification, Taxonomy of MANET routing algorithms, Topology based routing algorithms, Position based routing algorithms, Other routing algorithms.

UNIT -II

Data Transmission:

Broadcast storm problem, Broadcasting, Multicasting and Geocasting -TC Pover Ad Hoc:

TCP protocol overview, TCP and MANETs, Solutions for TCP over Ad hoc

UNIT- III

Basics of Wireless, Sensors and Applications:

Applications, Classification of sensor networks, Architecture of sensor network, Physical layer, MAC layer, Link layer.

UNIT- IV

Data Retrieval in Sensor Networks:

Routing layer, Transport layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs, Sensor Networks and mobile robots-Security:

Security in Ad Hoc networks, Key management, Secure routing, Cooperation in MANETs, Intrusion Detection systems.

UNIT- V

Sensor Network Platforms and Tools: Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms -Operating System: Tiny OS -Imperative Language: nesC, Data flow style language: Tiny GALS, Node Level Simulators, ns-2 and its sensor network extension.

TEXT BOOKS:

1. Ad Hoc and Sensor Networks –Theory and Applications, Carlos Corderio Dharma P. Aggarwal,World Scientific Publications, March 2006,ISBN –981-256-681-3.
2. Wireless Sensor Networks: An Information Processing Approach, Feng Zhao, Leonidas Guibas, Elsevier Science, ISBN –978-1-55860-914-3 (Morgan Kauffman)

A40528c-NATURAL LANGUAGE PROCESSING
(Professional Elective-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

Course Objectives

- Explain and apply fundamental algorithms and techniques in the area of natural language processing(NLP)
- Discuss approaches to syn tax and semantics in NLP.
- Examine current methods for statistical approach esto machine translation.
- Teach machine learning techniques used in NLP.

Course Out comes:

After completion of the course, students will be able to

- Under stand the various NLP Applications and Organization of Natural language, able to learn and implement realistic applications using Python.
- Apply the various Parsing techniques, Bayes Rule, Shannongame, Entropy and Cross Entropy.
- Under stand the fundamentals of CFG and parsers and mechan is msin ATN's.
- Apply Semantic Interpretation and Language Modelling.
- Apply the concept of Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.

UNIT- I Introduction to Natural language

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Under standing Systems, Linguistic Back ground: Anoutline of English Syn tax.

UNIT- II Grammars and Parsing

Grammars and Parsing – Top – Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphologica l Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayees Rule, Shannongame, Entropy and Cross Entropy.

UNIT- III Grammars for Natural Language

Grammars for Natural Language, Movement Phenomenonin Language, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

UNIT-IV

Semantic Interpretation

Semantic &Logical form, Word senses &ambiguity, The basic logical form language, Encoding ambiguity in the logical Form, Verbs &States in logical form, The maticroles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modelling

Introduction,n-GramModels, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modelling Problems, Multilingual and Cross lingual Language Modelling.

UNIT-V
Machine Translation

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches ,Current Status .Anusarakaor Language Accessor: Background, Cutting the GordianKnot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Givingup Agreementin Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval

Introduction, Document Pre-processing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization

Introduction, Approach esto Summarization, Evaluation, How to Builda Summarizer, Competitions and Datasets.

Textbooks:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications: From Theory To Practice- Daniel M.Bikel and ImedZitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi, Vineetchaitanya, Prentice – Hall of India.

Reference Books:

1. Charniack, Eugene, Statistical Language Learning, MITPress,1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Hen rich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

Online Learning Resources:

https://nptel.ac.in/courses/106/105/106105158/http://www.nptelvideos.in/2012/11/natural-language-processing.html

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A40528d-DISTRIBUTED OPERATING SYSTEMS
(Professional Elective-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

Course Objectives

- To study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems)
- Hardware and software features that support these systems.

Course Outcomes

- Understand the design approaches of advanced operating systems
- Analyze the design issues of distributed operating systems.
- Evaluate design issues of multi processor operating systems.
- Identify the requirements Distributed File System and Distributed Shared Memory.
- Formulate the solutions to schedule the real time applications.

UNIT - I

Architectures of Distributed Systems: System Architecture Types, Distributed Operating Systems, Issues in Distributed Operating Systems, Communication Primitives. Theoretical Foundations: Inherent Limitations of a Distributed System, Lam port's Logical Clocks, Vector Clocks, Causal Ordering of Messages, Termination Detection.

UNIT - II

Distributed Mutual Exclusion: The Classification of Mutual Exclusion Algorithms, Non-Token –Based Algorithms: Lamport's Algorithm, The Ricart-Agrawalsa Algorithm, Maekawa's Algorithm,Token-Based Algorithms: Suzuki-Kasami's Broadcast Algorithm, Singhal's Heurisric Algorithm,Raymond's Heuristic Algorithm.

UNIT - III

Distributed Deadlock Detection: Preliminaries, Deadlock Handling Strategies in Distributed Systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized- Deadlock – Detection Algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms

UNIT - IV

Multiprocessor System Architectures: Introduction, Motivation for multiprocessor Systems, Basic Multiprocessor System Architectures Multi Processor Operating Systems: Introduction, Structures of Multiprocessor Operating Systems, Operating Design Issues, Threads, Process Synchronization, Processor Scheduling. Distributed File Systems: Architecture, Mechanisms for Building Distributed File Systems, Design Issues

UNIT - V

Distributed Scheduling: Issues in Load Distributing, Components of a Load Distributed Algorithm, Stability, Load Distributing Algorithms, Requirements for Load Distributing, Task Migration, Issues in task Migration Distributed Shared Memory: Architecture and Motivation, Algorithms for Implementing DSM, Memory Coherence, Coherence Protocols, Design Issues

TEXT BOOK:

1. Advanced Concepts in Operating Systems, Mukesh Singhal, Niranjan G. Shivaratri, Tata Mc Graw-Hill Edition 2001

REFERENCE BOOK:

1. Distributed Systems: Andrew S. Tanenbaum, Maarten Van Steen, Pearson Prentice Hall, Edition – 2, 2007

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
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A40529-INTRODUCTION TO MACHINE LEARNING LAB

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

Course Objectives:

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.

Course Outcomes (CO):

After completion of the course, students will be able to

- Understand the Mathematical and statistical prospectives of machine learning algorithms through python programming
- Appreciate the importance of visualization in the data analytics solution.
- Derive insights using Machine learning algorithms

List of Experiments:

a. The programs can be implemented in either JAVA or Python.
b. For Problems 1 to 6 and 10, programs are to be developed without using the built-in classes or APIs of Java/Python.
c. Data sets can be taken from standard repositories (https://archive.ics.uci.edu/ml/datasets.html) or constructed by the students.

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
4. Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.
5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

Projects

1. Predicting the Sale price of a house using Linear regression
2. Spam classification using Naïve Bayes algorithm
3. Predict car sale prices using Artificial Neural Networks
4. Predict Stock market trends using LSTM
5. Detecting faces from images

References:

1.Python Machine Learning Workbook for beginners, AI Publishing, 2020.

Online Learning Resources/ Virtual Labs:

1) Machine Learning A-Z (Python & R in Data Science Course) | Udemy
2) Machine Learning | Coursera

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A40530- CRYPTOGRAPHY AND NETWORK SECURITY LAB

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

List of Experiments:

1. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should XOR each character in this string with 0 and displays the result.

2. Write a C program that contains a string (char pointer) with a value 'Hello world'. The program should AND or and XOR each character in this string with 127 and display the result.

3. Write a Java program to perform encryption and decryption using the following algorithms
   a. Ceasercipher b. Substitution cipher c. Hill Cipher

4. Write a C/JAVA program to implement the DES algorithm logic.

5. Write a C/JAVA program to implement the Blowfish algorithm logic.

6. Write a C/JAVA program to implement the Rijndael algorithm logic.

7. Write the RC4 logic in Java Using Java cryptography; encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.

8. Write a Java program to implement RSA algorithm.

9. Implement the Diffie-Hellman Key Exchange mechanism using HTML and JavaScript.

10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

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A40021-SOFTSKILLS

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	1	2	42	0	0	2	30	70	100

Course Objectives:
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
Course Outcomes (CO):

COs	Statements	Blooms level
CO1	List out various elements of soft skills	L1, L2,
CO2	cribe methods for building professional image	L1, L2
CO3	Apply critical thinking skills in problem solving	L3
CO4	Analyse the needs of an individual and team for well-being	L4
CO5	Assess the situation and take necessary decisions	L5
CO6	Create a productive work place atmosphere using social and work-life skills ensuring personal and emotional well-being	L6

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:

I)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.

Alex K,*Soft Skills* S.Chand& Co, 2012 (Revised edition)

2)Gajendra Singh Chauhan& Sangeetha Sharma, *Soft Skills: An Integrated Approach to Maximise Personality*Published by Wiley, 2013

3)Pillai, Sabina & Fernandez Agna, *Soft Skills and Employability Skills,* Cambridge University Press, 2018

4)Dr. Rajiv Kumar Jain, Dr. Usha Jain, *Life Skills* (Paperback English) Publisher : Vayu Education of India,

2014

Online Learning Resources:

https://youtu.be/DUlsNJtg2L8?list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q

https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ

https://youtu.be/-Y-R9hDl7lU

https://youtu.be/gkLsn4ddmTs

https://youtu.be/2bf9K2rRWwo

https://youtu.be/FchfE3c2jzc

https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-training-games/

https://onlinecourses.nptel.ac.in/noc24_hs15/preview

https://onlinecourses.nptel.ac.in/noc21_hs76/preview

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A40033-Technical Report Writing & IPR

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	-	30		30

Course Objectives:·

1. To enable the students to practice the basic skills of research paper writing
2. To make the students understand the importance of IP and to educate them on the basic concepts of Intellectual Property Rights.
3. To practice the basic skills of performing quality literature review
4. To help them in knowing the significance of real life practice and procedure of Patents.
5. To enable them learn the procedure of obtaining Patents, Copyrights, & Trade Marks

Course Outcomes: On successful completion of this course, the students will be able to:

COURSE OUTCOMES: At the end of the course, students will be able to		**Blooms Level**
CO1	Identify key secondary literature related to their proposed technical paper writing	L1, L2
CO2	Explain various principles and styles in technical writing	L1, L2
CO3	Use the acquired knowledge in writing a research/technical paper	L3
CO4	Analyse rights and responsibilities of holder of Patent, Copyright, Trademark, International Trademark etc.	L4
CO5	Evaluate different forms of IPR available at national & international level	L5
CO6	Develop skill of making search of various forms of IPR by using modern tools and techniques.	L3, L6

UNIT – I:

Principles of Technical Writing: styles in technical writing; clarity, precision, coherence andlogical 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- Problemsand 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.

Textbooks:

1. Deborah. E. Bouchoux, *Intellectual Property Rights*, Cengage Learning India, 2013
2. Meenakshi Raman, Sangeeta Sharma. *Technical Communication:Principles and practices.*Oxford.

Reference Books:

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 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/

https://www.extension.purdue.edu/extmedia/ec/ec-723.pdf

SEMESTER-VII

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

		VII SEMESTER(IV BTECH)								
S.NO	Course Code	Title of the Course	Category	Periods per Week			Credits	Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	A40531	Deep Learning	PC	3	0	0	3	30	70	100
2	A40034 A40035 A40036	**Management Course- II** 1. Business Ethics and Corporate Governance 2. E-Business 3. Management Science	HSMC	2	0	0	2	30	70	100
3	A40532a A40532b A40532c A40532d	**Professional Elective-IV** 1. Software Architecture & Design Patterns 2. Block chainTechnology 3. Augmented Reality & Virtual Reality 4. Internet of Things	PE	3	0	0	3	30	70	100
4	A40533a A40533b A40533c A40533d	**Professional Elective-V** 1. Agile methodologies 2. Metaverse 3. Computer Vision 4. Cyber Physical Systems	PE	3	0	0	3	30	70	100
5		Open Elective-III	OE	3	0	0	3	30	70	100
6		Open Elective-IV	OE	3	0	0	3	30	70	100
7	A43121	Prompt Engineering	SEC	0	1	2	2	30	70	100
8	A40037	Gender Sensitization	MC	2	0	0	-	100*	-	100*
9	A40534	Evaluation of Industry Internship	PW	-	-	-	2	100	-	100
		TOTAL		19	01	02	21	310	490	800

12 week MOOCs Swayam / NPTEL course recommended by the BoS

OpenElective–III

Course Code	Title of the Course	L-T-P	Credits	Offered by
A40175	Building Materials and Services	3-0-0	3	CE
A40176	Environmental Impact Assessment	3-0-0	3	CE
A40273	Smart Grid Technologies	3-0-0	3	EEE
A40373	3D Printing Technologies	3-0-0	3	ME
A40473	Introduction to Microprocessors and Micro controllers	3-0-0	3	ECE
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

Course Code	Title of the Course	L-T-P	Credits	Offered by
A40177	Geo-Spatial Technologies	3-0-0	3	CE
A40178	Solid Waste Management	3-0-0	3	CE
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
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

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

A40531 - DEEP LEARNING

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

Course Objectives:

- Demonstrate the major technology trends driving Deep Learning
- Build, train, and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyse the key parameters and hyper parameters in a neural network's architecture

Course Outcomes:

After completion of the course, students will be able to

- Demonstrate the mathematical foundation of neural network
- Describe the machine learning basics
- Differentiate architecture of deep neural network
- Build a convolutional neural network
- Build and train RNN and LSTMs

UNIT-I Lecture 8Hrs

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.
Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

UNIT-II Lecture 9Hrs

Machine Learning: Basics and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

UNIT-III Lecture 8Hrs

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT-IV Lecture 9Hrs

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

UNIT V Lecture 8Hrs

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Text books:

1. Ian Good fellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press,2016.
2. Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.

Reference Books:

1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O’Reilly, Shroff Publishers,2019.
2. Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O’Reilly, Shroff Publishers,2019.

Online Learning Resources:

1. https://keras.io/datasets/
2. http://deeplearning.net/tutorial/deeplearning.pdf
3. https://arxiv.org/pdf/1404.7828v4.pdf
4. https://www.cse.iitm.ac.in/~miteshk/CS7015.html
5. https://www.deeplearningbook.org
   https://nptel.ac.in/courses/106105215

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
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Management Course- II
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
2	0	0	28	0	0	2	30	70	100

Course Objectives
The objectives of this course are
1 To make the student understand the principles of business ethics
2 To enable them in knowing about the ethics in management
3 To facilitate the student' role in corporate culture
4 To impart knowledge about the fair-trade practices
5 To encourage the student in knowing about the corporate governance

COURSE OUTCOMES: At the end of the course, students will be able to

CO1	Understand the Ethics and different types of Ethics.	L2
CO2	Understand business ethics and ethical practices in management	L2
CO3	Understand the role of ethics in management	L2
CO4	Apply the knowledge of professional ethics & technical ethics	L3
CO5	Analyze corporate law, ethics, codes & principles	L4
CO6	Evaluate corporate governance & corporate scams	L5

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.

LEARNING OUTCOMES:- After completion of this unit student will
- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Analyze issues & crisis of 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.

LEARNING OUTCOMES:- After completion of this unit student will
- Understand the meaning of Ethics in various areas of management
- Compare and contrast professional ethics and technical ethics
- Develop ethical values in self and organization

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.

LEARNING OUTCOMES:- After completion of this unit student will

- Define corporate culture
- Understand the key elements of corporate culture
- Analyze organization leadership and corporate culture

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.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand Law and Ethics
- Analyze Different fair trade practices
- Make use of Environmental Protection and Fair Trade Practices

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 social responsibility. Bo Ds composition, Cadbury Committee - Various committees - Reports - Benefits and Limitations.

LEARNING OUTCOMES:- After completion of this unit student will

- Understand corporate governance code
- Analyze role of auditors, board of directors and shareholders in corporate governance
- Implementing corporate social responsibility in India.

Text books.

1. Murthy CSV: Business Ethics and Corporate Governance, HPH July 2017

2. Bholananth Dutta, S.K. Podder – Corporation Governance, VBH. June 2010

Reference books

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*

ONLINE RESOURCES:

1. https://onlinecourses.nptel.ac.in/noc21_mg46/
2. https://archive.nptel.ac.in/courses/110/105/110105138/
3. https://onlinecourses.nptel.ac.in/noc21_mg54/
4. https://onlinecourses.nptel.ac.in/noc22_mg54/
5. https://archive.nptel.ac.in/courses/109/106/109106117/

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
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A40035-E-Business (Elective-2 VII - SEMESTER)
(w.e.f. Academic Year – 2023-2024)

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

Course Objectives: The Objectives of this course are

1 To provide knowledge on emerging concept on E-Business related aspect.

2 To understand various electronic markets & business models.

3 To impart the information about electronic payment systems & banking.
4 To create awareness on security risks and challenges in E-commerce.
5 To the students aware on different e-marketing channels & strategies.

COURSE OUTCOMES: At the end of the course student will be able to		BTL
CO1	Remember E-Business & its nature, scope and functions.	L1
CO2	Understand E-market-Models which are practicing by the organizations	L2
CO3	Apply the concepts of E-Commerce in the present globalized world.	L3
CO4	Analyze the various E-payment systems & importance of net banking.	L4
CO5	Evaluate market research strategies & E-advertisements.	L5
CO6	Understand importance of E-security & control	L2

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 –E-Commerce and E-Business, Internet Services, Online Shopping- E-Commerce Opportunities for Industries.

Learning Outcomes: -After completion of this unit student

- Understand the concept of E-Business
- Contrast and compare E-Commerce & E-Business
- Evaluate opportunities of E-commerce for industry

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

Learning Outcomes: -After completion of this unit student will

- Understand the concept of business models
- Contrast and compare Vertical portal and Horizontal portals
- Analyze the B2B,B2C and B2G model

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

Learning Outcomes: -After completion of this unit student will

- Understand the Electronic payment system
- Contrast and compare EFT and smart cards
- Analyze debit card and credit cards

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.

Learning Outcomes: -After completion of this unit student will

- Understand E-Security
- Contrast and compare security protocols and public network
- Evaluate on Digital signature

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)

Learning Outcomes: -After completion of this unit student will

- Understand the concept of online marketing
- Apply the knowledge of online marketing
- Compare e-CRM and e-SCM

Text Books:

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

References:

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,* RaymondLeathamWiley India 2007
4. S. Jaiswal. *E-Commerce* GalgotiaPublication Pvt Ltd., 2003.

BTL = Bloom's Taxonomy Level

Online 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

Online 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

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

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

COURSE OBJECTIVES : The objectives of this course are

1. To provide fundamental knowledge on Management, Administration, Organization & its concepts.
2. To make the students understand the role of management in Production
3. To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
4. To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
5. To make the students aware of the contemporary issues in modern management

COURSE OUTCOMES: At the end of the course, students will be able to **BTL**

CO1	Remember the concepts & principles of management and designs of organization in a practical world	**L1**
CO2	Understand the knowledge of Work-study principles & Quality Control techniques in industry	**L2**
CO3	Apply the process of Recruitment & Selection in organization.	**L3**
CO4	Analyze the concepts of HRM & different training methods.	**L4**
CO5	Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time & cost of project & to analyze the business through SWOT.	**L5**
CO6	Create awareness on contemporary issues in modern management & technology.	**L3**

UNIT- IINTRODUCTION 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.

LEARNING OUTCOMES: At the end of the Unit, the students will be able to

- Understand the concept of management and organization
- Apply the concepts & principles of management in real life industry.
- Analyze the organization chart & structure of an enterprise.

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.

LEARNING OUTCOMES: At the end of the Unit, the students will be able to

- Understand the core concepts of Operations Management
- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Evaluate Materials departments & Determine EOQ
- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion

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

LEARNING OUTCOMES: At the end if the Unit, the students will be able to

- Understand the concepts of HRM, Recruitment, Selection, Training & Development
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages

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).

LEARNING OUTCOMES: At the end of the Unit, the students will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques

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.

LEARNING OUTCOMES At the end if the Unit, the students will be able to

- Understand modern management techniques
- Apply Knowledge in Understanding in TQM, SCM
- Analyze CRM, BPR
- Evaluate change management & sustainability

Text Books:

1. Frederick S. Hillier, Mark S. Hillier. *Introduction to Management Science*, October 26, 2023
2. A.R Aryasri, *Management Science*, TMH, 2019

References:

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

ONLINE RESOUECES:

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/

A40532a- SOFTWARE ARCHITECTURE AND DESIGN PATTERNS
(Professional Elective –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

Course Objectives:

After completing this course, the student should be able to:

- To under stand the concept of patterns and the Catalog.
- To discuss the Presentation tier design patterns and their affect on: sessions, client access, validation and consistency.
- To understand the variety of implemented bad practices related to the Business and Integration tiers.

Course Out comes:

- To highlight the evolution of patterns.
- To learn how to add functionality to designs while minimizing complexity
- To learn what design patterns really are, and are not
- To know about specific design patterns.
- To learn how to use design patterns to keep code quality high without over design.

UNIT-I

Envisioning Architecture: The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views. Creating an Architecture: Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture.

UNIT- II

Analyzing Architectures: Architecture Evaluation, Architecture design decision making, ATAM, CBAM. Moving from one system to many: Software Product Lines, Building systems from off the shelf components, Software architecture in future.

UNIT- III

Patterns: Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.Creational and Structural patterns: Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight.

UNIT- IV

Behavioural patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer, state, strategy. template method, visitor.

UNIT- V

Case Studies: A-7E – A case study in utilizing architectural structures, The World Wide Web - a case study in interoperability, Air Traffic Control – a case study in designing for high availability, Celsius Tech – a case study in product line development.

TEXT BOOKS:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements & Rick Kazman, Pearson Education, 2003.
2. Design Patterns, Erich Gamma, Pearson Education.

REFERENCES:

1. Beyond Software architecture, Luke Hohmann, Addison wesley, 2003.
2. Software architecture, David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR, 2001
3. Software Design, David Budgen, second edition, Pearson education, 2003
4. Head First Design patterns, Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
5. Design Patterns in Java, Steven John Metsker & William C. Wake, Pearson education, 2006 6. J2EE Patterns, Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
7. Design Patterns in C#, Steven John metsker, Pearson education, 2004.
8. Pattern Oriented Software Architecture, F.Buschmann &others, John Wiley & Sons.

A40532b- BLOCK CHAIN TECHNOLOGY (Professional Elective –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

Course Objectives:

- Understand how block chain systems (mainly Bit coin and Ethereum) work and to securely interact with them.
- Design, build, and deploy smart contracts and distributed applications.
- Integrate ideas from block chain technology into their own projects.

Course Outcomes (CO):

After completion of the course, students will be able to

1. Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
2. Identify the risks involved in building Block chain applications.
3. Review of legal implications using smart contracts.
4. Choose the present landscape of Blockchain implementations and Understand Crypto currency markets
5. Examine how to profit from trading crypto currencies.

UNIT - I Introduction8Hrs

Introduction, Scenarios, Challenges Articulated, Block chain, Block chain Characteristics, Opportunities Using Block chain, History of Block chain. Evolution of Block chain: Evolution of Computer Applications, Centralized Applications, Decentralized Applications, Stages in Block chain Evolution, Consortia, Forks, Public Block chain Environments, Type of Players in Block chain Ecosystem, Players in Market.

UNIT - II Block chain Concepts9Hrs

Block chain Concepts: Introduction, Changing of Blocks, Hashing, Merkle-Tree, Consensus, Mining and Finalizing Blocks, Currency aka tokens, security on block chain, data storage on block chain, wallets, coding on block chain: smart contracts, peer-to-peer network, types of block chain nodes, risk associated with bloc chain solutions, life cycle of block chain transaction.

UNIT - III Architecting Block chain solutions 9Hrs

Architecting Block chain solutions: Introduction, Obstacles for Use of Block chain, Block chain Relevance Evaluation Framework, Block chain Solutions Reference Architecture, Types of Block chain Applications. Cryptographic Tokens, Typical Solution Architecture for Enterprise Use Cases, Types of Block chain Solutions, Architecture Considerations, Architecture with Block chain Platforms, Approach for Designing Block chain Applications.

UNIT - IV Ethereum Block chain Implementation8Hrs

Ethereum Block chain Implementation: Introduction, Tuna Fish Tracking Use Case, Ethereum Ecosystem, Ethereum Development, Ethereum Tool Stack, Ethereum Virtual Machine, Smart Contract Programming, Integrated Development Environment, Truffle Framework, Ganache, Unit Testing, Ethereum Accounts, My Ether Wallet, Ethereum Networks/Environments, Infura, Ether scan, Ethereum Clients, Decentralized Application, Metamask, Tuna Fish Use Case Implementation, Open Zeppel in Contracts .

UNIT - V Hyper ledger Block chain Implementation8Hrs

Hyper ledger Implementation: Introduction, Use Case – Car Ownership Tracking, Hyper ledger Fabric, Hyper ledger Fabric Transaction Flow, FabCar Use Case Implementation, Invoking Chain code Functions Using Client Application.

Advanced Concepts in Block chain: Introduction, Inter Planetary File System (IPFS), Zero Knowledge Proofs, Oracles, Self-Sovereign Identity, Block chain with IoT and AI/ML Quantum Computing and Block chain, Initial Coin Offering, Block chain Cloud Offerings, Block chain and its Future Potential.

Textbooks:

1. Ambadas, Arshad Sarfarz Ariff, Sham "Block chain for Enterprise Application Developers", Wiley, 2020
2. Andreas M. Antonopoulos, "Mastering Bitcoin: Programming the Open Blockchain", O'Reilly, 2017

Reference Books:

1. Blockchain: A Practical Guide to Developing Business, Law, and Technology Solutions, Joseph Bambara, Paul R. Allen, Mc Graw Hill.
2. Blockchain: Blueprint for a New Economy, Melanie Swan, O'Reilly

Online Learning Resources:

https://github.com/blockchainedindia/resources

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

A40532c-AUGMENTED REALITY AND VIRTUAL REALITY
(Professional Elective –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

Course Discription:

The primary objective of this course is to introduce students to the foundational principles and technologies of Virtual Reality (VR) and Augmented Reality (AR), along with the key devices, modeling techniques, and interaction mechanisms involved in creating immersive environments. The course will cover the essentials of VR and AR, including hardware, software, and human perception, as well as advanced concepts such as 3D modeling, interaction design, and audio rendering. Students will gain hands-on experience in the use of VR/AR systems and explore the challenges and methodologies for building interactive virtual environments.

Course Outcomes:

At the end of the Course the student will be able to:

1. Understand the core concepts of Virtual Reality and Augmented Reality, and their differences.
2. Learn about the hardware and software components required for VR and AR systems, as well as the impact of human physiology and perception on the virtual experience.
3. Gain knowledge of input devices (trackers, navigation, and gesture interfaces) and output devices (graphics, sound displays, and haptic feedback).
4. Develop skills in modeling techniques, including geometric, kinematics, physical, and behavior modeling for VR and AR environments.
5. Explore the technologies and methodologies used to create Augmented Reality systems, including marker-based AR and AR software development.

Syllabus

UNIT – I **(10 Lectures)**

INTRODUCTION TO VIRTUAL REALITY (VR): Defining Virtual Reality, Key elements of virtual reality experience, Virtual Reality, Telepresence, Augmented Reality and Cyberspace. **Bird's-Eye View:** Hardware, Software, Human Physiology and Perception.

UNIT-II **(10 Lectures)**

Input Devices: (Trackers, Navigation, and Gesture Interfaces): Three-dimensional position trackers, navigation and manipulation, interfaces and gesture interfaces.

Output Devices: Graphics displays, sound displays & haptic feedback.

UNIT-III **(10 Lectures)**

Modeling: Geometric modeling, Kinematics modeling, Physical modeling, Behaviour modeling, Model management.

UNIT-IV **(10 Lectures)**

Augmented Reality (AR): Taxonomy, Technology and Features of Augmented Reality, AR Vs VR, Challenges with AR, AR systems and functionality, Augmented Reality Methods, Visualization Techniques for Augmented Reality, Enhancing interactivity in AR Environments, Evaluating AR systems

AR software development : AR software, Camera parameters and camera calibration, Marker-based augmented reality, AR Toolkit.

UNIT-V **(10 Lectures)**

Interaction & Audio:

Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction. Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering.

Interaction - Motor Programs and Remapping, Locomotion, Manipulation, Social Interaction.

Audio -The Physics of Sound, The Physiology of Human Hearing, Auditory Perception, Auditory Rendering. (from Text Book2)

TEXT BOOKS:

1. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc, 2017.
2. Virtual Reality, Steven M. LaValle, Cambridge University Press, 2016.

REFERENCES:

1. RajeshK.Maurya,*Computer Graphics with Virtual Reality System*, 3rd Edition, Wiley Publication, 2018.
2. William R. Sherman and Alan B. Craig, *Understanding Virtual Reality Interface, Application, and Design*, 2nd Edition, Morgan Kaufmann Publishers, Elsevier, 2019.
3. GrigoreC.Burdea,PhilippeCoiffet,*Virtual Reality Technology*, 2nd Edition, Wiley,2017.
4. K.S. Hale and K. M. Stanney, *Handbook on Virtual Environments*, 2nd Edition, CRC Press, 2015.

WEB REFERENCES:

1. http://vr.cs.uiuc.edu/vrbook.pdf
2. https://nptel.ac.in/courses/106/106/106106138/

A40532d-INTERNET OF THINGS (Professional Elective –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

Course Objectives:

- 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 Outcomes:

After completion of the course, students will be able to

- Understand general concepts of Internet of Things.
- Apply design concept to IoT solutions
- Analyze various M2M and IoT architectures
- Evaluate design issues in IoT applications
- Create IoT solutions using sensors, actuators and Devices

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.

Text books:

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 Books:

1. Jan Holler, Vlasios Tsiatsis, 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. ArshdeepBahga, 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 daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress 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:

1. https://www.arduino.cc/
2. https://www.raspberrypi.org/
3. https://nptel.ac.in/courses/106105166/5
4. https://nptel.ac.in/courses/108108098/4

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

A40533a-AGILE METHODOLOGIES
(Professional Elective –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

Course Objectives:

- To provide students with a theoretical as well as practical under standing of agile software development practices and how small teams can apply them to create high-quality software.
- To provide good under standing of software design and a set of software technologies and APIs.
- To carry out detailed examination and demonstration of Agile development and testing techniques.
- To discuss Agile software development

Course Out comes:

After completion of the course, students will be able to

- Realize the importance of interacting with business stakeholders in determining the requirements for a software system
- Perform iterative software development processes: how to plan them, how to execute them.
- Point out the impact of social aspects on software development success.
- Develop techniques and tools for improving team collaboration and software quality.
- Perform Software process improvement as an ongoing task for development teams.
- Show how agile approaches can be scaled up to the enterprise level.

UNIT I AGILE METHODOLOGY **Lecture 9 Hrs**

Theories for Agile Management – Agile Software Development – Traditional Model vs. Agile Model - Classification of Agile Methods – Agile Manifesto and Principles – Agile Project Management – Agile Team Interactions – Ethics in Agile Teams - Agility in Design, Testing – Agile Documentations – Agile Drivers, Capabilities and Values

UNIT II AGILE PROCESSES **Lecture 8Hrs**

Lean Production - SCRUM, Crystal, Feature Driven Development- Adaptive Software Development - Extreme Programming: Method Overview – Lifecycle – Work Products, Roles and Practices.

UNIT III AGILITY AND KNOWLEDGE MANAGEMENT **Lecture 8 Hrs**

Agile Information Systems – Agile Decision Making - Earl_S Schools of KM – Institutional Knowledge Evolution Cycle – Development, Acquisition, Refinement, Distribution, Deployment, Leveraging – KM in Software Engineering – Managing Software Knowledge – Challenges of Migrating to Agile Methodologies – Agile Knowledge Sharing – Role of Story-Cards – Story-Card Maturity Model (SMM).

UNIT IV AGILITY AND REQUIREMENTS ENGINEERING **Lecture 9 Hrs**

Impact of Agile Processes in RE–Current Agile Practices – Variance – Overview of RE Using Agile Managing Unstable Requirements – Requirements Elicitation – Agile Requirements Abstraction Model – Requirements Management in Agile Environment, Agile Requirements Prioritization – Agile Requirements Modeling and Generation – Concurrency in Agile Requirements Generation.

UNIT V AGILITY AND QUALITY ASSURANCE

Lecture 9 Hrs

Agile Product Development – Agile Metrics – Feature Driven Development (FDD) – Financial and Production Metrics in FDD – Agile Approach to Quality Assurance - Test Driven Development – Agile Approach in Global Software Development.

Text books:

1. David J. Anderson and Eli Schragenheim, —Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results‖, Prentice Hall, 2003.
2. Hazza and Dubinsky, —Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer, 2009.

Reference Books:

1. Craig Larman, —Agile and Iterative Development: A Manager‗s Guide‖, Addison-Wesley, 2004.
2. Kevin C. Desouza, —Agile Information Systems: Conceptualization, Construction, and Management‖, Butterworth-Heinemann, 2007.

Online Learning Resources:

https://www.nptelvideos.com/video.php?id=904

A40533b-METAVERSE
(Professional Elective –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

Course Objectives:

Themainobjectivesofthecourseareto:

1. Present and discuss Metaverse characteristics, concepts and layers.
2. Explain and analyse Metaverse technologies, tools, platforms,and applications.
3. Discuss design theories and practices relevant to the Metaverse.
4. Explore cyber security and cyber crime in the Metaverse.
5. Examine open challenges in the Metaverse.

Course Outcomes:

After completion of the course students are expected to be able to:

1.Under stand the characteristics, and interdisciplinary nature of the Metaverse, the opportunities and risks it presents.

2.Analyze Metaverselayers, the technologies used increating them, as well as design theories and practices for Metaverse.

3.Examine and discuss Metaverse platforms, applications and the latest technological developments in this area.

4.Identify cyber security issues, understand cybercrime, and discuss the open challenges.

5.Building Metaverse Applications

Unit-1

Metaverse fundamentals: Metaverse evolution, Metaverse importance and characteristics, the interdisciplinary nature of the Metaverse, Metaverse opportunities and risks, Computer-mediated communication (social presence theory, social information processing theory, media richness theory, cyborg theory), Avatar-mediated communication.

Unit-2

The seven layer so Metaverse: Experience Discovery, Creatoreconomy, Spatial computing, Decentralization, Human interface, Infrastructure

Metaverse Technologies partI: AR/VR/MR/XR, 3Dreconstruction, Gameengines, Smart glasses, wearables, haptic devices, headsets and headwear.

Unit-3

Metaverse technologies part II: Blockchain, smart contracts, tokens, NFTs, Cryptography, Artificial Intelligence (AI), Internet of Things (IoT), Edge computing and 5G, 6G.Design theories and practices: Social presence and co-presence,Motion sickness and cybersickness, Uncanny valley,Sense of self-location, sense of agency and sense of body ownership, Universal simulation principle, Prototyping, Evaluation techniques (qualitative and quantitative).

Unit-4

Tools and technologies for Metaverse UX and UI: Tools and services for avatar systems, Spatial user interface design, Cross-platform user experience design, Multimodal user interface, Technologies and devices for human computer interaction in Metaverse, Metaverse platforms: Decentraland, SANDBOX, Roblox, Axie Infinity, uHive, Hyper Nation, Nakamoto (NAKA), Metahero (HERO), Star Atlas (ATLAS), Bloktopia (BLOK), Stageverse, Spatial, PalkaCity, Viverse, Sorare, Illuvium, Upland, Second Life, Sansar, Sensorium Galaxy

Unit-5

Metaverse applications -part I: Gaming and entertainment, Travel and tourism, Education and learning, Remote working, Commerce and business, Metaverse applications - part II: Real estate, Banking and Finance, Healthcare, Social media, Fashion, Metaverse and cyber security: Cyber security concerns in Metaverse:Social engineering attacks, Data theft, Decentralization vs vulnerabilities, Cyber security risks in Metaverse: process, people, technology, Metaverse and cybercrime: Scam and theft, Rug pull, Money manipulation and wash trading, Money laundering, Metaverse challenges and open issues: Persistency, Interoperability and scalability, Maturity, Regulation, Usefulness and ease-of-use, Privacy and data security, Content creation, NFTs and creator economy, Social, legal and ethical issues in the Metaverse

Textbooks

The Metaverse, Terry Winters, Independently published, 2021, ISBN: 979-8450959283

ReferenceBooks:

1. Ball,M.,2022,—The Metaverseand How It Will Revolutionize Everything—, Liveright, ISBN:978-1324092032
2. Damar, M.(2021). Metaverse shape of your life for future: Abibliometric snapshot.Journal of Metaverse, 1(1), 1–8.
3. Day,J.(2022) Metaversewill seecyber warfare attack sunlike anything before: 'Massivelyelevated', February 28.
4. https://www.express.co.uk/news/science/1570844/metaverse-news-cyber-warfare-attacks-virtual-worlds-russia-china-spt.
5. Polyviou, A., Sharma K., Pappas, I.O.(2023). Training in the metaverse: Employing physiological data to improve how we build metaverses for businesses. The next generation internet: The role of metaverses, AR, VR, MR, and digital twins, Temple University Institute for Business and Information Technology Link: https://ibit.temple.edu/nextgenerationinternet
6. QuHarrison T. , Keeney, S., 2022, —The Metaverse Handbook: Innovating for the Internet's NextTectonic Shift‖, Wiley, ISBN: 978-1119892526
7. The mistocleous, M., Christodoulou, K., & Katelaris, L. (2023). An Educational Metaverse Experiment: The first on-chain and in- Metaverse academic course. Information Systems. EMCIS2022. Lecture Notes in Business Information Processing, Springer, Cham.
8. Stephenson,N.,1992,—SnowCrash‖,ISBN:978-055338

A40533c- COMPUTER VISION (Professional Elective –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

Course Objectives:
The objective of this course is to understand the basic issues in computer vision and major approaches to address the methods to learn the Linear Filters, segmentation by clustering, Edge detection, Texture.

Course Outcomes:
After completing the course, you will be able to:
- Identify basic concepts, terminology, theories, models and methods in the field of computer vision,
- Describe known principles of human visual system,
- Describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,
- Suggest a design of a computer vision system for a specific problem

UNIT-I LINEAR FILTERS **Lecture 8Hrs**
Introduction to Computer Vision, Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing Filters as Templates, Technique: Normalized Correlation and Finding Patterns, Technique: Scale and Image Pyramids.

UNIT-II EDGE DETECTION Lecture 9Hrs
Noise- Additive Stationary Gaussian Noise, Why Finite Differences Respond to Noise, Estimating Derivatives - Derivative of Gaussian Filters, Why Smoothing Helps, Choosing a Smoothing Filter, Why Smooth with a Gaussian? Detecting Edges-Using the Lap lacian to Detect Edges, Gradient-Based Edge Detectors, Technique: Orientation Representations and Corners.

UNIT- III TEXTURE **Lecture 9Hrs**
Representing Texture –Extracting Image Structure with Filter Banks, Representing Texture using the Statistics of Filter Outputs, Analysis (and Synthesis) Using Oriented Pyramids –The Lap lacian Pyramid, Filters in the Spatial Frequency Domain, Oriented Pyramids, Application: Synthesizing Textures for Rendering, Homogeneity, Synthesis by Sampling Local Models, Shape from Texture, Shape from Texture for Planes

UNIT-IV SEGMENTATION BY CLUSTERING **Lecture 8Hrs**
What is Segmentation, Human Vision: Grouping and Gestalt, Applications: Shot Boundary Detection and Background Subtraction. Image Segmentation by Clustering Pixels, Segmentation by Graph-Theoretic Clustering. The Hough Transform, Fitting Lines, Fitting Curves

UNIT-V RECOGNIZATION BY RELATIONS BETWEEN TEMPLATES **Lecture 8Hrs**
Finding Objects by Voting on Relations between Templates, Relational Reasoning Using Probabilistic Models and Search, Using Classifiers to Prune Search, Hidden Markov Models, Application: HMM and Sign Language Understanding, Finding People with HMM.

Text books:

1. David A. Forsyth, Jean Ponce, Computer Vision – A modern Approach, PHI, 2003.

Reference Books:

1. Geometric Computing with Clifford Algebras: Theoretical Foundations and Applications in Computer Vision and Robotics, Springer;1 edition,2001by Sommer.
2. Digital Image Processing and Computer Vision,1/e, by Sonka.
3. Computer Vision and Applications: Concise Edition (With CD) by Jack Academy Press, 2000.

Online Learning Resources:https://nptel.ac.in/courses/106105216https://nptel.ac.in/courses/108103174

A40533d- CYBER PHYSICAL SYSTEMS

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

Course Objective:
The objective of this course is to provide students with a comprehensive understanding of the various techniques and methodologies used to design, secure, synchronize, and schedule operations within **Cyber- Physical Systems (CPS)**. The course will cover symbolic synthesis for CPS, security aspects, distributed synchronization, real-time scheduling, and model integration, with an emphasis on both basic principles and advanced techniques.

Course Out comes: Upon the Successful Completion of the Course, the Students would be able to:

1. Understand the core principles behind CPS
2. Identify Security mechanisms of Cyber physical systems
3. Under stand Synchronization in Distributed Cyber-Physical Systems
4. To Understand the Scheduling for Cyber-Physical Systems
5. To understand the various Cyber-Physical System models

UNIT - I

Symbolic Synthesis for Cyber-Physical Systems
Introduction and Motivation, Basic Techniques - Preliminaries, Problem Definition, Solving the Synthesis Problem, Construction of Symbolic Models, Advanced Techniques: Construction of Symbolic Models, Continuous-Time Controllers, Software Tools

UNIT - II

Security of Cyber-Physical Systems
Introduction and Motivation, Basic Techniques - Cyber Security Requirements, Attack Model, Countermeasures, Advanced Techniques: System Theoretic Approaches

UNIT - III

Synchronization in Distributed Cyber-Physical Systems: Challenges in Cyber-Physical Systems, A Complexity-Reducing Technique for Synchronization, Formal Software Engineering, Distributed Consensus Algorithms, Synchronous Lockstep Executions, Time-Triggered Architecture, Related Technology, Advanced Techniques

UNIT - IV

Real-Time Scheduling for Cyber-Physical Systems
Introduction and Motivation, Basic Techniques - Scheduling with Fixed Timing Parameters, Memory Effects, Multiprocessor/Multicore Scheduling, Accommodating Variability and Uncertainty

UNIT - V

Model Integration in Cyber-Physical Systems

Introduction and Motivation, Causality, Semantic Domains for Time, Interaction Models for Computational Processes, Semantics of CPS DSMLs, Advanced Techniques, For Spec, The Syntax of CyPhyML, Formalization of Semantics, Formalization of Language Integration.

TEXT BOOKS:

1. Raj Raj kumar, Dion is io De Niz, and Mark Klein, Cyber-Physical Systems, Addison-Wesley Professional.
2. Rajeev Alur, Principles of Cyber-Physical Systems, MIT Press, 2015

A43121-**PROMPT ENGINEERING (Skill Enhancement Course)**

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
0	1	2	42	0	0	2	30	70	100

Course Discription:

This course delves into prompt engineering principles, strategies, and best practices, a crucial aspect in shaping AI models' behaviour and performance. Understanding Prompt Engineering is a comprehensive course designed to equip learners with the knowledge and skills to effectively generate and utilize prompts in natural language processing (NLP) and machine learning (ML) applications. This course delves into prompt engineering principles, strategies, and best practices, a crucial aspect in shaping AI models' behaviour and performance.

Course Out comes:

- Under standing the fundamentals and evolution of prompt engineering.
- Gaining the ability to craft effective closed-ended, open-ended, and role-based prompts.
- Learning to probe and stress-test AI models for bias and robustness.
- Applying prompt optimization techniques and performance evaluation methods.
- Mitigating bias and promoting ethical prompting practices in NLP/ML systems.

Module 1: Introduction to Prompt Engineering

- *Lesson 1: Foundations of Prompt Engineering*
  - Overview of prompt engineering and its significance in NLP and ML.
  - Historical context and evolution of prompt-based approaches.

Module 2: Types of Prompts and Their Applications

- *Lesson 2: Closed-Ended Prompts*
  - Under standing and creating prompts for specific answers.
  - Applications in question- answering systems.
- *Lesson 3: Open-Ended Prompts*
  - Crafting prompts for creative responses.
  - Applications in language generation models.

Module 3: Strategies for Effective Prompting

- *Lesson 4: Probing Prompts*
  - Designing prompts to reveal model biases.
  - Ethical considerations in using probing prompts.
- *Lesson 5: Adversarial Prompts*
  - Creating prompts to stress-test models.
  - Enhancing robustness through adversarial prompting.

Module 4: Fine-Tuning and Optimizing with Prompts

- *Lesson 6: Fine-Tuning Models with Prompts*
  - Techniques for incorporating prompts during model training.
  - Balancing prompt influence and generalization.
- *Lesson 7: Optimizing Prompt Selection*
  - Methods for selecting optimal prompts for specific tasks.
  - Customizing prompts based on model behavior.

Module 5: Evaluation and Bias Mitigation

- *Lesson 8: Evaluating Prompt Performance*
  - Metrics and methodologies for assessing model performance with prompts.
  - Interpreting and analyzing results.
- *Lesson 9: Bias Mitigation in Prompt Engineering*
  - Strategies to identify and address biases introduced by prompts.
  - Ensuring fairness and inclusivity in prompt-based models.

Module 6: Real-World Applications and Case Studies

- *Lesson 10: Case Studies in Prompt Engineering*
- *Exploration of successful implementations and challenges in real-world scenarios.*
- *Guest lectures from industry experts sharing their experiences.*

Text books:

1. **"**Prompt Engineering in Action" – *Danny D. Sullivan*
2. "The Art of Prompt Engineering with Chat GPT: A Hands-On Guide" – *Nathan Hunter.*

Reference Books:

1. **"**Prompt Engineering in Practice" – *Michael F. Lewis*
2. "Mastering AI Prompt Engineering: The Ultimate Guide for Chat GPT Users" – *Adriano Damiao*
3. "Writing AI Prompts For Dummies" – *Stephanie Diamond and Jeffrey Allan*
4. "Prompt Engineering Guide" (Online Resource) – *promptingguide.ai*

Online Resource link :

https://www.udemy.com/course/understanding-prompt-engineering/?couponCode=NVDINCTA35TRT

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

A40037-Gender Sensitization

Hours Per Week			Hours Per Semester			Credits	Assessment Marks		
L	T	P	L	T	P	C	CIE	SEE	Total
2	0	0	28	0	0	-	30	70	100

Course Objectives:
To enable students to understand the gender related issues, vulnerability of women and men
To familiarize them about constitutional safeguard for gender equality
To expose the students to debates on the politics and economics of work
To help students reflect critically on gender violence
To 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 Outcomes (CO):

CO1	Understand the basic concepts of gender and its related terminology	L1, L2,
CO2	Identify the biological, sociological, psychological and legal aspects of gender.	L1, L2
CO3	Use the knowledge in understanding how gender discrimination works in our society and how to counter it.	L3
CO4	Analyzethe gendered division of labour and its relation to politics and economics.	L4
CO5	Appraise how gender-role beliefs and sharing behaviour are associated with more well-being in all culture and gender groups	L5
CO6	Develop students' sensibility with regard to issues of gender in contemporary India	L3

Syllabus

Unit-1 UNDER STANDING 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-2 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-3 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-4

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-5

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

Prescribed Books

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 Books

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 Resources:

1. **Understanding Gender chrome-**
extension://kdpelmjpfafjppnhbloffcjpeomlnpah/https://www.arvindguptatoys.com//kamla-gender1.pdf

https://onlinecourses.swayam2.ac.in/nou24_hs53/preview

2. Gender Roles and Relations

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://onlinecourses.swayam2.ac.in/cec23_hs29/preview

3. Gender and Labour

https://www.economicsobservatory.com/what-explains-the-gender-division-of-labour-and-how-can-it-be-redressed
https://onlinecourses.nptel.ac.in/noc23_mg67/preview

4. Gender based violence
https://eige.europa.eu/gender-based-violence/what-is-gender-based-violence?language_content_entity=en
https://www.worldbank.org/en/topic/socialsustainability/brief/violence-against-women-and-girls
https://onlinecourses.swayam2.ac.in/nou25_ge38/preview

5. **Gender and culture**
https://gender.study/psychology-of-gender/culture-impact-gender-roles-identities/
https://sociology.iresearchnet.com/sociology-of-culture/gender-and-culture/
https://archive.nptel.ac.in/courses/109/106/109106136/
Abdulali Sohaila. “I Fought For My Life…and Won.”Available online
(at: http://www.thealternative.in/lifestyle/i-fought-for-my-lifeand-won-sohaila-abdulal/

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
A40535a	Internship	PW	-	-	-	4	100	-	100
A40535b	Project	PW	-	-	-	8	30	70	100
		TOTAL	-	-	-	12	130	70	200

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
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COURSES OFFERED FOR HONOURS DEGREE IN CSE

S.No.	CourseCode	CourseTitle	Contact Hours per Week			Credits
			L	T	P	
1		Quantum Computing	3	0	0	3
2		No SQL Data bases	3	0	0	3
3		Software Defined Data Centre	3	0	0	3
4		Robotic sand Intelligent Systems	3	0	0	3
5		Cloud Security	3	0	0	3
6		NoS QL Lab			3	1.5
7		Quantum & Cloud Computing Lab			3	1.5

OPEN ELECTIVES

Open Elective - I

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

A40171-GREEN BUILDINGS (OPEN ELECTIVE - 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

Course Objectives :

The objectives of this course are to make the student:

To understand the fundamental concepts of green buildings, their necessity, and sustainable features.

To analyze green building concepts, rating systems, and their benefits in India.

To apply green building design principles, energy efficiency measures, and renewable energy sources.

To evaluate air conditioning systems, HVAC designs, and energy modeling for sustainable buildings.

To assess material conservation strategies, waste management, and indoor environmental quality in green buildings.

Course Outcomes (COs)

Upon successful completion of the course, students will be able to:

Understand the importance of green buildings, their necessity, and sustainable features.

Analyze various green building practices, rating systems, and their impact on environmental sustainability.

Apply principles of green building design to enhance energy efficiency and incorporate renewable energy sources.

Evaluate HVAC systems, energy-efficient air conditioning techniques, and their role in sustainable building design.

Assess material conservation techniques, waste reduction strategies, and indoor air quality management in green buildings.

CO - PO Articulation Matrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO -1	3	-	-	-	-	2	3	-	-	-	-	-	3	3
CO -2	-	3	-	-	2	-	3	-	-	-	-	2	3	3
CO -3	-	-	3	3	3	-	3	-	-	-	-	-	3	3
CO -4	-	-	3	3	3	-	3	-	-	-	-	-	3	3
CO -5	-	-	-	-	-	3	3	3	2	-	-	-	-	3

UNIT – I

Introduction to Green Building– Necessity of Green Buildings, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing A Green Building, Important Sustainable Features for Green Buildings.

UNIT – II

Green Building Concepts and Practices– Indian Green Building Council, Green Building Movement in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation; Green Building Opportunities and Benefits: Opportunities of Green Buildings, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy-Saving Approaches in Buildings, LEED India Rating System, and Energy Efficiency.

UNIT – III		
Green Building Design– Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximizing System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources, Eco-Friendly Captive Power Generation for Factories, Building Requirements.		
UNIT – IV		
Air Conditioning– Introduction, CII Godrej Green Business Centre, Design Philosophy, Design Interventions, Energy Modeling, HVAC System Design, Chiller Selection, Pump Selection, Selection of Cooling towers, Selection of Air Handling Units, Pre-Cooling of Fresh Air, Interior Lighting Systems, Key Features of The Building, Eco-Friendly Captive Power Generation for Factories, Building Requirements.		
UNIT – V		
Material Conservation– Handling of Non-Process Waste, Waste Reduction During Construction, Materials With Recycled Content, Local Materials, Material Reuse, Certified Wood, Rapidly Renewable Building Materials and Furniture. Indoor Environment Quality and Occupational Health– Air Conditioning, Indoor Air Quality, Sick Building Syndrome, tobacco Smoke.		
TEXT BOOKS:		
Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009. Green Building Hand Book by tom woolley and Sam kimings, 2009.		
REFRENCE BOOKS:		
Complete Guide to Green Buildings by Trish riley Standard for the design for High Performance Green Buildings by Kent Peterson, 2009 Energy Conservation Building Code –ECBC-2020, published by BEE		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/102/105102195/		

A40172-CONSTRUCTIONTECHNOLOGYAND MANAGEMENT
(OPENELECTIVE –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

Course Objectives:
The objectives of this course are to make the student:

To understand project management fundamentals, organizational structures, and leadership principles in construction.
To analyze manpower planning, equipment management, and cost estimationin civilengineering projects.
To apply planning, scheduling, and project management techniques such as CPM andPERT.
Toevaluatevariouscontract types, contract formation, and legal aspectsinconstruction management.
To assess safety management practices, accident prevention strategies, and quality management systems in construction.

Course Out comes(COs):
Up on successful completion of the course, students will be able to:
Understand (Cos) project management fundamentals, organizational structures, and leadership principles in construction.
Analyze man powerplanning, equipment management, and costestimationin civil engineering projects.
Apply planning, scheduling, and project management techniques such as CPM and PERT.
Evaluate various contract types, contract formation, and legal aspects in construction management.
Assess safety management practices, accident prevention strategies, and quality management systems in construction.

CO–POArticulationMatrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO-1	3	-	-	-	-	2	-	2	2	-	-	-	3	3
CO-2	-	3	-	-	2	-	-	-	-	-	-	2	3	3
CO-3	-	-	3	3	3	-	-	-	-	2	-	-	3	3
CO-4	-	-	3	3	3	-	-	2	-	-	-	-	3	3
CO-5	-	-	-	-	-	3	3	3	2	-	-	-	-	3

UNIT– I

Introduction:Projectforms, Management Objectives and Functions; Organizational Chart of A Construction Company; Manager's Duties and Responsibilities; Public Relations; Leadership And Team-Work; Ethics, Morale, Delegation and Accountability.

UNIT– II

Man and Machine: Man-Power Planning, Training, Recruitment, Motivation, Welfare Measures and Safety Laws; Machinery for Civil Engineering., Earth Mover sandauling Costs, Factors Affecting Purchase, Rent, and Lease of Equipment, and Cost Benefit Estimation.

UNIT– III		
Planning, Scheduling andProject Management: Planning Stages, Construction Schedules and Project Specification, Monitoring and Evaluation; Bar-Chart, CPM, PERT, Network- formulation and Time Computation.		
UNIT– IV		
Contracts: Types of Contracts, formation of Contract – Contract Conditions – Contract forLabour, Material, Design, Construction – Drafting of Contract Documents Based On IBRD/ MORTH Standard Bidding Documents – Construction Contracts – Contract Problems – Arbitration and Legal Requirements Computer Applications in Construction Management: Software for Project Planning, Scheduling and Control.		
UNIT– V		
SafetyManagement – Implementation and Application of QMS inSafetyPrograms, ISO 9000 Series, Accident Theories, Cost of Accidents, Problem Areas inConstruction Safety, Fall Protection, Incentives, Zero Accident Concepts, Planning for Safety, Occupational Health and Ergonomics.		

TEXT BOOKS:

1. Construction Project Management, SK. Sears, GA. Sears, RH. Clough, John Wileyand Sons, 6th Edition, 2016.
2. Construction Project Scheduling and Control by Saleh Mubarak, 4th Edition, 2019
3. Pandey, I.M (2021) Financial Management 12 the dition. Pearson India Education Services Pvt. Ltd.

REFRENCEBOOKS:

1. Brien, J.O. and Plotnick, F.L., CPM in Construction Management, McgrawHill, 2010.
2. Punmia, B.C., and Khandelwal,K.K., Project Planning and control with PERT and CPM, Laxmi Publications, 2002.
3. Construction Methods and Management: Pearson New International Edition 8th Edition Stephens Nunnally.
4. Rhoden, MandCatoB, Construction Management and Organisational Behaviour, Wiley-Blackwell, 2016.

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/104/105104161/
https://archive.nptel.ac.in/courses/105/103/105103093/

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A40271-ELECTRICAL SAFETY PRACTICES AND STANDARDS (Open Elective-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

Course Outcomes:
CO1: Understanding the Fundamentals of Electrical Safety -L2
CO2: Identifying and Applying Safety Components -L3
CO3: Analyzing Grounding Practices and Electrical Bonding
CO4: Applying Safety Practices in Electrical Installations and Environments- L4
CO5: Evaluating Electrical Safety Standards and Regulatory Compliance -L5

UNIT I Introduction To ElectricalSafety:
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-Earthingpractices-Determiningsafeapproachdistance-Determining archazard category.

UNIT IV SafetyPractices:
General first aid-Safety in handling hand held electrical appliances tools-Electrical safety in train stations-swimming pools, externallighting installations, medical locations-Casestudies.

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 electricalinspectorate

TEXTBOOKS:

1. MassimoA.G.Mitolo,“ElectricalSafetyofLow-VoltageSystems”,McGrawHill,USA,2009.
2. MohamedEl-Sharkawi,“ElectricSafety-PracticeandStandards”,CRCPress,USA,2014

REFERENCES:

1. KennethG.Mastrullo, RayA.Jones,“TheElectricalSafetyProgramBook”,Jones andBartlettPublishers,London, 2nd Edition, 2011.
2. PalmerHickman,“ElectricalSafety-RelatedWorkPractices”,Jones&BartlettPublishers,London,2009.
3. FordhamCooper,W.,“ElectricalSafetyEngineering”,ButterworthandCompany,London,1986.
4. JohnCadick,MaryCapelli-Schellpfeffer,DennisK.Neitzel,“ElectricalSafetyHandbook,McGraw-Hill,NewYork,USA, 4th edition, 2012.

A40371-**SUSTAINBLE ENERGY TECHNOLOGIES**
(Open Elective-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

Course objectives: Theobjectives of the courseareto	
1	Demonstrate the importance the impact of solar radiation, solar PVmodules
2	understand the principles of storage in PV systems
3	Discuss solar energy storage systems and their applications.
4	Get knowledge in wind energy and bio-mass
5	n insights in geothermal energy, ocean energy and fuel cells.

COURSE OUTCOMES On successful completion of this course the student will be able to		
CO1	Illustrate the importance of solar radiation and solar PV modules.	L1, L2
CO2	Discuss the storage methods in PV systems	L2,L3
CO3	Explain the solar energy storage for different applications	L2,L3
CO4	Understand the principles of wind energy, and bio-mass energy.	L2, L3
CO5	Attain knowledge in geothermal energy, ocean energy and fuel cells.	L1, L2,L3, L4

UNIT – 1

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 – 2

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 – 3

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 – 4

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 – 5

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.

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

References:

1. Principles of Solar Engineering - D.Yogi Goswami, Frank Krieth& John F Kreider / Taylor &Francis
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:

https://nptel.ac.in/courses/112106318
https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=-mwIa2X-SuSiNy13
https://youtube.com/playlist?list=PLyqSpQzTE6M-ZgdjYukayF6QevPv7WE-r&si=Apfjx6oDfz1Rb_N3

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A40471-ELECTRONIC CIRCUITS
(Open Elective –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

Course Objectives:

1. To understand semiconductor diodes, their characteristics and applications.
2. To explore the operation, configurations, and biasing of BJTs.
3. To study the operation, analysis, and coupling techniques of BJT amplifiers.
4. To learn the operation, applications and uses of feedback amplifiers and oscillators.
5. To analyze the characteristics, configurations, and applications of operational amplifiers.

Course Outcomes:
At the end of this course, the students will be able to

1. Understand semiconductor diodes, their characteristics and applications.
2. Explore the operation, configurations, and biasing of BJTs.
3. Gain knowledge about the operation, analysis, and coupling techniques of BJT amplifiers.
4. Learn the operation, applications and uses of feedback amplifiers and oscillators.
5. Analyze the characteristics, configurations, and applications of operational amplifiers.

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.

TEXT BOOKS:

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press. 2008.

REFERENCE BOOKS:

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.

A40071-MATHEMATICS FOR MACHINE LEARNING AND AI
(Open Elective 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

Course Objectives:

- 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 analysing mathematical formulations in AI/ML.

Course Outcomes:

After successful completion of this course, the students should be able to:

COs	Statements	Blooms level
CO1	Apply linear algebra concepts to ML techniques like PCA and regression.	L3 (Apply)
CO2	Analyze probabilistic models and statistical methods for AI applications.	L4 (Analyze)
CO3	Implement optimization techniques for machine learning algorithms.	L3 (Apply)
CO4	Utilize vector calculus and transformations in AI-based models.	L3 (Apply)
CO5	Develop graph-based AI models using mathematical representations.	L5 (Evaluate)

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	-	-	-	-	-	-	1
CO2	3	3	2	3	2	-	-	-	-	-	-	2
CO3	3	3	3	3	2	1	-	-	-	-	-	2
CO4	3	3	2	2	1	-	-	-	-	-	-	1
CO5	3	3	3	3	2	-	-	-	-	-	-	2

• **3** = Strong Mapping, **2** = Moderate Mapping, **1** = Slight Mapping, **-** = No Mapping

UNIT I: Linear Algebra for Machine Learning(08)

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(08)
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(08)
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(08)
Vector calculus: Gradient, divergence, curl. Fourier Transform & Laplace Transform in ML applications.

UNIT V: Graph Theory for AI(08)
Graph representations: Adjacency matrices, Laplacian matrices. Bayesian Networks & Probabilistic Graphical Models. Introduction to Graph Neural Networks (GNNs).

Textbooks:

1. Mathematics for Machine Learning by Marc Peter Deisenroth, A. Aldo Faisal, Cheng Soon Ong, Cambridge University Press, 2020.
2. Pattern Recognition and Machine Learningby Christopher Bishop, Springer.

Reference Books:

1. Gilbert Strang, Linear Algebra and Its Applications, Cengage Learning, 2016.
2. Jonathan Gross, Jay Yellen, Graph Theory and Its Applications, CRC Press, 2018.

Web References:

- MIT– Mathematics for Machine Learning https://ocw.mit.edu
- Stanford CS229 – Machine Learning Course https://cs229.stanford.edu/

DeepAI – Mathematical Foundations for AI https://deepai.org

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A40072 - MATERIALS CHARACTERIZATION TECHNIQUES
(Open Elective-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

COURSE OBJECTIVES

1	To provide exposure to different characterization techniques.
2	To explain the basic principles and analysis of different spectroscopic techniques.
3	To elucidate the working of Scanning electron microscope - Principle, limitations and applications.
4	To illustrate the working of the Transmission electron microscope (TEM) - SAED patterns and its applications.
5	To educate the uses of advanced electric and magnetic instruments for characterization.

Course Outcomes

		Blooms Level
CO1	Analyze the crystal structure and crystallite size by various methods	L1,L2, L3, L4
CO2	Analyze the morphology of the sample by using a Scanning Electron Microscope	L1,L2, L4
CO3	Analyze the morphology and crystal structure of the sample by using Transmission Electron Microscope	L1,L2, L3
CO4	Explain the principle and experimental arrangement of various spectroscopic techniques	L1,L2
CO5	Identify the construction and working principle of various Electrical & Magnetic Characterization technique	L1,L2

UNIT

I Structure analysis by Powder X-Ray Diffraction9Hr

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).

UNITII Microscopy technique -1 –Scanning Electron Microscopy (SEM) 9Hr

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) 9Hr
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

UNITIV Spectroscopy techniques 9Hr

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 9Hr

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.

Textbooks:

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 Books:

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville BanwellandElaine 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

NPTEL courses link :

1. **https://nptel.ac.in/courses/115/103/115103030/**
2. **https://nptel.ac.in/content/syllabus_pdf/113106034.pdf**
3. **https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-mm08/**

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							
CO2	3	3	2	1	1							
CO3	3	3	2	1	1							
CO4	3	2	1	1	-							
CO5	3	3	1	1	-							

1-Slightly, 2-Moderately, 3-Substantially.

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

A40073-CHEMISTRY OF ENERGY SYSTEMS

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

COURSE OBJECTIVES	
1	To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
2	To understand the basic concepts of processing and limitations of Fuel cells & their applications.
3	To impart knowledge to the students about fundamental concepts of photo chemical cells, reactions and applications
4	Necessarily of harnessing alternate energy resources such as solar energy and its basic concepts.
5	To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquification method.

COURSE OUTCOMES	
CO 1	• Solve the problems based on electrode potential, Describe the Galvanic Cell Differentiate between Lead acid and Lithium ion batteries, Illustrate the electrical double layer
CO 2	Describe the working Principle of Fuel cell, Explain the efficiency of the fuel cell Discuss about the Basic design of fuel cells, Classify the fuel cell
CO 3	Differentiate between Photo and Photo electrochemical Conversions, Illustrate the photochemical cells, Identify the applications of photochemical reactions, interpret advantages of photoelectron catalytic conversion.
CO 4	Apply the photo voltaic technology, Demonstrate about solar energy and prospects llustrate the Solar cells, Discuss about concentrated solar power
CO 5	Differentiate Chemical and Physical methods of hydrogen storage, Discuss the metal organic frame work, Illustrate the carbon and metal oxide porous structures Describe the liquification methods.

UNIT-1: 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-2: 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-3: 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-4: Solar Energy: Introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar cells and applications. .

UNIT-5: 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.

Text books

1. Physical chemistry by Ira N. Levine
2. Essentials of Physical Chemistry, Bahl and Bahl and Tuli.
3. Inorganic Chemistry, Silver and Atkins

Reference Books:

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 ArvindTiwari and Shyam.
3. Solar energy fundamental, technology and systems by Klaus Jagar et.al.
4. Hydrogen storage by Levine Klebonoff

A40074-ENGLISH FOR COMPETITIVE EXAMINATIONS
(Open Elective-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

Course Objectives:
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 Outcomes (CO): Blooms Level
By the end of the program students will be able to
Identify the basics of English grammar and its importance L1, L2
Explain the use of grammatical structures in sentences L1, L2
Demonstrate the ability to use various concepts in grammar and vocabulary and their applications in everyday use and in competitive exams L3
Analyze an unknown passage and reach conclusions about it. L4
Choose the appropriate form of verbs in framing sentences L5
Develop speed reading and comprehending ability thereby perform better in competitive exams L3

UNIT – I **GRAMMAR-1** Lecture Hrs
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** Lecture Hrs
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** Lecture Hrs
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** Lecture Hrs
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** Lecture Hrs

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

Textbooks:

. **Wren & Martin, *English for Competitive Examinations,* S.Chand & Co, 2021**

*Objective English for Competitive Examination***,** Tata McGraw Hill, New Delhi, 2014.

Reference Books:

Hari Mohan Prasad, *Objective English for Competitive Examination,* Tata McGraw Hill, New Delhi, 2014.

Philip Sunil Solomon, *English for Success in Competitive Exams*, Oxford 2016

Shalini Verma , *Word Power Made Handy*, S Chand Publications

Neira, Anjana Dev & Co. *Creative Writing: A Beginner's Manual.* Pearson Education India, 2008.

Abhishek Jain, Vocabulary Learning Techniques Vol. I & II, RR Global Publishers 2013.

Michel Swan, *Practical English Usage*,Oxford,2006.

Online Resources

1. **https://www.grammar.cl/english/parts-of-speech.htm**
2. **https://academicguides.waldenu.edu/writingcenter/grammar/partsofspeech**
3. **https://learnenglish.britishcouncil.org/grammar/english-grammar-reference/active-passive-voice**
4. **https://languagetool.org/insights/post/verb-tenses/**
5. **https://www.britishcouncil.in/blog/best-free-english-learning-resources-british-council**
6. **https://www.careerride.com/post/social-essays-for-competitive-exams-586.aspx**

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

A40075-ENTREPRENEURSHIP AND NEW VENTURE CREATION
(Open Elective-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

COURSE OBJECTIVES: The objectives of this course are	
1	To foster an entrepreneurial mind-set for venture creation and intrapreneurial leadership.
2	To encourage creativity and innovation
3	To enable them to learn pitching and presentation skills
4	To make the students understand MVP development and validation techniques to determine Product-Market fit and Initiate Solution design, Prototype for Proof of Concept.
5	To enhance the ability of analyzing Customer and Market segmentation, estimate Market size, develop and validate Customer Persona

COURSE OUTCOMES: At the end of the course, students will be able to		**BTL**
CO1	Develop an entrepreneurial mindset and appreciate the concept of entrepreneurship	L3
CO2	Comprehend the process of problem-opportunity identification through design thinking, identify market potential and customers while developing a compelling value proposition solution	L3
CO3	Analyze and refine business models to ensure sustainability and profitability	L3
CO4	Build Prototype for Proof of Concept and validate MVP of their practice venture idea	L4
CO5	Create business plan, conduct financial analysis and feasibility analysis to assess the financial viability of a venture	L5
CO6	Prepare and deliver an investible pitch deck of their practice venture to attract stakeholders	L6

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

LEARNING OUTCOMES
At the end of the Unit, the learners will be able to
- Understand theconcept of Entrepreneur and Entrepreneurship in India
- Analyze recent trends in Entrepreneurship role in economic development
- Develop a creative mind set and personality in starting a business.

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.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to

- Understand the problem and Customer identification.
- Analyze problem and validating with potential customer
- Evaluate customer segmentation and customer personas

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.

Core Teaching Tool: Venture Activity, no-code Innovation tools, Class activity

LEARNING OUTCOMES

At the end if the Unit, the learners will be able to

- Analyze jobs-to-be-done
- Evaluate customer needs to create a strong value proposition
- Design and draw prototyping and MVP

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.

Core Teaching Tool: Founder Case Studies – Sama and Securely Share; Class activity and discussions; Venture Activities.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to:

- Understand lean approach in business models
- Apply business plan, sales plan and financial plan
- Analyze financial planning, marketing channels of distribution.
- Design their own venture and source of funds.

UNIT-V: Scale Outlook and Venture Pitch readiness
Understand and identify potential and aspiration for scale vis-a-vis your venture idea. Persuasive Story telling and its key components. Build an Investor ready pitch deck.

Core Teaching Tool: Expert talks; Cases; Class activity and discussions; Venture Activities.

LEARNING OUTCOMES

At the end of the Unit, the learners will be able to
- Understand aspiration for scale
- Analyze venture idea and its key components
- Evaluate and build investors ready pitch

TEXT BOOKS
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).

REFERENCES

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.

E-RESOURCES

Learning resource- Ignite 5.0 Course Wadhwani platform (Includes 200+ components of custom created modular content + 500+ components of the most relevant curated content)
BTL: Bloom’s Taxonomy Level

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

A40091–ENTREPRENEURSHIP (OE-1)

HoursPerWeek			HoursPerSemester			Credits	AssessmentMarks		
L	T	P	L	T	P	C	CIE	SEE	Total
3	0	0	42	0	0	3	30	70	100

1. Course Description

CourseOverview

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

CoursePre/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. CourseSyllabus

UNIT-I

The Entrepreneurial Process Entrepreneurial Journey
Introduction to the entrepreneurial process, keystages, milestones, and challenges. Successstories 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.
Ideationand Innovation: Ideation and Proto typing-Creative techniques for generating ideas. Steps for developing proto types and minimum viable products(MVP) usingiterative 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, block chain, 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 off unding sources such as venture capital, angelinvestors, and crowd funding. Strategies for securing funding and best practices for financial management.

Education and Entrepreneurship- Theroleofeducation infostering 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.

Indiaas 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-depthanalysisofreal-worldstartups. Lessons learned from both successful ventures and failures across various industries.

4. Books

TextBook(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).

ReferenceBook(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

Open Elective - II

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

A40173-DISASTER MANAGEMENT
(Open Elective – 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

Course Objectives:

Theobjectivesof thiscoursearetomakethestudent:

To understand the fundamental concepts of natural disasters, their occurrence, and disaster risk reduction strategies.

To analyze the impact of cyclones on structures and explore retrofitting techniques for adaptive reconstruction.

To apply wind engineering principles and computational techniques in designing wind- resistant structures.

To evaluate earth quake effects on buildings and develop strategies forseismic retrofitting.

To assess seismic safety planning, design considerations, and innovative constructionmaterials for disaster-resistant structures.

Course Outcomes:

After successful completion of this course, students will be able to:

Understand the fundamental concepts ofnatural disasters, their occurrence, and disaster risk reduction strategies.

Analyze the impact of cyclones on structures and explore retro fitting techniques for adaptive reconstruction.

Apply wind engineering principles and computational techniques indesigning wind- resistant structures.

Evaluate earthquake effects on buildings and develop strategies for seismicretrofitting.

Assessseismic safety planning, design considerations, and innovative construction materials for disaster-resistant structures.

CO–POArticulation Matrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO-1	3	-	-	-	-	2	-	2	2	-	-	-	3	3
CO-2	-	3	-	-	2	-	-	-	-	-	-	2	3	-
CO-3	3	-	-	3	-	-	3	-	-	2	-	-	-	3
CO-4	-	-	3	-	3	-	-	2	-	-	-	-	3	-
CO-5	-	-	-	3	-	3	3	3	2	-	-	-	-	3

UNIT– I

Introduction to Natural Disasters– Brief Introduction to Different Types of Natural Disasters, Occurrence of Disasters inDifferent Climatic and Geographical Regions, Hazard Maps (EarthquakeandCyclone) of The World and India, Regulations for Disaster Risk Reduction,
Post-Disaster Recovery and Rehabilitation (Socioeconomic Consequences).

UNIT– II

Cyclones and Their Impact– Climate Change and Its Impact On Tropical Cyclones, Nature of Cyclonic Wind, Velocities and Pressure, Cyclone Effects, Storm Surges, Floods, and
Land slides. Behavior of Structures in Past Cyclones and Windstorms, Case Studies. Cyclonic

Retrofitting, Strengthening of Structures, and Adaptive Sustainable Reconstruction. Life-Line Structures Such as Temporary Cyclone Shelters.

UNIT– III

Wind Engineering and Structural Response– Basic Wind Engineering, Aerodynamics of Bluff Bodies, Vortex Shedding, and Associated Unsteadiness Along and Across Wind forces. Lab: Wind Tunnel Testing and Its Salient Features. Introduction to Computational Fluid Dynamics (CFD). General Planning and Design Considerations Under Windstorms and Cyclones. Wind Effects On Buildings, towers, Glass Panels, Etc., and Wind-Resistant Features in Design.Codal Provisions, Design Wind Speed, Pressure Coefficients. Coastal Zoning Regulations for Construction and Reconstruction in Coastal Areas. Innovative Construction Materials and Techniques, Traditional Construction Techniques in Coastal Areas.

UNIT– IV

Seismology and Earthquake Effects– Causes of Earthquakes, Plate Tectonics, Faults, Seismic Waves; Magnitude, Intensity, Epicenter, Energy Release, and Ground Motions. Earthquake Effects– On Ground, Soil Rupture, Liquefaction, Landslides. Performance of Ground and Buildings in Past Earthquakes– Behavior of Various Types of Buildings and Structures, Collapse Patterns; Behavior of Non-Structural Elements Such as Services, Fixtures, and Mountings – Case Studies. Seismic Retrofitting– Weakness in Existing Buildings, Aging, Concepts in Repair, Restoration, and Seismic Strengthening.

UNIT– V

Planning and Design Considerations for Seismic Safety– General Planning and Design Considerations; Building forms, Horizontal and Vertical Eccentricities, Mass and Stiffness Distribution, Soft StoreyEffects, Etc.; Seismic Effects Related to Building Configuration. Plan and Vertical Irregularities, Redundancy, and Setbacks. Construction Details– Various Types of Foundations, Soil Stabilization, RetainingWalls,Plinth Fill, Flooring, Walls, Openings, Roofs, Terraces, Parapets, Boundary Walls, Underground and Overhead Tanks, Staircases, and Isolation of Structures. Innovative Construction Materials and Techniques. Local Practices– Traditional Regional Responses. Computational Investigation Techniques.

TEXT BOOKS:

David Alexander, *Natural Disasters*, 1stEdition, CRC Press, 2017.
EdwardA. Kellerand Duane E.DeVecchio, *Natural Hazards: Earth's Processesas Hazards, Disasters, and Catastrophes*, 5th Edition, Routledge, 2019.

REFRENCEBOOKS:

BenWisner, J.C.Gaillard, and Ilan Kelman (Editors), *Handbook of Hazardsand Disaster Risk Reduction and Management*, 2nd Edition, Routledge, 2012.
DamonP.Coppola, *Introduction to International Disaster Management*, 4thEdition, Butterworth-Heinemann, 2020.
Bimal KantiPaul, *Environmental Hazards and Disasters: Contexts, Perspectives and Management*, 2nd Edition, Wiley-Blackwell, 2020.

OnlineLearningResources:

https://nptel.ac.in/courses/124107010https://onlinecourses.swayam2.ac.in/cec19_hs20/preview

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

A40174-SUSTAINABILITY IN ENGINEERING PRACTICES (OE – 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

Course Objectives:
The objectives of this course are to make the student:
To understand the fundamentals of sustainability, the carboncycle, and the environmental impact of construction materials.
To analyze sustainable construction materials, their durability, and life cycle assessment.
To apply energy calculations in construction materials and assess their embodiedenergy.
To evaluate green building standards, energy codes, and performanceratings.
To assess the environmental effects of energy use, climate change, and global warming.

Course Outcomes:
After successful completion of this course, students will be able to:
Understand the fundamentals of sustainability, the carbon cycle, and the environmental impact of construction materials.
Analyze sustainable construction materials, their durability, and life cycle assessment.
Apply energy calculations in construction materials andassess theirembodiedenergy.
Evaluate green building standards, energy codes, and performance ratings.
Assess the environmental effects of energy use, climate change, and global warming.

CO–POArticulation Matrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 10	P O 11	P O 12	PSO 1	PSO 2
CO-1	3	-	-	-	-	2	3	2	-	-	-	-	3	3
CO-2	-	3	-	-	2	-	3	-	-	-	-	2	3	3
CO-3	-	-	3	3	3	-	2	-	-	2	-	-	3	3
CO-4	-	-	3	3	3	-	3	2	-	-	-	-	3	3
CO-5	-	-	-	-	-	3	3	3	-	-	-	-	-	3

UNIT– I

INTRODUCTION
Introduction and Definition of Sustainability - Carbon Cycle - Role of Construction Material: Concrete and Steel, Etc. - CO_2Contribution From Cement and Other Construction Materials.

UNIT– II

MATERIALS USED in SUSTAINABLE CONSTRUCTION
Construction Materials and Indoor Air Quality-No/Low Cement Concrete-Recycledand Manufactured Aggregate - Role of QC and Durability - Life Cycle and Sustainability.

UNIT– III

ENERGY CALCULATIONS
Components of Embodied Energy- Calculation of Embodied Energy for Construction Materials-Energy Concept and Primary Energy-Embodied Energy Via-A-Vis Operational

Energy in Conditioned Building –Life Cycle Energy Use

UNIT– IV		
GREEN BUILDINGS Control of Energy Use inBuilding - ECBC Code, Codes inNeighboring Tropical Countries - OTTV Concepts and Calculations – Features of LEED and TERI – GRIHA Ratings - Role of Insulation and Thermal Properties of Construction Materials - Influence of Moisture Content and Modeling - Performance Ratings of Green Buildings - Zero Energy Building		
UNIT– V		
ENVIRONMENTAL EFFECTS Non-Renewable Sources of Energy and Environmental Impact– Energy Norm, Coal, Oil, Natural Gas - Nuclear Energy - Global Temperature, Green House Effects, Global Warming - Acid Rain: Causes, Effects and Control Methods - Regional Impacts of Temperature Change.		

TEXT BOOKS:

Charles JKibert, Sustainable Construction: Green Building Design & Delivery, 4th Edition , Wiley Publishers 2016.

Steve Goodhew, Sustainable Construction Process, Wiley Blackwell, UK, 2016.

REFRENCEBOOKS:

Craig A. Langston & Grace K.C. Ding, Sustainable Practicesinthe Built Environment, Butterworth Heinemann Publishers, 2011.

William P Spence, Construction Materials, Methods & Techniques(3e), Yesdee Publication Pvt. Ltd, 2012.

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/105/105105157/

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

A40272-RENEWABLE ENERGY SOURCES
(Open Elective-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

Course Outcomes (CO): At the end of the course the student will be able to:
CO 1: Understand principle operation of various renewable energy sources. L1
CO 2: Identify site selection of various renewable energy sources. L2
CO 3: Analyze various factors affecting on solar energy measurements, wind energy conversion techniques, Geothermal, Biomasss, Tidal Wave and Fuel cell energies L3
CO 4: Design of Solar PV modules and considerations of horizontal and vertical axis Wind energy systems. L5
CO 5: Apply the concepts of Geo Thermal Energy, Ocean Energy, Bio mass and Fuel Cells for generation of power. L4

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.

UNIT – V 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.

Text books:

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 Books:

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:

1. https://nptel.ac.in/courses/103103206
2. https://nptel.ac.in/courses/108108078

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

A40372-AUTOMATIONANDROBOTICS
(OpenElective–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

Course objectives: The objectives of the course are to	
1	Fundamentals of industrial automation, production types, automation strategies, and hardware elements used in modern manufacturing processes.
2	Understanding of automated manufacturing systems, and strategies for improving productivity and flexibility in industrial automation.
3	Knowledge of industrial automation and robotics, sensors, and end-effector design for modern manufacturing environments.
4	Explain industrial automation and robotics, and trajectory planning for intelligent and efficient manufacturing applications.
5	Familiarity of industrial automation and robotics, and practical applications in manufacturing processes.

COURSE OUTCOMES On successful completion of this course the student will be able to		
1	Understand and analyze the structure and functions of automated manufacturing systems, and evaluate hardware components for efficient production.	*L2,L4,L5*
2	Analyze and design automated flow lines with or without buffer storage, perform quantitative evaluations, apply assembly line balancing techniques.	L4,L5,L6
3	Classify robot configurations, select suitable actuators and sensors, analyze and apply automation and robotics principles to optimize production efficiency and flexibility.	L2,L3,L4
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.	L3,L4,L5
5	Design, program, and implement robotic systems, understand and apply robotics technology to manufacturing tasks.	L1,L3,L6

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.

Text Books:

1. Automation, Production systems and CIM, M.P. Groover/Pearson Edu.
2. Industrial Robotics -M.P. Groover,TMH.

References:

1. Robotics, FuKS, McGrawHill, 4thedition,2010.
2. An Introduction to Robot Technology, P.Coiffet and M.Chaironze, Kogam PageLtd. 1983 London.
3. Robotic Engineering, RichardD. Klafter, Prentice Hall
4. Robotics, Fundamental Conceptsandanalysis–Ashitave Ghosal, Oxford Press, 1/e,2006
5. Robotics and Control, Mittal RK & NagrathIJ, TMH.

Online Learning Resources:

https://www.youtube.com/watch?v=yxZm9WQJUA0&list=PLRLB5WCqU54UJG45UnazSYmnmhl-gt76o

https://www.youtube.com/watch?v=6f3bvIhSWyM&list=PLRLB5WCqU54X5Vy4DwjfSODT3ZJgwEjy

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

A40472-DIGITAL ELECTRONICS
(Open Elective –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

Course Objectives:

1. To Learn Boolean algebra, logic simplification techniques, and combinational circuit design.
2. To analyze combinational circuits like adders, subtractors, and code converters.
3. To explore combinational logic circuits and their applications in digital design.
4. To understand sequential logic circuits, including latches, flip-flops, counters, and shift registers.
5. To gain knowledge about programmable logic devices and digital IC's.

Course Outcomes:
At the end of this course, the students will be able to

1. Learn Boolean algebra, logic simplification techniques, and combinational circuit design.
2. Analyze combinational circuits like adders, subtractors, and code converters.
3. Explore combinational logic circuits and their applications in digital design.
4. Understand sequential logic circuits, including latches, flip-flops, counters, and shift registers.
5. Gain knowledge about programmable logic devices and digital IC's.

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, Subtractors 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, Demultiplexers, 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).

TEXT BOOKS:

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 BOOKS:

1. Fundamentals of Logic Design, Charles H Roth,Jr., 5th Edition, Brooks/cole Cengage Learning, 2004.

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

A40076-OPTIMIZATION TECHNIQUES
(Open Elective -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

Course Outcomes:
After successful completion of this course, the students should be able to:

Cos	Statements	Blooms level
CO1	Understand the meaning, purpose, tools of Operations Research and linear programming in solving practical problems in industry.	L2, L3
CO2	Interpret the transportation models' solutions and infer solutions to the real-world problems.	L3, L5
CO3	Develop mathematical skills to analyze and solve nonlinear programming models arising from a wide range of applications.	L3
CO4	Apply the concept of non-linear programming for solving the problems involving non-linear constraints and objectives	L2, L3
CO5	Apply the concept of unconstrained geometric programming for solving the problems involving non-linear constraints and objectives.	L3,L5

UNIT – I: Linear programming I **9Hr**

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 **9Hr**

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 9Hr

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 **9Hr**

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 **9Hr**

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.

TEXT BOOK:

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.

REFERENCES:

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.

Web Reference:

- 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

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

A40080-Mathematical foundation of quantum technologies

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

Course Objectives:

- To provide students with essential linear algebra foundations including vector spaces, inner products, and operators for quantum mechanical applications.
- To develop understanding of the transition from finite-dimensional systems to infinite-dimensional function spaces and Hilbert space concepts.
- To establish quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution principles.
- To enable students to apply quantum mechanical principles to solve problems in simple quantum systems and understand statistical interpretation.
- To introduce advanced concepts in composite systems, measurement processes, and modern perspectives in quantum mechanics.

Course Outcomes:

After successful completion of this course, the students should be able to:

COs	Statements	Blooms level
CO1	Understand vector spaces, inner products, and linear operators with applications to quantum systems.	L1, L2 (Understand, Comprehend)
CO2	Apply linear algebra concepts to function spaces and analyze the transition from finite to infinite dimensional systems.	L3, L4 (Apply, Analyze)
CO3	Analyze quantum mechanical formalism including measurement theory, uncertainty relations, and time evolution.	L4 (Analyze)
CO4	Apply quantum mechanical principles to solve problems in simple quantum systems and evaluate statistical interpretations.	L3, L5 (Apply, Evaluate)
CO5	Evaluate advanced concepts in composite systems and synthesize understanding of measurement processes and modern quantum theory.	L5, L6 (Evaluate, Create)

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	-	-	-	-	-	-	2
CO2	3	3	2	3	2	-	-	-	-	-	-	2
CO3	3	3	3	3	2	-	-	-	-	-	-	2
CO4	3	3	3	3	2	-	-	-	-	-	-	2
CO5	3	3	3	3	2	1	-	-	-	-	-	3

• **3** = Strong Mapping, **2** = Moderate Mapping, **1** = Slight Mapping, **-** = No Mapping

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

Syllabus

UNIT I: Linear Algebra Foundation for Quantum Mechanics (10 hours)
Vector spaces definition and examples (R^2, R^3, function spaces), Inner products (dot product, orthogonality, normalization), Linear operators (matrices, eigenvalues, eigenvectors), Finite-dimensional examples (2×2 matrices, spin-1/2 systems), Dirac notation introduction ($|\psi\rangle$, $\langle\phi|$, $\langle\phi|\psi\rangle$), Change of basis (transformations, unitary matrices).

UNIT II: From Finite to Infinite Dimensions (08 hours)
Function spaces (L^2 space, square-integrable functions), Inner products for functions ($\int\psi^*\phi\, dx$), Orthogonal function sets (Fourier series, basis functions), Introduction to Hilbert space concept (complete inner product spaces), Position and momentum representations (wave functions), Operators on functions (d/dx, multiplication by x).

UNIT III: Quantum Mechanical Formalism (08 hours)
Mathematical formulation (states as vectors, observables as operators), Measurement theory (Born rule, expectation values, probabilities), Uncertainty relations (mathematical derivation from commutators), Time evolution (Schrödinger equation, unitary evolution).

UNIT IV: Applications and Statistical Interpretation (06 hours)
Simple applications (infinite square well, harmonic oscillator), Statistical interpretation (ensembles, pure vs mixed states), Measurement process (von Neumann measurement scheme).

UNIT V: Advanced Topics (08 hours)
Composite systems (tensor products basic introduction), Reversibility and irreversibility (unitary evolution vs measurement), Thermodynamic connections (equilibrium states, entropy), Modern perspectives (decoherence, measurement problem conceptual).

Textbooks:

1. David J. Griffiths, Darrell F. Schroeter, “Introduction to Quantum Mechanics”, 3rd Edition, Cambridge University Press (2018).
2. R. Shankar, Principles of Quantum Mechanics, 2nd Edition, Kluwer Academy/Plenum Publishers (1994).

Reference Books:

1. George. F. Simmons, “Introduction to Topology and Modern Analysis”, MedTech Science Press.
2. Gilbert Strang, Linear Algebra and Its Applications, 4th Edition, Cengage Learning (2006).
3. John von Neumann and Robert T Beyer, Mathematical Foundations of Quantum Mechanics, Princeton Univ. Press (1996).

Web Resources

1. https://eclass.uoa.gr/modules/document/file.php/CHEM248/Griffiths%20-%20Introduction%20to%20Quantum%20Mechanics%203rd%20ed%202018.pdf
2. https://fisica.net/mecanica-quantica/Shankar%20-0Principles%20of%20quantum%20mechanics.pdf

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

A40077-PHYSICS OF ELECTRONIC MATERIALS AND DEVICES
Open Elective-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

Course Objectives	
1	To make the students to understand the concept of crystal growth, defects in crystals and thin films.
2	To provide insight into various semiconducting materials and their properties.
3	To develop a strong foundation in semiconductor physics and device engineering.
4	To elucidate excitonic and luminescent processes in solid-state materials.
5	To understand the principles, technologies, and applications of modern display systems.

Syllabus:

UNIT-I Fundamentals of Materials Science **9H**

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).

UNITII Semi conductors **9H**

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: **9Hr**

Introduction, Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Heterojunctions, Transistors, MOSFETs.

UNIT IV Excitons and Luminescence: **9H**

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.

UNITV Display devices : **9Hr**

LCD, three-dimensional display: Holographic display, light-field displays: Head-mounted display,

MOEMS (Micro-Opto-Electro-Mechanical Systems) and MEMS displays.

Text books:

1. Principles of Electronic Materials and Devices-S.O. Kasap, McGraw-Hill Education (India) Pvt. Ltd.,4th edition, 2021.
2. Semiconductor physics & devices: basic principles, 4th Edition, McGraw-Hill, 2012.

Reference Books:

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

NPTEL course links:

https://nptel.ac.in/courses/113/106/113106062/
https://onlinecourses.nptel.ac.in/noc20_ph24/preview

	Course Outcomes	Blooms Level
CO1	Understand crystal growth and thin film preparation	L1,L2
CO2	Summarize the basic concepts of semiconductors	L1,L2
CO3	Illustrate the working of various semiconductor devices	L1,L2, L3
CO4	Analyze various luminescent phenomena and the devices based on these concepts	L1,L2, L3
CO5	Explain the working of different display devices	L1,L2

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							
CO2	3	3	2	1	1							
CO3	3	3	2	1	1							
CO4	3	2	1	1	-							
CO5	3	3	1	1	-							

1-Slightly, 2-Moderately,3-Substantially.

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

A40078-CHEMISTRYOFPOLYMERSANDAPPLICATIONS
OpenElective-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

Course Objectives	
1	To understand the basic principles of polymers
2	To understand natural polymers and their applications.
3	impart knowledge to the students about synthetic polymers, their preparation and importance.
4	To enumerate the applications of hydogel polymers
5	To enumerate applications of conducting and degradable polymers in engineering.

Course Outcomes	
CO1	Classify the polymers, Explain polymerization mechanism, Differentiate addition, condensation polymerizations, Describe measurement of molecular weight of polymer
CO2	Describe the physical and chemical properties of natural polymers and Modified cellulosics.
CO3	Differentiate Bulk, solution, Suspension and emulsion polymerization, Describe fibers and elastomers, Identify the thermosetting and thermo polymers.
CO4	Identify types of polymer networks, Describe methods involve in hydrogel preparation, Explain applications of hydrogels in drug delivery,
CO5	Explain classification and mechanism of conducting and degradable polymers.

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 cellulosics

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 cellulosics: 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.

Text Books:

1. A Text book of Polymer science, Billmayer
2. Polymer Chemistry – G.S.Mishra
3. Polymer Chemistry – Gowarikar

References Books:

1. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall

2.Advanced Organic Chemistry, B.Miller, Prentice Hall

1. 3. Polymer Science and Technology by Premamoy Ghosh, 3rd edition, McGraw-Hill, 2010.

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

A40079-ACADEMICWRITINGANDPUBLIC SPEAKING
OPEN ELECTIVE - 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

Course Objectives:	
To encourage all round development of the students by focusing on writing skills To make the students aware of non-verbal skills To develop analytical skills To deliver effective public speeches	
Course Outcomes (CO):	Blooms Level
By the end of the program students will be able to Understand various elements of Academic Writing L1, L2 Identify sources and avoid plagiarismL1, L2 Demonstrate the knowledge in writing a Research paper L3 Analyse different types of essays L4 Assess the speeches of others and know the positive strengths of speakers L5 Build confidence in giving an impactful presentation to the audience L3	

UNIT - I	UNIT - I	UNIT - I
Introduction to Academic Writing – Essential Features of Academic Writing – Courtesy – Clarity – Conciseness – Correctness – Coherence – Completeness – Types – Descriptive, Analytical, Persuasive, Critical writing		
UNIT - II	**UNIT - II**	**UNIT - II**
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	**UNIT - III**	**UNIT - III**
Compare and Contrast – Argumentative Essay – Exploratory Essay – Features and Analysis of Sample Essays – Writing Book Report, Summarizing, Book/film Review- SoP		
UNIT - IV	**UNIT - IV**	**UNIT - IV**
Introduction, Nature, characteristics, significance of Public Speaking – Presentation – 4 Ps of Presentation – Stage Dynamics – Answering Strategies –Analysis of Impactful Speeches- Speeches for Academic events		
UNIT - V	**UNIT - V**	**UNIT - V**
Body Language – Facial Expressions-Kinesics – Oculesics – Proxemics – Haptics – Chronomics -Paralanguage - Signs		
Textbooks:		
Critical Thinking, Academic Writing and Presentation Skills: MG University Edition Paperback – 1 January 2010 Pearson Education; First edition (1 January 2010) Pease, Allan & Barbara. *The Definitive Book of Body Language*RHUS Publishers, 2016		

Reference Books: Alice Savage, Masoud Shafiei *Effective Academic Writing,* ***2Ed.,*** 2014 .Oxford University Press Shalini Verma, *Body Language*, S Chand Publications 2011. Sanjay Kumar and Pushpalata ,*Communication Skills* 2E 2015, Oxford. Sharon Gerson, Steven Gerson, *Technical Communication Process and Product,* Pearson, New Delhi, 2014 *Elbow, Peter. Writing with Power. OUP USA, 1998*
Online Learning Resources:
https://youtu.be/NNhTIT81nH8 phttps://www.youtube.com/watch?v=478ccrWKY-A https://www.youtube.com/watch?v=nzGo5ZC1gMw https://www.youtube.com/watch?v=Qve0ZBmJMh4 https://courses.lumenlearning.com/publicspeakingprinciples/chapter/chapter-12-nonverbal-aspects-of-delivery/ https://onlinecourses.nptel.ac.in/noc21_hs76/preview https://archive.nptel.ac.in/courses/109/107/109107172/# https://archive.nptel.ac.in/courses/109/104/109104107/

Open Elective - III

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

A40175-BUILDINGMATERIALS AND SERVICES
(OPENELECTIVE –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

Course Objectives:
The objectives of this course are to make the student :
To understand the properties, classifications, and applications of building materials like stones, bricks, tiles, wood, aluminum, glass, paints, and plastics.
To analyze the composition, manufacturing process, and properties of cement and admixtures.
To apply knowledge of building components such as lintels, arches, walls, stairs, floors, roofs, foundations, and joinery.
To evaluate masonry, mortars, finishing techniques, and formwork systems.
To assess various building services including plumbing, ventilation, air conditioning, acoustics, and fire protection.

Course Outcomes:
Upon successful completion of the course, students will be able to:
Understand the properties, classifications, and applications of building materials like stones, bricks, tiles, wood, aluminum, glass, paints, and plastics.
Analyze the composition, manufacturing process, and properties of cement and admixtures.
Apply knowledge of building components such as lintels, arches, walls, stairs, floors, roofs, foundations, and joinery.
Evaluate masonry, mortars, finishing techniques, and formwork systems.
Assess various building services including plumbing, ventilation, air conditioning, acoustics, and fire protection.

CO – PO Articulation Matrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO -1	3	-	-	-	2	-	-	-	-	-	-	-	3	3
CO -2	3	3	-	-	2	-	-	-	-	-	-	2	3	3
CO -3	3	-	3	2	3	-	-	-	-	-	-	-	3	3
CO -4	-	-	3	3	3	-	2	-	-	-	-	-	3	3
CO -5	-	-	-	-	-	3	3	2	-	-	-	-	-	3

UNIT – I

StonesandBricks, Tiles: Building Stones – Classifications and Quarrying – Properties – Structural Requirements – Dressing. Bricks – CompositionofBrick Earth – Manufacture and Structural Requirements, Fly Ash, Ceramics. Timber, Aluminum, Glass, PaintsandPlastics: Wood - Structure – Types and Properties – Seasoning – Defects; Alternate Materials for Timber – GI / Fibre – Reinforced Glass Bricks, Steel & Aluminum, Plastics.

UNIT – II

Cement &Admixtures: Types of Cement - Ingredients of Cement – Manufacture – Chemical Composition – Hydration - Field & Lab Tests – Fineness – Consistency – Initial &Final Setting – Soundness . Admixtures – Mineral & Chemical Admixtures – Uses

UNIT – III

Building Components: Lintels, Arches, Walls, Vaults – Stair Cases – Types of Floors, Types of Roofs – Flat, Curved, Trussed; Foundations – Types; Damp Proof Course; Joinery – Doors – Windows – Materials – Types.

UNIT – IV		
Mortars, MasonryandFinishing’s Mortars: Lime and Cement Mortars Brick Masonry – Types – Bonds; Stone Masonry – Types; Composite Masonry – Brick-Stone Composite; Concrete, Reinforced Brick. Finishers: Plastering, Pointing, Painting, Claddings – Types – Tiles – ACP.form Work: Types: Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.		
UNIT – V		
Building Services: Plumbing Services: Water Distribution, Sanitary – Lines &Fittings; Ventilations: Functional Requirements Systems of Ventilations. Air-Conditioning - Essentials andTypes; Acoustics – Characteristic – Absorption – Acoustic Design; Fire Protection – Fire Hazards – Classification of Fire Resistant Materials and Constructions.		

TEXT BOOKS:

Building Materials and Construction – Arora&Bindra, Dhanpat Roy Publications.
Building Materials and Construction by G C Sahu, Joygopal Jena McGraw hill Pvt Ltd 2015.

REFRENCE BOOKS:

Building Construction by B. C. Punmia, Ashok Kumar Jain andArun Kumar Jain - Laxmi Publications (P) ltd., New Delh
P. C. Varghese, Building Materials, Prentice Hall of India, 2015.
N.Subramanian ,”Building Materials Testing and Sustainability”, Oxford Higher Education, 2019.
R. Chudley, Construction Technology, Longman Publishing Group, 1973.
S. K. Duggal, Building Materials, Oxford & IBH Publishing Co. Ltd., New Delhi, 2019

Online Learning Resources:

https://archive.nptel.ac.in/courses/105/102/105102088/

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

A40176-ENVIRONMENTAL IMPACTASSESSMENT
(OPENELECTIVE –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

Course Objectives:
The objectives of this course are to make the student to:
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 Outcomes (COs):
Upon successful completion of the course, students will be able to:
Apply various methodologies for conducting Environmental Impact Assessments.
Analyze the impact of land-use changes on soil, water, and air quality.
Evaluate the environmental impact on vegetation, wildlife, and conduct risk assessments.
Develop environmental audit reports and assess compliance with environmental policies.
Interpret and apply environmental acts and regulations related to EIA.

CO – PO Articulation Matrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO -1	3	2	2	2	2	3	-	-	-	-	-	1	2	2
CO -2	3	3	3	2	2	3	-	-	-	-	-	1	3	2
CO -3	3	3	3	2	2	3	3	-	-	-	-	1	3	3
CO -4	3	3	3	3	2	3	3	-	-	-	-	1	3	3
CO -5	2	2	2	2	2	3	3	3	-	-	-	1	2	2

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. E I Ain 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 An 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, ConceptofISO and ISO 14000.		
TEXT BOOKS:		
Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B. S. Publication, Hyderabad 2nd edition 2011 Environmental Impact Assessment, by Canter Larry W., McGraw-Hill education Edi (1996)		
REFRENCE BOOKS:		
Environmental Engineering, by Peavy, H. S, Rowe, D. R, Tchobanoglous, G.Mc-Graw Hill International Editions, New York 1985. Environmental Science and Engineering, by Suresh K. Dhaneja, S.K., Katania& Sons Publication, New Delhi Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke, Prentice Hall Publishers. Environmental Pollution and Control, by H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/124/107/124107160/		

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

A40273-SMARTGRIDTECHNOLOGIES
(OpenElective- 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

CourseOutcomes:

CO1: Course Outcomes:
CO1: Understanding the Concept and Evolution of Smart Grids. L2
CO2: Analyzing Wide Area Monitoring System and Synchrophasor Technology. L4
CO3: Applying Smart Metering and Advanced Metering Infrastructure (AMI) Concepts. L3
CO4: Evaluating Information and Communication Technology (ICT) Systems in Smart Grids. L5
CO5: Designing Smart Grid Applications and Cybersecurity Measures. L6

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:
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.

TEXT BOOKS:

1.James Momoh, "SMART GRID : Fundamentals of Design and Analysis", John Wiley and Sons, New York, 2012.Jana
2. ka Ekanayake, Nick Jenkins, Kithsiri Liyanage, Jianzhong Wu, Akihiko Yokoyama, "Smart Grid: Technology and Applications", John Wiley & Sons, New Jersey, 2012.

REFERENCES:

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, Newyork, 2012.

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

A40373--3D PRINTING TECHNOLOGIES

(Open Elective-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

Course objectives: The objectives of the course are to	
1	**Understand** the fundamental concepts of prototyping and distinguish between traditional and rapid prototyping methods.
2	**Demonstrate** the working principles, materials, and applications of solid-, liquid-, and powder-based RP systems.
3	**Define** the processes and classifications of rapid tooling and reverse engineering techniques.
4	**Identify** common errors in 3D printing and evaluate pre-processing, processing, and post-processing issues.
5	**Familiarize** RP-related software and its role in applications such as design, manufacturing, and medical fields.

Course Outcomes: On successful completion of the course, the student will be able to,		
1	Define and explain the evolution and need for rapid prototyping in modern product development.	L1,L2,L6
2	Compare and contrast various 3D printing technologies based on working principles, materials, and limitations.	L2,L4
3	Apply knowledge of rapid tooling and reverse engineering techniques for industrial and design applications.	L3,L5,L6
4	Diagnose and interpret different types of errors encountered in 3D printing processes and recommend solutions.	L2,L3,L5,
5	Use RP-specific software tools to manipulate STL files and prepare models for printing in real-world scenarios.	L1,L3,L6

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 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.

Textbooks:

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 Books:

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.

Online Learning Resources:

- NPTEL Course on Rapid Manufacturing.
- https://nptel.ac.in/courses/112/104/112104265/
- https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/
- https://slideplayer.com/slide/6927137/
- https://www.mdpi.com/2073-4360/12/6/1334
- https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-
- %20FDM.pdf
- https://lecturenotes.in/subject/197
- https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdfcompressed.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
- https://www.youtube.com/watch?v=NkC8TNts4B4.

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

A40473-MICROPROCESSORS AND MICROCONTROLLERS
(OpenElective–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

Course Objectives:

1. To comprehend the architecture, operation, and configurations of the 8086 microprocessors.
2. To get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
3. To study the interfacing of 8086 with memory, peripherals, and controllers for various applications.
4. To learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. To understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

Course Outcomes:
At the end of this course, the students will be able to

1. Gain knowledge on the architecture, operation, and configurations of the 8086 microprocessors.
2. Get familiar with 8086 programming concepts, instruction set, and assembly language development tools.
3. Know the interfacing of 8086 with memory, peripherals, and controllers for various applications.
4. Learn the architecture, instruction set, and programming of the 8051 microcontrollers.
5. Understand microcontroller interfacing techniques, peripheral programming, and processor comparisons.

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 - Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits - Instruction set - Addressing modes - Assembly language programming.

UNIT V

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

Textbooks:

1. Microprocessors and Interfacing – Programming and Hardware by Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rdEdition,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.

References:

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
(AUTONOMOUS)

A40081-WAVELETTRANSFORMSANDITSAPPLICATIONS
(OpenElective-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

Course Outcomes:
After successful completion of this course, the students should be able to:

COs	Statements	Blooms level
CO1	Understand wavelets and wavelet basis and characterize continuous and discrete wavelet transforms	L2, L3
CO2	Illustrate the multi resolution analysis ad scaling functions	L3, L5
CO3	Implement discrete wavelet transforms with multirate digital filters	L3
CO4	Understand multi resolution analysis and identify various wavelets and evaluate their time- frequency resolution properties.	L2, L3
CO5	Design certain classes of wavelets to specification and justify the basis of the application of wavelet transforms to different fields	L3,L5

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	-	-	-	-	-	-	-	1
CO2	3	2	2	2	-	-	-	-	-	-	-	1
CO3	3	2	2	1	-	-	-	-	-	-	-	1
CO4	2	2	2	1	-	-	-	-	-	-	-	1
CO5	3	3	2	1	-	-	-	-	-	-	-	1

1-Slightly,

2-Moderately,

3-Substantially.

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.

TEXT BOOK:

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)..

REFERENCES:

1. RaghuveerRao, “Wavelet Transforms”, Pearson Education, Asia

2. C. S. Burrus, Ramose and A. Gopinath, Introduction to Wavelets and Wavelet Transform, Prentice Hall Inc.

1. http://users.rowan.edu/~polikar/WAVELETS/WTtutorial.html
2. http://www.wavelet.org/
3. http://www.math.hawaii.edu/~dave/Web/Amara's%20Wavelet%20Page.htm
4. https://jqichina.wordpress.com/wp-content/uploads/2012/02/ten-lectures-of-waveletsefbc88e5b08fe6b3a2e58d81e8aeb2efbc891.pdf

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

A40082-SMARTMATERIALSANDDEVICES
OpenElective-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

Course Objectives	
1	To provide exposure to smart materials and their engineering applications.
2	To impart knowledge on the basics and phenomenon behind the working of smart materials
3	To explain the properties exhibited by smart materials
4	To educate various techniques used to synthesize and characterize smart materials
5	To identify the required smart material for distinct applications/devices

UNIT I Introduction to Smart Materials **9Hr**
Historical account of the discovery and development of smart materials, Shape memory materials, chromoactive materials, magnetorheological materials, photoactive materials, Polymers and polymer composites (Basics).

UNIT II Properties of Smart Materials **9Hr**
Optical, Electrical, Dielectric, Piezoelectric, Ferroelectric, Pyroelectric and Magnetic properties of smart materials.

UNIT III Synthesis of Smart Materials **9Hr**

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 **9Hr**

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 **9Hr**
Devices based on smart materials: Shape memory alloys in robotic hands, piezoelectric based devices, MEMS and intelligent devices.

Textbooks:
1. YaserDahman, 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 Books:
1. Gauenzi,P.,Smart Structures, Wiley, 2009.
2. MahmoodAliofkhazraei, Handbook of functional nanomaterials, Vol (1&2), Nova Publishers, 2014
3. **Handbook of Smart Materials, Technologies, and Devices: Applications of Industry,4.0,**Chaudhery MustansarHussain, Paolo Di Sia, Springer,2022.
4.**Fundamentals of Smart Materials,**Mohsen Shahinpoor, Royal Society of Chemistry, 2020

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(AUTONOMOUS)

NPTEL course link: https://onlinecourses.nptel.ac.in/noc22_me17/preview

	Course Outcomes	Blooms Level
CO1	Identify key discoveries that led to modern applications of shape memory materials, describe the two phases in shape memory alloys.	L1,L2, L3, L4
CO2	Describe how different external stimuli (light, electricity, heat, stress, and magnetism) influence smart material properties.	L1,L2, L3
CO3	Summarize various types of synthesis of smart materials	L1,L2, L3
CO4	Analyze various characterization techniques used for smart materials	L1,L2, L3
CO5	Interpret the importance of smart materials in various devices	L1,L2

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							
CO2	3	3	2	1	1							
CO3	3	3	1	1	1							
CO4	3	2	1	1	1							
CO5	3	3	1	1	-							

1-Slightly,

2-Moderately,

3-Substantially.

A40083-GREENCHEMISTRYANDCATALYSISFOR SUSTAINABLE ENVIRONMENT
OpenElective-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

Course Objectives	
1	To Understand Principle And Concepts Of Green Chemistry.
2	To Understand The Types Of Catalysis And Industrial Applications.
3	To Apply Green Solvents In Chemical Synthesis.
4	To Enumerate Different Sourced Of Green Energy.
5	To Apply Alternative Greener Methods Foe Chemical Reactions

Course Outcomes	
CO 1	Apply the Green chemistry Principles for day to day life as well as synthesis, describe the sustainable development and green chemistry, Explain economic and un-economic reactions, Demonstrate Polymer recycling.
CO 2	Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries, Differentiate Homogeneous and Heterogeneous catalysis, Identify the importance of Bio and Photo Catalysis, Discuss Transition metal and Phase transfer Catalysis
CO 3	Demonstrate Green solvents and importance, Discuss Supercritical carbondioxide, Explain Supercritical water, recycling of green solvents.
CO 4	Describe importance of Biomass and Solar Power, Illustrate Sonochemistry, Apply Green Chemistry for Sustainable Development; discuss the importance of Renewable resources, mechanochemical synthesis.
CO 5	Discuss Alternative green methods like Photoredox catalysis, single electron transfer reactions (SET), Photochemical Reactions, Microwave-assisted Reactions and Sonochemical reactions, examples and applications.

Syllabus

UNIT 1: 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 2: 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 3: GREEN SOLVENTS IN CHEMICAL SYNTHESIS

Green Solvents: Concept, Tools and techniques for solvent selection, supercritical fluids: Super critical carbondioxide, super critical water, Polyethylene glycol (PEG), Ionic liquids, Recyling of green solvents.

UNIT 4: 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 5: ALTERNATIVE GREENER METHODS

Photochemical Reactions - Examples, Advantages and Challenges, Photoredox catalysis, single electron transfer reactions (SET), Examples of Photochemical Reactions, Microwave-assisted Reactions and Sonochemical reactions, examples and applications.

Text Books :

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

References :

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and AckmezMudhoo, CRC Press, 2010.
2. Edited by AlvisePerosa and Maurizio Selva , Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.

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

A40084-EMPLOYABILITYSKILLS
OPEN ELECTIVE-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

Course Objectives:

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
To function effectively with heterogeneous teams

Course Outcomes (CO):	Blooms Level
CO1: Understand the importance of goals and try to achieve them	L1, L2
CO2: Explain the significance of self-management	L1, L2
CO3: Apply the knowledge of writing skills in preparing eye-catchy resumes	L3
CO4: Analyse various forms of Presentation skills	L4
CO5: Judge the group behaviour appropriately	L5
CO6: Develop skills required for employability.	L3, L6

UNIT - I	**Goal Setting and Self-Management**	Lecture Hrs

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**	Lecture Hrs

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**	Lecture Hrs

Nature, meaning & significance of Presentation Skills – Planning, Preparation, Presentation, Stage Dynamics –Anxiety in Public speaking (Glossophobia)- PPT & Poster Presentation

UNIT - IV	**Group Presentation Skills**	Lecture Hrs

Body Language – Group Behaviour - Team Dynamics – Leadership Skills – Personality Manifestation-Group Discussion-Debate –Corporate Etiquette

UNIT - V	**Job Cracking Skills**	Lecture Hrs

Nature, characteristics, importance & types of Interviews – Job Interviews – Skills for success – Job searching skills - STAR method - FAQs- Answering Strategies – Mock Interviews

Textbooks:

1. Sabina Pillai, Agna Fernandez. *Soft Skills & Employability Skills*,2014.Cambridge Publisher.

2.Alka Wadkar. *Life Skills for Success*, Sage Publications, 2016.

Reference Books:

Gangadhar Joshi. *Campus to Corporate Paperback* , Sage Publications. 2015
Sherfield Montogomery Moody,*Cornerstone Developing Soft Skills*, Pearson Publications. 4 Ed. 2008
Shikha Kapoor. *Personality Development and Soft Skills - Preparing for Tomorrow* .1 Edition, Wiley, 2017.
M. Sen Gupta, *Skills for Employability,* Innovative Publication, 2019.
Steve Duck and David T McMahan**,** *The Basics f Communication Skills A Relational Perspective,* Sage press, 2012.

Online Learning Resources:
- https://youtu.be/gkLsn4ddmTs - https://youtu.be/2bf9K2rRWwo - https://youtu.be/FchfE3c2jzc - https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ - https://www.youtube.com/c/skillopedia/videos - https://onlinecourses.nptel.ac.in/noc25_hs96/preview - https://onlinecourses.nptel.ac.in/noc21_hs76/preview - https://archive.nptel.ac.in/courses/109/107/109107172/# - https://archive.nptel.ac.in/courses/109/104/109104107/

Open Elective - IV

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

A40177-GEO-SPATIAL TECHNOLOGIES
(OPENELECTIVE–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

Course Objectives:

Theobjectivesof thiscoursearetomakethestudent:

To understand raster – based spatial analysis techniques, including query, overlay, and cost-distance analysis.

To analyze vector-based spatial analysis techniques such as topology, overlay, and proximity analysis.

To apply net work analysis techniques for geocoding, shortest path analysis, and location-allocation problems.

To evaluate surface and geostatistical analysis methods, including terrain modeling, watershed analysis, and spatial interpolation.

To assess GIS customization, Web GIS, and mobile mapping techniques for real-world applications.

Course Outcomes:

Uponsuccessful completionofthecourse,studentswillbeableto:

1. Understandraster-basedspatialanalysistechniques, including query, overlay, and cost-distance analysis.
2. Analyze vector-based spatial analysis techniques such astopology, overlay, and proximity analysis.
3. Apply network analysis techniques for geocoding, shortest path analysis,and location-allocation problems.
4. Evaluate surface and geo statistical analysis methods, including terrain modeling, watershed analysis, and spatial interpolation.
5. Assess GIS customization, Web GIS, and mobile mapping techniques for real-world applications.

CO–POArticulation Matrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO-1	3	-	-	-	2	-	-	-	-	-	-	-	3	3
CO-2	3	3	-	-	2	-	-	-	-	-	-	2	3	3
CO-3	3	-	3	2	3	-	-	-	-	-	-	-	3	3
CO-4	-	-	3	3	3	-	2	-	-	-	-	-	3	3
CO-5	-	-	-	-	3	3	3	2	-	-	-	-	3	3

UNIT– I		
RASTER ANALYSIS Raster Data Exploration: Query Analysis - Local Operations: Map Algebra, Reclassification, Logical and Arithmetic Overlay Operations—Neighborhood - Operations: Aggregation, Filtering–ExtendedNeighborhood-Operations- ZonalOperations-StatisticalAnalysis–Cost- Distance Analysis-Least Cost Path.		
UNIT– II		
VECTOR ANALYSIS Non-Topological Analysis: Attribute Database Query, Structured Query Language, Co- Ordinate Transformation, Summary Statistics, Calculation of Area, Perimeter and Distance –topologicalAnalysis:Reclassification,Aggregation,OverlayAnalysis:Point-In-Polygon,Line- In-Polygon, Polygon-On-Polygon: Clip, Erase, Identity, Union, Intersection – Proximity Analysis: Buffering		
\UNIT– III		
NETWORK ANALYSIS Network – Introduction - Network Data Model – Elements of Network - Building A Network Database - Geocoding – Address Matching - Shortest Path inA Network – Time and Distance Based Shortest Path Analysis – Driving Directions – Closest Facility Analysis – Catchment / Service Area Analysis-Location-Allocation Analysis		
UNIT– IV		
SURFACE and GEOSTATISTICAL ANALYSIS Surface Data – Sources of X,Y, Z Data – DEM, TIN – Terrain Analysis – Slope, Aspect, Viewshed, Watershed Analysis: Watershed Boundary, Flow Direction, Flow Accumulation, Drainage Network, Spatial Interpolation: IDW, Spline, Kriging, Variogram.		
UNIT– V		
CUSTOMISATION,WEBGIS, MOBILE MAPPING Customisation of GIS: Need, Uses, Scripting Languages –Embedded Scripts – Use of Python Script - Web GIS: Web GIS Architecture, Advantages of Web GIS, Web Applications- Location Based Services: Emergency and Business Solutions - Big Data Analytics.		
TEXT BOOKS:		
Kang–Tsung Chang, Introduction to Geographical Information System, 4thEd., Tata McGraw Hill Edition, 2008. Lo, C.P. and Yeung, Albert K.W., Concepts and Techniques of Geographic Information Systems Prentice Hall, 2002		
REFRENCE BOOKS:		
Michael N.Demers, Fundament also Geographic Information Systems, Wiley,2009 IanHeywood, SarahCornelius, Steve Carver, Srinivasaraju,—AnIntroduction to Geographical Information Systems, Pearson Education, 2nd Edition, 2007. JohnPeter Wilson, The Handbook of Geographic Information Science, Blackwell Pub., 2008		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/105/105105202/ https://onlinecourses.nptel.ac.in/noc19_cs76/preview		

A40178-SOLIDWASTE MANAGEMENT
(OPENELECTIVE –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

Course Objectives:
The objectives of this course are to make the student:
To understand the types, sources, and characteristics of solid waste, along with regulatory frameworks.
To analyze engineering systems for solid was tecollection, storage, and transportation.
To apply resource and energy recovery techniques for sustainable solid waste management.
To evaluate land fill design, construction, and environmental impact mitigation strategies.
To assess hazardous waste management techniques, including biomedical and e-waste disposal.

Course Outcomes:
1. Understand the types, sources, and characteristics of solid waste, along with regulatory frameworks.
2. Analyze engineering systems for solid waste collection, storage, and transportation.
3. Apply resource and energy recovery techniques for sustainable solid waste management.
4. Evaluate land fill design, construction, and environmental impact mitigation strategies.
5. Assess hazardous waste management techniques, including biomedical and e-waste disposal.

CO–POArticulation Matrix

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 10	P O 11	P O 12	PSO 1	PSO 2
CO-1	3	-	-	-	2	-	2	-	-	-	-	-	3	3
CO-2	3	3	-	-	2	-	3	-	-	-	-	2	3	3
CO-3	3	-	3	2	3	-	3	-	-	-	-	-	3	3
CO-4	-	-	3	3	3	-	3	2	-	-	-	-	3	3
CO-5	-	-	-	-	3	3	3	3	-	-	-	-	3	3

UNIT– I

Solid Waste: Definitions,Types of Solid Wastes, Sources of Solid Wastes, Characteristics, and Perspectives; Properties of Solid Wastes, Sampling of Solid Wastes, Elements of Solid Waste Management-Integrated Solid Waste Management, Solid Waste Management Rules 2016.

UNIT– II

Engineering SystemsforSolid Waste Management: Solid Waste Generation; On-Site Handling, Storage and Processing; Collection of Solid Wastes; Stationary Container System and Hauled Container Systems – RoutePl anning-Transferand Transport; Processing Techniques;

UNIT– III

Engineering Systems for Resourceand Energy Recovery: Processing Techniques; Materials Recovery Systems; Recovery of Biological Conversion Products–Composting, Preand Post

Processing, Types of Composting, Critical Parameters, Problems With Composing - Recovery of Thermal Conversion Products; Pyrolisis, Gasification, RDF - Recovery of Energy From Conversion Products; Materials and Energy Recovery Systems.

UNIT– IV		
Landfills: Evolution of Landfills – Types and Construction of Landfills – Design Considerations – Lifeof Landfills- LandfillProblems – Liningof Landfills –Typesof Liners – Leachate Pollution and Control – Monitoring Landfills – Landfills Reclamation.		
UNIT– V		
Hazardous Waste Management: – Sources and Characteristics, Effects On Environment, Risk Assessment – Disposal of Hazardous Wastes – Secured Landfills, Incineration - Monitoring – Biomedical Waste Disposal, E-Waste Management, Nuclear Wastes, Industrial Waste Management		
TEXT BOOKS:		
TchobanoglousG, Theisen Hand VigilSA_Integrated Solid Waste Management, Engineering Principles and Management Issues' McGraw-Hill, 1993. VesilindPA, Worrell Wand ReinhartD,_Solid Waste Engineering 'Brooks/Cole Thomson Learning Inc., 2002.		
REFRENCE BOOKS:		
Peavy, H.S, Rowe, D.R., and G. Tchobanoglous, _Environmental Engineering', McGraw Hill Inc., New York, 1985. Qian X, Koerner RM and GrayDH,_Geotechnical Aspects of Land fill Design and Construction' Prentice Hall, 2002.		
Online Learning Resources:		
https://archive.nptel.ac.in/courses/105/103/105103205/ https://archive.nptel.ac.in/courses/120/108/120108005/		

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

A40274-ELECTRICVEHICLES
(OpenElective-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

Course Objectives: To make the student
- Rememberand 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 dynamics.
- 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 Outcomes (CO): Student will be able to
CO1: To understand and differentiate between Conventional Vehicle and Electric Vehicles, electro mobility and environmental issues of EVs. -L2
CO2: Understand Various dynamics of Electric Vehicles. -L2
CO3: To remember and understand various configuration sinparameters of EV system and dynamic aspects of EV -L1
CO 4:To analyze fuel cell technologies in EV and HEV systems. -L3
CO5: To analyze the battery charging and controls required of EVs. -L3

UNITI 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 FuelCells:
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-Modelingof electromechanicalsystem-Feedbackcontroller 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-Super conducting Magnetic Energy Storage (SMES) –SOC –SoH –fuel cells - G2V - V2G – Energy storage in Micro-grid and Smartgrid-Energy Management with storage systems- Battery SCADA

Textbooks:

1.C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University Press Inc., New York 2001,1st Edition
2.AliEmadi,—Advanced Electric Drive Vehicles, CRCPress, 2017, 1stEdition

Reference Books:

1. Electricand Hybrid Vehicles Design Fundamentals, Iqbal Husain, CRC Press2021, 3rdEdition.
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 PowerSystems, 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. JamesLarminie, John Lowry,—Electric Vehicle Technology Explained‖,Wiley, 2003, 2ndEdition.

Online Learning Resources:
1. https://nptel.ac.in/courses/108/102/108102121/
2. https://nptel.ac.in/syllabus/108103009

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

A40374-TOTALQUALITYMANAGEMENT
(OpenElective-IV)

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

Course objectives:	
The objectives of the course are to	
1	Familiarize the basic concepts of Total Quality Management.
2	Expose with various quality issues in Inspection.
3	Gain Knowledge on quality control and its applications toreal time..
4	Understand the extent of customer satisfaction by the application of various quality concepts.
5	Demonstrate the importance of Quality standards in Production

CourseOutcomes: On successful completion of the course, the student will be able to,		
1	Define and develop on quality Management philosophies and analyze quality costs Frame works.	L1,L3,L4
2	Understanding of the historical development of Total Quality Management (TQM), implementation, and real-world applications through case studies.	L2, L3,L6
3	Evaluate the cost of poor quality, process seffectiveness and efficiency to analyze areas for improvement.	L2,L4,L5
4	Apply bench marking and business process reengineering to improvemanagement processes.	L3,L5,L6
5	Demonstrate these to findications to evaluate performance excellence of an organization	L1,L2,L5

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, SupplierSelection,SupplierRating,RelationshipDevelopment,PerformanceMeasuresBasicConcepts, Strategy, Performance Measure Case studies.

UNIT- IV TQM Tools:
BenchmarkingReasonstoBenchmark,BenchmarkingProcess,QualityFunctionDeployment(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.

Text Books:

1. DaleH Bester field, 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, ThirdEition, CRCPress,2017.

Reference Books:

1. Narayana Vand Sreenivasan N.S, Quality Management–Concepts and Tasks, New Age International, 1996.
2. RobertL.Flood, Beyond TQM, FirstEdition, John Wiley & Sons Ltd, 1993.
3. Richard S.Leaven worth & Eugene Lodewick Grant, Statistical Quality Control, Seventh Edition, Tata Mcgraw Hill, 2015
4. Samuel Ho,TQM–AnIntegrated Approach, Kogan Page Ltd, USA, 1995.

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
(AUTONOMOUS)

A40474-TRANSDUCERSANDSENSORS
(OpenElective–IV)

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

Course Objectives:

1. To understand characteristics of Instrumentation System and the operating principle of motion transducers.
2. To explore working principles, and applications of different temperature transducers and Piezo-electric sensors.
3. To provide knowledge on flow transducers andtheir applications.
4. To studythe working principles of pressure transducers.
5. To introduce working principleand applications of force and sound transducers.

Course Outcomes:

After completing the course, the student will be able to,

1. To understand characteristics of Instrumentation System and the operating principle of motion transducers.
2. To explore working principles, and applications of different temperature transducers and Piezo-electric sensors.
3. To provide knowledge on flow transducers andtheir applications.
4. To studythe working principles of pressure transducers.
5. To introduce working principleand applications of force and sound transducers.

UNITI

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.

MotionTransducers: Resistive straingauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

UNITII

Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers-bimetallicstrip, Thermometer, Thermistor, RTD, Thermo couple and their characteristics.

Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smartsensors, Piezo-electric sensors.

UNITIII

Flow Transducers: Bernoulli's principle and continuity, Orificeplate, Nozzleplate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

UNITIV

Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourd on tube, capacitive and resistive pressure transducers, high and low pressure measurement.

UNITV

Force and Sound Transducers: Provingring, hydraulic and pneumaticload cell, dynamo meter and gyroscopes. Sound level meter, sound characteristics, Microphone.

TEXT BOOKS

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 ManiVSV,—Instrumentation Devices and Systems, TATA McGraw Hill publications, 2007.

REFERENCE BOOKS

1. Doebelin.E.O,— Measurement Systems Application and Design, McGraw Hill International, New York, 2004.
2. Nakra B.Cand Chaudhary K.K, — Instrumentation Measurement and Analysis, Second Edition, Tata McGraw - Hill Publication Ltd.2006.

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

A40086-FINANCIALMATHEMATICS
(OpenElective-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

Course Objectives:

1. To provide mathematical foundations for financial modelling, risk assessment and asset pricing.
2. To introduces to chastic models and their applications in pricing derivatives and interestrate modelling.
3. To develop analytical skills for fixed-incomesecurities, creditrisk, and investment strategies.
4. To equipstudent swith computational techniques for pricing financial derivatives.

Course Outcomes:

After successful completion of this course, the students should be able to:

Cos	Statements	Bloomslevel
CO1	Explain fundamental financial concepts, including arbitrage, valuation, and risk.	L2 (Understand)
CO2	Apply stochastic models, including Brown ian motion and Stochastic Differential Equations (SDEs), in financial contexts.	L3 (Apply)
CO3	Analyzemathematicaltechniquesforpricingoptionsandfinancial derivatives.	L4 (Analyze)
CO4	Evaluate interestrate models and bond pricing methodologies.	L5 (Evaluate)
CO5	Utilize computational techniques such as Monte Carlo simulations for financial modeling.	L3 (Apply)

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	1	-	-	-	-	-	2	1
CO2	3	3	2	2	2	-	-	-	-	-	1	1
CO3	3	3	3	3	2	1	-	-	-	-	3	2
CO4	3	3	3	3	1	-	-	-	-	-	2	1
CO5	3	3	3	3	3	-	-	-	-	-	2	2

• **3**=StrongMapping,**2**=ModerateMapping,**1**=SlightMapping,**-**=NoMapping

UNIT-I

Asset Pricing and Risk Management **(08)**

Fundamental financial concepts: Returns, arbitrage, valuation, and pricing. Asset/Liability management, investment income, capital budgeting, and contingent cash flows. One-periodmodel: 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 Look backs. Monte Carlo methods for derivative pricing, Black-Scholes-Merton model: Derivation and applications.

Textbooks:

1. AlesCerny, *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 Books:

1. IoannisKaratzas & Steven E.Shreve, *Methods of Mathematical Finance*, Springer, NewYork.
2. JohnC.Hull, *Options, Futures, and Other Derivatives*, Pearson.

Web References:

- MIT–Mathematics for MachineL earning https://ocw.mit.edu
- Coursera–Financial Engineering and Risk Management (Columbia University) https://www.coursera.org/
- NationalStockExchange(NSE)India–FinancialDerivativeshttps://www.nseindia.com/

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

A40087--SENSORSANDACTUATORSFOR ENGINEERING APPLICATIONS
(OpenElective-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

COURSE OBJECTIVES	
1	To provide exposure to various kind sof sensors and actuators and their engineering applications.
2	To impart knowledge on the basic laws and phenomenon behind the working of sensors and actuators
3	To explain the operating principles of various sensors and actuators
4	To educate the fabrication of sensors
5	To explain the required sensor and actua or for interdisciplinary application

	Course Outcomes	BloomsLevel
CO1	Classify different types of Sensors and Actuators along with their characteristics	L1,L2
CO2	Summarize various types of Temperature and Mechanical sensors	L1,L2
CO3	Illustrates various types of optical and mechanical sensors	L1,L2
CO4	Analyze various types of Optical and Acoustic Sensors	L1,L2,L3
CO5	Interpret the importance of smart materials in various devices	L1,L2

UNIT-I
Introduction to Sensors and Actuators
Sensors: Type sof sensors: temperature, pressure, strain, active and passivesensors, General characteristics of sensors (Principlesonly), 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-resistivesensors: Thermistors, Thermo electricsensors: Thermo couples, PNjunction 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-electricresonators, Microphones

UNIT-IV
Magnetic and Electromagnetic Sensors
Motor sasactuators (linear, rotational, steppingmotors), magneticvalves, inductivesensors (LVDT, RVDT, and Proximity), Hall Effectsensors, Magneto-resistive sensors, Magnetostrictive sensors andactuators.

UNIT-V
Chemical and Radiation Sensors
Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidityand moisture sensors.
RadiationSensors: Principle and working of Ionizationdetectors, Scintillationdetectors, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)

Text books:

1. Sensors and Actuators–Clarence W.deSilva, CRCPress, 2ndEdition, 2015
2. Sensorsand Actuators, D.A.HallandC.E.Millar, CRCPress,1999

Reference Books:

1. Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd.2003
2. Measurement, Instrumentation, and Sensors Handbook-JohnG.Webster, CRCpress1999
3. Sensors– A ComprehensiveSensors-HenryBolte, John Wiley.
4. Hand book of modernsensors, Springer, Stefan Johann Rupitsch.

NPTEL course link:
https://onlinecourses.nptel.ac.in/noc21_ee32/preview

Course Articulation Matrix:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1							
CO2	3	3	2	1	1							
CO3	3	3	1	1	1							
CO4	3	2	1	1	-							
CO5	3	3	1	1	-							

1-Slightly, 2-Moderately, 3-Substantially.

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A40088--CHEMISTRYOFNANOMATERIALSAND APPLICATIONS
(OpenElective-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

Course Objectives	
1	To understand basics and characterization of nano materials.
2	To understand synthetic methods of nano materials.
3	To apply various techniques for charterization of nano materials.
4	To understand Studies of Nano-structured Materials
5	To enumerate the applications of advanced nano materials in engineering

Course Outcomes	
CO1	Classify the nano structure materials; describe scope of nano science and importance technology.
CO2	Describe the top-down approach, Explain aerosol synthesis and plasma arc technique, Differentiate chemical vapor deposition method and electrode position method, Discuss about high energy ball milling.
CO3	Discuss different technique for characterization of nano material, Explain electron microscopy techniques for characterization of nano material, Describe BET method for surface area analysis.
CO4	Explain synthesis and properties and applications of nano materials, Discuss about fullerenes and carbon nanotubes, Differentiate nanomagnetic materials and thermo electric materials, nonlinear optical materials.
CO5	Illustrate advance engineering applications of Water treatment, sensors, electronic devices, medical domain, civil engineering, chemical engineering, metallurgy and mechanical engineering, food science, agriculture, pollutants degradation.

Syllabus

Unit –I

Basics and Characterization of Nanomaterials: Introduction**,** Scope of nanoscience and nanotecnology, 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, highenergy 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, spectros copy 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 ofNano Particle, nanorods, nano wires, Water treatment, sensors, electronic devices, medical domain, civil engineering, chemical engineering, metallurgy and mechanical engineering, food science, agriculture, pollutants degradation.

TEXTBOOKS:

1. **NANO: The Essentials:** T Pradeep, MaGraw-Hill, 2007.
2. **Textbook of Nanoscience and nanotechnology:** B S Murty, P Shankar, BaldevRai, BBRath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A.Ozin & Geoffrey A.Ozin, Wiley-VCH, 2011.
2. **Nanostructures & Nanomaterials; Synthesis, Properties & Applications:** Guozhong Cao, Imperial College Press, 2007.

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A40089--LITERARYVIBES
(OpenElective-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

Course Objectives

- 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 Outcomes

- Identify genres, literary techniques and creative uses of language in literary texts.
- Explain the relevance of themes found in literary texts to contemporary, personal and cultural values and to historical forces
- Apply knowledge and understanding of literary texts when responding to others‘ problems and their own and make evidence-based arguments
- Analyze the underlying meanings of the text by using the elements of literary texts
- Evaluate their own work and that of others critically

UNIT I: Poetry

1. Ulysses-AlfredLordTennyson
2. Ain‘tIwoman?-SojournerTruth
3. TheSecondComing-W.B. Yeats
4. WheretheMindisWithoutFear-RabindranathTagore

UNIT II : Drama :*Twelfth Night* – William Shakespeare

1. Shakespeare-life and works
1. Plot & sub-plot and Historical back ground of theplay
2. Themesand Criticism
3. Style and literary elements
4. Characters and characterization

UNIT III : Short Story

1. The Luncheon-Somerset Maugham
2. The Happy Prince-OscarWild
3. Three Questions – Leo Tolstoy
4. Grief–Antony Chekov

UNIT IV: Prose: Essay and Auto biography

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

Text Books:

1. Charles Dickens**.** *HardTimes.* (Sangam Abridged Texts)Vantage Press,1983
2. DENTJC. *William Shakespeare. TwelfthNight***.** OxfordUniversity Press,2016.

References:

1. WJLong. *History of English Literature***,** Rupa Publications India; First Edition (4October 2015)
2. RK Kaushik And 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.*PearsonIndia, 2008.

Online Resources

https://www.litcharts.com/poetry/alfred-lord-tennyson/ulysseshttps://www.litcharts.com/lit/ain-t-i-a-woman/summary-and-analysishttps://englishliterature.education/articles/poetry-analysis/the-second-coming-by-w-b-yeats-critical-analysis-summary-and-line-by-line-explanation/#google_vignettehttps://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/

HONOURS

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
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QUANTUMCOMPUTING

Hours Per 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

Course Objectives:

- Discuss the history unstructured data
- To know non- relational databases and their importance in Data science.
- Under stand the differences between Relational and No SQL databases
- To explore the several types of No SQL data bases and understand the role in Big Data.

Course Out comes:

After completion of the course, students will be able to

- Explain and compare different types of No SQL database.
- Compare and contrast RDBMS with different No SQL databases.
- Define, compare and use the four types of No SQL databases (Document-oriented, Key Value pairs, Column-oriented and Graph
- Demonstrate the architecture, define objects, load data, query data and performance tune Column-oriented, Key-Value pair, Document and Graph databases.
- Evaluate No SQL database development tools and programming languages

UNIT I

Overview and history of No SQL Data bases Lecture 12Hrs

Definition of the four types of No SQL data bases. The value of Relational Databases, Getting at Persistent Data, Concurrency, Integration, Impedance Mismatch, Application and Integration Databases, Attack of the Clusters, The emergence of No SQL, Key Points.

UNIT II RDBMS Vs No SQL Lecture 12Hrs

Comparison of relational databases to new No SQL stores, Mongo DB, Cassandra, HBASE, Neo4j use and deployment, Application, RDBMS approach, Challenges No SQL approach, Key-Value and Document Data Models, Column-Family Stores, Aggregated-Oriented Databases, Replication and Sharding, Map Reduce on databases, Distribution Models, Single Server, Sharding, Master-Slave Replication, Peer-to-Peer Replication, Combining Sharding and Replication.

UNIT III Document Data bases Lecture 12Hrs

No-SQL Key-Value Databases using Mongo DB, Document Databases, Document oriented Database Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases, Event Logging, Content Management Systems, Blogging Platforms, Web Analysis or Real Time Analytics.

UNIT IV Column Oriented Databases Lecture 12Hrs

Column-oriented No SQL databases using Apache HBASE, Column-oriented No SQL databases using Apache Cassandra, Architecture of HBASE, Column-Family Data Store Features, Consistency, Transactions, Availability, Query Features, Scaling, Suitable Use

Cases, Event Logging, Content Management Systems, Blogging Platforms, Counters, Expiring Usage.

UNIT V Key Value Data bases Lecture 12Hrs

No SQL Key-Value databases using Riak, Key-Value Data bases, Key-Value Store, Key-Value Store Features, Consistency, Transactions, Query Features, Consistency, Transactions, Query Features, Structure of Data, Scaling, Suitable Use Cases, Storing Session Information, User Profiles, Preferences, Shopping Cart Data, Relationships among Data, Multi operation Transactions, Query by Data, Operations by Sets, Firebase- Cloud hosted No SQL Database, Graph No SQL databases using Neo4j, No SQL database development tools and programming languages, Graph Databases features, consistency, Transactions, Availability, Query Features, Scaling, Suitable Use Cases.

Text books:

1. Sadalage, P. & Fowler, No SQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence, Wiley Publications, 1st Edition 2019.

Reference Books:

1. Redmond, E. & Wilson, J. (2012). Seven Databases in Seven Weeks: A Guide to Modern Databases and the No SQL Movement (1st Ed.). Raleigh, NC: The Pragmatic Programmers, LLC. ISBN-13: 978-1934356920 ISBN-10: 1934356921
2. Guy Harrison, Next Generation Database: No SQL and big data, Apress.

Online Learning Resources:

1. https://www.ibm.com/cloud/learn/nosql-databases
2. https://www.coursera.org/lecture/nosql-databases/introduction-to-nosql-VdRNp
3. https://www.geeksforgeeks.org/introduction-to-nosql/
4. https://www.javatpoint.com/nosql-databa

SOFTWARE DEFINED DATA CENTER

Hours Per 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

Course Objectives:

- Introduce conventional Data Centers followed by Modern Data Centers
- To discuss various software elements of modern data centers
- Explain Virtualization concepts for Data Centers
- Discuss Compute, Storage and Network virtualization

Course Out comes:

After completion of the course, students will be able to

- Understanding of difference between Conventional Data Center Vs Modern Data Centers
- Differentiate Cloud computing and Software Defined Data Centers
- Differentiate Virtualization with conventional techniques
- Explore the techniques of Software Defined Compute, Storage and Networking components
- Able Manage Software Defined Data Centers and Develop the techniques for future Data Centers.

UNIT I

Introduction Lecture 12Hrs

Data Center evolution, A history of Modern Data Center, Focus on cost reduction, Focus on Customer service in the business, Flattening of the IT organization, IT as an operational Expense, Monolithic Storage Array rise and fall, Move From Disk to Flash, Emergence of Convergence, The Role of Cloud computing.

UNIT II

Emerging Data Center Trends Lecture 12Hrs

Emergence of SDCC, Commoditization of Hardware, Software Defined – Compute, Storage, Networking and Security, Software Defined Storage (SDS), Hyper convergence, Hyper Converged Infrastructure(HCI) and SDS relationship, Flash in Hyper convergence, Modern IT business Requirements.

UNIT III

Data Center Agility Lecture 12Hrs

Principles and Strategies, Transform Data Center, Align Data Center and Business Needs, Server virtualization, VDI, Eliminate and Implement Monolithic to Hyper convergence, Full Stack Management.

UNIT IV

Hyper converged Infrastructure Lecture 12Hrs

Software Defined Storage, SDS comparison to Traditional Storage, SDS requirements, SDS in Hyper converged, Hyper convergence Design Model, Virtual Storage appliances, Appliance vs. Software/Reference Architecture,

UNIT V

Future Data Centers Lecture 12Hrs

Data growth, Storage capacity, flash storage deployment, Deployment Experiences SDS and HCI, IT transformations- Automation, Orchestration, Dev Ops, Open Standards and Interoperability, Performance Benchmarking Standards, Future Trends, Containers Instead of virtual machines, Open Source tools, Beyond Today's Flash, Pooling of Resources.

Text books:

1.Building a Modern Data Center, Principles and Strategies of Design, Scott D.Lowe, James Green, David Davis. Actual Tech Media, 2016.

Reference Books:

1.Data Center Handbook: Plan, Design, Build, and Operations of a Smart Data Center, Second Edition, HwaiyuGeng P.E.,2021 John Wiley & Sons.

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SOFTWARE DEFINED DATA CENTER

Hours Per 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

Course Objectives:

- Introduce conventional Data Centers followed by Modern Data Centers
- To discuss various software elements of modern data centers
- Explain Virtualization concepts for Data Centers
- Discuss Compute, Storage and Network virtualization

Course Outcomes:

After completion of the course, students will be able to

- Understanding of difference between Conventional Data Center Vs Modern Data Centers
- Differentiate Cloud computing and Software Defined Data Centers
- Differentiate Virtualization with conventional techniques
- Explore the techniques of Software Defined Compute, Storage and Networking components
- Able Manage Software Defined Data Centers and Develop the techniques for future Data Centers.

UNIT I Introduction 12Hrs

Data Center evolution, A history of Modern Data Center, Focus on cost reduction, Focus on Customer service in the business, Flattening of the IT organization, IT as an operational Expense, Monolithic Storage Array rise and fall, Move From Disk to Flash, Emergence of Convergence, The Role of Cloud computing.

UNIT II Emerging Data CenterTrends 12Hrs

Emergence of SDCC, Commoditization of Hardware, Software Defined–Compute, Storage, Networking and Security, Software Defined Storage (SDS), Hyper convergence, Hyper Converged Infrastructure (HCI) and SDS relationship, Flash in Hyper convergence, Modern IT business Requirements.

UNIT III Data Center Agility 12Hrs

Principles and Strategies, Transform Data Center, Align Data Center and Business Needs, Server virtualization, VDI, Eliminate and Implement Monolithic to Hyper convergence, Full Stack Management.

UNIT V Hyper converged Infrastructure 12Hrs

Software Defined Storage, SDS comparison to Traditional Storage, SDS requirements, SDS in Hyper converged, Hyper convergence Design Model, Virtual Storage appliances, Appliancevs. Software / Reference Architecture,

UNIT V

Future Data Centers 12Hrs

Data growth, Storage capacity, flashstorage deployment, Deployment Experiences SDS andHCI, IT transformations- Automation, Orchestration, Dev Ops, Open Standards and Interoperability, Performance Benchmarking Standards, Future Trends, Containers Instead of virtual machines, Open Source tools, Beyond Today‘s Flash, Pooling of Resources.

Textbooks:

1. Buildinga Modern DataCenter, Principles and Strategies of Design, Scott D.Lowe, James Green, David Davis. Actual Tech Media, 2016.

ReferenceBooks:

1. Data Center Handbook: Plan, Design, Build, and Operations of a Smart Data Center, Second Edition, Hwaiyu Geng P.E., 2021 John Wiley & Sons.

G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY, KURNOOL
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ROBOTICS AND INTELLIGENT SYSTEMS

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

Course Objectives:

- Understand the basic concepts of robotics.
- Discuss the requirement of robotic technology
- Introduce robotics kinematics, dynamic analysis and programming.
- Understand the concepts of intelligent system and apply them to robotics

Course Outcomes:

After completion of the course, students will be able to

- Understand general concepts of Robotics and intelligent systems.
- Understan drobotics control systems
- Analyze and underst and the various programming languages of robotics
- Understand Industrial robots and its applications
- CreateIoTsolutions usings ensors, actuators and Devices

UNIT-I Lecture 8Hrs

Introduction to Robotics : Back ground, Historical development, Robot Arm Kinematics and Dynamics, Manipulator Trajectory planning and Motion Control, Robot Sensing

UNIT-II Lecture 9Hrs

Robot Arm Kinematics and Dynamics: IntroductiontoKinematics,Direct andInverse Kinematics Problem and solution, Dynamics introduction, Lagrange-Euler Formulation, Newton Euler Formation, Generalized D'Alembert Equations of motion. Trajectory planning,

UNIT-III Lecture 9Hrs

Sensing and Vision: Introduction to Sensing, Proximity Sensing, Touch Sensors, Force and Torque Sensing, Image acquisition, Illumination techniques, Imaging Geometry, Recognition andInterpretation.

UNIT-IV Lecture 8Hrs

Robot Programming Languages: Introduction to Robot Programming Languages, Characteristicsof Robot Level Languages, three levelsof robot programming, requirements of arobot programming language, Task Level Languages, problems peculiar to robot languages, Introduction to Robot Operating System(ROS)

UNIT V Lecture 8Hrs

Robot Intelligence: Introduction, State Space Search, Problem Reduction, Use of Predicate Logic, Means-Ends Analysis, Problem solving, Robot Learning, Robot Task Planning, Basic Problems in Task Planning, Expert systems and knowledge engineering.

Text books:

1. K.S. Fu, R.C. Gonzalez, C.S.G. Lee, Robotics : Control, Sensing, Vision and Intelligence
2. Aaron Martinez, Enrique Fernandez, Learning ROS for Robotics Programming: A practical, instructive, and comprehensive guide to introduce your self to ROS, the top-notch, leading robotics framework, PACKT publishing, Open Source.

Reference Books:

JohnJ.Craig, Introduction to Robotics: Mechanics and Control, Addison Wesley publication, Third Edition.

Online Learning Resources

https://nptel.ac.in/courses/107106090 https://nptel.ac.in/courses/112108298

CLOUD SECURITY

Hours Per 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

Pre-requisites : Computer Networks, Cryptography and Network Security, Cloud Computing.

Course Objectives:

The courseis designed to

- Understand the cloud security and privacy issues.
- Familiarize with the Threat Model and Cloud Attacks.
- Understand the Data Security and Storage.
- Analyze Security Management in the Cloud

Course Outcomes:

After completion of the course, students will be able to

- Distinguish the various cloud security and privacy issues.
- Analyze the various threats and Attack tools.
- Describe the Data Security and Storage.
- Analyzethe Security Management in the Cloud

UNIT I

Overview of Cloud Computing 9 Hrs

Overview of Cloud Computing: Introduction, Definitions and Characteristics, Cloud Service Models, Cloud Deployment Models, Cloud Service Platforms, Challenges Ahead. Introduction to Cloud Security: Introduction, Cloud Security Concepts, CSA Cloud Reference Model, NISTC loud Reference Model, NIST Cloud Reference Model.

UNIT II

Cloud Security and Privacy Issues 9 Hrs

Cloud Security and Privacy Issues: Introduction, Cloud Security Goals/Concepts, Cloud Security Issues, Security Requirements for Privacy, Privacy Issues in Cloud. Infrastructure Security: The Network Level, the Host Level, the Application Level, SaaS Application Security, PaaS Application Security, IaaS Application Security.

UNIT III

Threat Model and Cloud Attacks 9 Hrs

Threat Model and Cloud Attacks: Introduction, Threat Model- Type of attack entities, Attack surfaces with attack scenarios, A Taxonomy ofAttacks,Attack Tools-Network-levelattack tools, VM-level attack tools, VMM attack tools, Security Tools, VMM security tools.

UNIT IV

Data Security and Storage 9Hrs

Information Security Basic Concepts, an Example of a Security Attack, Cloud Software Security Requirements, Rising Security Threats. Data Security and Storage: Aspects of Data Security, Data Security Mitigation, Provider Data and Its Security.

UNIT V

Security Management in the Cloud 9 Hrs

Evolution of Security Considerations, Security Concerns of Cloud Operating Models, Identity Authentication, Secure Transmissions, Secure Storage and Computation, Security Using Encryption Keys, Challenges of Using Standard Security Algorithms, Variations and Special Cases for Security Issues with Cloud Computing, Side Channel Security Attacks in the Cloud. Security Management in theCloud-Security Management Standards, Availability Management, Access Control, Security Vulnerability, Patch, and Configuration Management.

Text books:

1. Preeti Mishra, Emmanuel SPilli, Jaipur RCJoshi Graphic Era.,—Cloud Security Attacks, Techniques, Tools, and Challenges‖, 1st Edition, 2022, CRC press.
2. TimMather, SubraKumaraswamy, and Shahed Lati—Cloud Security and Privacy,1st Edition,2019, O'Reilly Media, Inc.

Reference Books:

1. Naresh Kumar Sehgal Pramod Chandra, P.BhattJohn M.Acken.,—Cloud Computing with Security Concepts and Practices‖, 2nd Edition Springer nature Switzerland AG 2020.
2. Essentials of Cloud Computing by K.Chandrasekaran Special Indian Edition CRC press.
3. RajkumarBuyya,—Cloud Computing Principles and Paradigms, JohnWiley.

Online Learning Resources:

- https://onlinecourses.nptel.ac.in/noc19_cs64/preview
- https://archive.nptel.ac.in/courses/106/105/106105167/

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No SQL 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	1.5	30	70	100

Course Objectives

1. To understand the fundamentals of NoSQL databases and how they differ from relational databases.
2. To gain hands-on experience with different types of NoSQL databases such as key–value, document, column-family, and graph databases.
3. To learn how to model, store, retrieve, and manipulate large-scale unstructured and semi-structured data.
4. To practice CRUD operations and query mechanisms using popular NoSQL tools (e.g., MongoDB, Cassandra, Redis).
5. To understand scalability, consistency, and performance aspects of NoSQL systems in real-world applications.

Course Outcomes

1. Students will be able to explain the concepts, architecture, and use cases of NoSQL databases.
2. Students will be able to design appropriate data models using NoSQL techniques for different application scenarios.
3. Students will be able to perform CRUD operations and write queries using NoSQL database tools.
4. Students will be able to compare NoSQL databases with traditional RDBMS and select suitable solutions for large-scale applications.
5. Students will be able to develop simple applications using NoSQL databases with an understanding of scalability and performance considerations.

- Installing and configuring mongoDB in windows
- Perform all databa

List of Experiments:

1.Mongo DB installation and configuration in windows.
2.Demon strate how to create and drop a database in Mongo DB.
3.Creating the Collection in Mongo DB on the fly
4.Creating collection with options before inserting the documents and drop the collection created.
5.Mongo DB insert document
  a.Insert single document
  b. Insert multiple documents in collection
6.Querying all the documents in json format and Querying based on the criteria.
7.Mongo DB update document
  a. Using update() method.
  b. Using save() method.
8.Mongo DB delete document from a collection.
  a. Using remove() method.
  b. Remove only one document matching your criteria
  c. Remove all documents

9. Mongo DB Projection
10. limit() ,skip(), sort() methods in Mongo DB
11. Mongo DB indexing
    a. Create index in Mongo DB
    b. Finding the indexes in a collection
    c. Drop indexes in a collection
    d. Drop all the indexes
12. Mongo DB with java and PHP
    a. Create a simple application that uses Mongo DB with Java
    b. Create a simple application that uses Mongo DB with PHP

Web References:

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Quantum & Cloud Computing 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	1.5	30	70	100

Course Objectives (COs)

This course aims to:

1. Introduce fundamental quantum computing concepts such as qubits, superposition, and quantum gates using Qiskit.
2. Develop an understanding of quantum algorithms through practical implementation, including Deutsch's algorithm.
3. Provide hands-on experience in cloud computing by simulating cloud environments, VM allocation, and scheduling policies.
4. Analyze cloud resource management techniques such as load balancing and deployment models.
5. Explore cloud security challenges by simulating cyber threats like Denial of Service (DoS) attacks.

Course Out comes (CLOs)

By the end of this course, students will be able to:

1. Implement and compare classical and quantum bits using Qiskit.
2. Design and analyze quantum circuits using logic gates and linear algebra principles.
3. Simulate and evaluate cloud computing infrastructures including data centers, VM allocation, and scheduling policies.
4. Apply resource provisioning techniques to optimize cloud performance and load balancing.
5. Assess cloud security threats by implementing and analyzing DoS attack simulations.

Quantum Computing Lab:

1. **Simulating Classical vs Quantum Bits**
   - Implement **classical bits and qubits** using Qiskit.
   - Compare **bit flip** vs **quantum superposition** using Hadamard gates.
2. **Quantum Logic Gates Implementation**
   - Implement and visualize basic **quantum gates** (X, Y, Z, H, S, T).
   - Apply these gates to single and multiple qubits.
   -
3. **Linear Algebra in Quantum Computing**

- Represent **quantum states** using matrices and vectors.
- Perform **matrix operations** (addition, multiplication, tensor product).

4. **Deutsch's Algorithm Implementation**

- Demonstrate quantum parallelism using **Deutsch's algorithm**. Compare results with classical computation.

Cloud Computing Lab:

1. Simulationof a Simple Cloud DataCenter: Create a cloud environment with multiple Hosts, Virtual Machines (VMs), and Cloudlets.
2. VM Allocation and Scheduling Policies: Implement and compare Time-Shared and Space-Shared VM allocation policies.
3. Resource Provisioning and Load Balancing : Simulate dynamic resource allocation for better load balancing.
4. Cloudlet Scheduling Algorithms: Implement and compare FCFS (First-Come-First-Serve), Round Robin, and Priority-Based Scheduling.
5. Performance Analysis of Cloud Deployment Models : Simulate and compare Public, Private, Hybrid, and Community Cloud environments.
6. Simulating Denial of Service (DoS) Attacks: Implement a scenario where multiple requests overload a cloud server.

TEXT BOOKS:

1. Shashank Tiwari, Professional No SQL, Wrox Press, Wiley, 2011, ISBN: 978-0-470-94224-6
2. Pramod Sadalage and Martin Fowler, No SQL Distilled, Addison-Wesley Professional, 2012.

REFERENCE BOOKS:

1. Dan Mc Creary and Ann Kelly, Making Sense of No SQL, Manning Publications, 2013.
2. Gaurav Vaish, Getting Started with No SQL, Packt Publishing, 2013