ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED FIRST YEAR SYLLABUS

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

B.Tech Four Year Degree Course

(Applicable for the batches admitted from 2020-21)

GUDLAVALLERU ENGINEERING COLLEGE

(An Autonomous Institute with Permanent Affiliation to JNTUK, Kakinada)

Seshadri Rao Knowledge Village

GUDLAVALLERU - 521 356, Krishna District, Andhra Pradesh

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VISION & MISSION OF THE COLLEGE

Vision

To be a leading institution of engineering education and research, preparing students for leadership in their fields in a caring and challenging learning environment.

Mission

* To produce quality engineers by providing state-of-the-art engineering education.
* To attract and retain knowledgeable, creative, motivated and highly skilled individuals whose leadership and contributions uphold the college tenets of education, creativity, research and responsible public service.
* To develop faculty and resources to impart and disseminate knowledge and information to students and also to society that will enhance educational level, which in turn, will contribute to social and economic betterment of society.
* To provide an environment that values and encourages knowledge acquisition and academic freedom, making this a preferred institution for knowledge seekers.
* To provide quality assurance.
* To partner and collaborate with industry, government, and R and D institutes to develop new knowledge and sustainable technologies and serve as an engine for facilitating the nation's economic development.
* To impart personality development skills to students that will help them to succeed and lead.
* To instil in students the attitude, values and vision that will prepare them to lead lives of personal integrity and civic responsibility.
* To promote a campus environment that welcomes and makes students of all races, cultures and civilizations feel at home.
* Putting students face to face with industrial, governmental and societal challenges.

VISION & MISSION OF THE DEPARTMENT

Vision

To be a Centre of Excellence in Computer Science and Engineering education and training to meet the challenging needs of the industry and society.

Mission

* To impart quality education through well-designed curriculum in tune with the growing software needs of the industry.
* To serve our students by inculcating in them problem solving, leadership, teamwork skills and the value of commitment to quality, ethical behavior & respect for others.
* To foster industry-academia relationship for mutual benefit and growth.

III. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

* Analyze, design, develop and optimize engineering solutions and work productively as engineers, including supportive and leadership roles in multidisciplinary teams.
* Apply knowledge, skills and innovative ideas in the field of Artificial Intelligence and Data Science to solve the issues in real world and engage in research.
* Develop automated systems with significant technical, legal, ethical, social, environmental and economic considerations.

IV. PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and

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modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

V. PROGRAM SPECIFIC OUTCOMES (PSOs)

Students will be able to

* Process, interpret the real world data to formulate the model for predicting and forecasting.
* Apply machine learning techniques to design and develop automated systems to solve real world problems.

VI. ACADEMIC REGULATIONS

Applicable for the students of B.Tech. from the Academic Year 2020-21.

1. UG – B.Tech. Programs

The following B.Tech. Programs are offered at present
i.   Civil Engineering (CE)
ii.   Electrical and Electronics Engineering (EEE)
iii. Mechanical Engineering (ME)
iv.   Electronics and Communication Engineering (ECE
v.   Computer Science and Engineering (CSE)
vi.   Information Technology (IT)
vii. Artificial Intelligence and Data Science (AI&DS)
viii. Internet of Things (IoT)

2. Duration of the Program

The duration of the program is four academic years consisting of eight semesters. However, a student is permitted to complete the course work of B.Tech. program in the stipulated time frame of **EIGHT** years from the date of joining. Students admitted into third semester of B.Tech. program directly, through Lateral Entry (LE), shall have to complete the course work of B.Tech. program in the stipulated time frame of **SIX** years from the date of joining.

3. Minimum Instruction Days

Each semester consists of a minimum of ninety instruction days.

4. Award of B.Tech. Degree

i)   Each discipline of the B.Tech. program is designed to have a total of **160** credits and the student shall have to complete the four year course work and earn all the **160** credits for the award of B.Tech. Degree.

il) Students, who fail to complete their four years' course of study within eight years from the year of their admission or fail to acquire the **160** credits within this period shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

iii) Students joining the B.Tech. program into the II year 1st semester directly through Lateral Entry (LE) Scheme shall have to complete the three year course work and earn **120** credits for the award of B.Tech. degree.

iv) Students, who fail to complete their three years course of study within six years from the year of their admission or fail to acquire the **120** credits for the award of degree within this period shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

v)   **Award of B. Tech. (Honors) / B. Tech. (Minor):** B. Tech. with Honors or a B.Tech. with a Minor will be awarded if a student earns 20 additional credits as per the regulations/guidelines. Registering for Honors / Minor degree is optional.

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5. Duration and Pattern of the Program

i) The duration of the program is four academic years consisting of eight semesters for regular students and three academic years consisting of six semesters for lateral entry students.

ii) Each semester consists of a minimum of ninety instructional days.

iii) Three week induction program is mandatory for all the first year UG students and shall be conducted as per AICTE/UGC/APSCHE guidelines.

iv) A student has to register for all the courses in a semester.

v) Grade points, based on percentage of marks awarded for each course will be the basis for calculation of SGPA (Semester Grade Point Average) and CGPA (Cumulative Grade Point Average).

vi) Award of division shall be based on the CGPA acquired.

vii) A pool of interdisciplinary, skill development courses, industry internship, socially relevant projects etc., which are relevant to the industry are integrated into the curriculum of the branch of engineering concerned.

viii) As a mandatory rule, all the students shall be registered for the mandatory non-credit courses as per AICTE/UGC/APSCHE guidelines.

6. Attendance Regulations

i) A student is eligible to write the semester end examinations if he acquires a minimum of 40% attendance in each subject and a 75% of attendance in aggregate of all the subjects.

ii) Condoning of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester will be considered for genuine reasons, such as on medical grounds and participation in co-curricular and extra-curricular activities and shall be granted only after the approval by a committee duly appointed by the college. For medical reasons, the student should submit application for medical leave along with medical certificate from a registered medical practitioner within three days from the day of reporting to the classwork after the expiry of the Medical Leave. In the case of participation in co-curricular and extra-curricular activities, either within the college or in other colleges, students must take prior permission in the written form from HoD concerned and should also submit the certificate of participation from the organizers of the event within three days after the completion of the event. Only such cases will be considered for condoning attendance shortage.

iii) A student shall be eligible to claim for condonation of attendance shortage for a maximum of two times during the four year (eight semesters) course work of B.Tech. (Regular) / three year (six semesters) course work of B.Tech. (Lateral).

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iv) A student will not be promoted to the next semester unless he satisfies the attendance requirement of the current semester. He may seek re-admission for that semester when offered within 4 weeks from the date of commencement of classwork.

v) Shortage of Attendance below 65% in aggregate shall in *NO* case be condoned.

vi) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end-examinations of current semester and their registration shall stand cancelled.

vii) A fee stipulated by the college shall be payable towards condonation of attendance shortage.

viii) A student is required to put up a minimum of 75% of attendance in the mandatory non-credit courses for getting the satisfactory grade. However, condonation of the shortage of attendance upto 10% shall be applicable for all mandatory non credit courses and a fee stipulated by the college shall be payable towards condonation fee.

7. Distribution and Weightage of marks - Evaluation

The distribution of Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) marks for each course is given in the table:

Sl.No.	Components	Internal	External	Total
1	Theory / Integrated Theory and Laboratory/ Project Based Theory	30	70	100
2	Engineering Graphics/ Design/ Drawing	30	70	100
3	Practical	15	35	50
4	Mini Project	15	35	50
5	Socially Relevant Project / Internship/ Skill Development Courses	-	50	50
6	Project Work	60	140	200
7	Mandatory Non-Credit Courses			
	i) Environmental Studies and Constitution of India	30	70	100
	ii) Sports & Games/ Cultural and NSS/Fine Arts /Yoga /Self Defence	100	-	100

(i) Continuous Internal Evaluation
Theory Courses:

a) For theory subjects, during a semester, there shall be two mid-term examinations. Each mid-term examination consists of (i) one online objective examination(OE) consisting of 20 multiple choice questions for 10 marks for a duration of 20 minutes (ii) one descriptive examination(DE) consisting of 3 descriptive questions for 5 marks each a total of 15 marks for a duration of 90 minutes and (iii) one assignment(AT) for 5 marks.

b) First mid-term examination(Mid-I) shall be conducted from first 50% of the syllabus and second mid-term examination(Mid-II) shall be conducted from the rest of the 50% of syllabus.

c) The total marks secured by the student in each mid-term examination are evaluated for 30 marks. The final marks of each mid-term examination shall be displayed in the respective department notice boards within 10 days of completion of last examination.

d) Internal marks can be calculated with the sum of the 80% marks of better scored mid-term examination and 20% marks of less scored mid-term examination.

Example:

Mid-1 marks = Marks secured in (online examination-1 + descriptive examination-1 + one assignment-1)

Mid-2 marks = Marks secured in (online examination-2 + descriptive examination-2 + one assignment-2)

Final internal Marks = (Best of (Mid-1/Mid-2) marks x 0.8
+ Least of (Mid-1/Mid-2) marks x 0.2)

e) *For subjects like Functional English and Professional Communication, the pattern of mid-term examination is given along with the syllabus of the respective subject.*

Integrated Theory and Lab Courses

For the integrated theory and laboratory course, the distribution of 30 marks for internal evaluation shall be, 15 marks for theory based on two descriptive examinations and 15 marks for laboratory. The pattern for the descriptive examination is as same as the pattern for the regular theory courses. Sum of the 80% marks of better scored descriptive examination and 20% marks of less scored descriptive examination are considered. Of the 15 marks for the laboratory, 5 marks for the day-to-day performance, 5 marks for record and 5 marks for the semester end internal examination.

Project Based Theory Courses

For the project based theory course, the distribution of 30 marks for internal evaluation shall be, 15 marks for the theory based on two descriptive examinations and 15 marks for project. The pattern for descriptive examination is as same as the pattern for the regular theory courses. Sum of the 80% marks of better scored descriptive examination and 20% marks of less scored descriptive examination are considered. 15 marks for project shall be awarded by the department review committee based on the project report and the performance in oral presentation.

Drawing / Design Courses

For the subjects such as Engineering Graphics, Engineering Drawing, Building Planning and Drawing, Estimation, Costing & Valuation, Design & Drawing of Steel Structures etc., the distribution of 30 marks for internal evaluation shall be, 15 marks for day-to-day work, and 15 marks based on two descriptive examinations. The pattern for the descriptive examination is as same as the pattern for

regular theory courses. Sum of the 80% marks of better scored descriptive examination and 20% marks of less scored descriptive examination are considered.

Practical Courses

For the practical courses the distribution of 15 internal marks shall be, 5 marks for day-to-day performance, 5 marks for record and 5 marks for an internal laboratory test conducted at the end of a semester.

Skill Development Courses

Each student shall register for seven skill development courses (total 10 credits) offered by the department concerned. The distribution of 15 internal marks shall be 10 marks for day-to-day performance, and 5 marks for an internal examination conducted at the end of a semester.

For courses like Logic Building and Basic Coding Principles, Logic Building and Algorithmic Programming and Programming for corporate distribution of 15 internal marks shall be 10 marks for day-to-day performance(these marks will be awarded by taking no. of assignments completed, no. of quizzes attempted and amount of time spent in learning each topic on the LMS prescribed) and 5 marks for an internal laboratory test (internal Lab examination will be conducted on the assessment portal) conducted at the end of a semester.

Mini Project

For a mini project, 15 internal marks shall be awarded by the project supervisor based on student's involvement in carrying out the project.

Project Work

Of the 60 internal marks for a project work, 30 marks shall be awarded by the supervisor based on the student's involvement and 30 marks shall be awarded by the project review committee consisting of a supervisor, a senior faculty member and the HoD concerned based on the performance in Viva-Voce examination at the end of the semester.

Mandatory Non-Credit Courses

a) Each student shall register for four mandatory non-credit courses like Environmental Studies, Constitution of India, Sports & Games/Cultural and NSS/Fine arts/Yoga/Self Defense offered by the respective departments as per the course structure.

b) For courses like Environmental Studies and Constitution of India, two descriptive examinations shall be conducted for 30 marks each along with the mid-term examinations of regular theory courses.

c) Each descriptive examination consists of 3 descriptive questions for 10 marks each with a total of 30 marks for a duration of 90 minutes.

d) Sum of the 80% marks of better scored descriptive examination and 20% marks of less scored descriptive examination are considered.

e) For courses like Sports & Games/Cultural and NSS/Fine arts/Yoga/Self Defense, 100 marks for continuous internal evaluation shall be awarded by the respective class teacher based on the day-to-day participation and performance in the activities organized under each event.

II) Semester End Examinations – Evaluation:

Theory/ Drawing/ Integrated theory and laboratory/ Project based theory Courses

i) For all Theory/Drawing/Integrated theory and laboratory/Project based theory Courses, the semester end examination shall be conducted for 70 marks consisting of five internal choice questions (i.e "either" "or" choice), carrying 14 marks each. There will be two questions from each unit and the student should answer either of the two questions.

ii) There will not be any external assessment for laboratory and project components for integrated theory and laboratory course and project based theory course respectively.

iii) For design courses like Estimating, Costing & Valuation, Design of steel structures, Design of RC structures, Design of Irrigation structures, etc., the pattern for the semester end examination is given along with the syllabus of the respective subject.

iv) *For subjects like Functional English, Professional Communication, etc, the pattern of semester end examination is given along with the syllabus of the respective subject.*

Practical Courses:

The semester end examination shall be conducted for 35 marks by the teacher concerned and an external examiner appointed by the controller of examinations.

Skill Development Courses:

The semester end examination shall be conducted for 35 marks along with the practical examinations in the presence of an external and an internal examiner (course instructor or mentor).

For courses like Logic Building and Basic Coding Principles, Logic Building and Algorithmic Programming and Programming for corporate, semester end examination paper shall consists of 3 sets of questions and student has to choose any one set of Questions. Each set shall have three questions with three levels of complexity and evaluated for a total of 35 marks.

Mini Project:

The semester end examination for 35 marks shall be awarded by a committee consisting of a supervisor and a senior faculty member of the department based on the performance in the Viva-Voce examination.

Socially Relevant Project

i) Every student should put in a minimum of **180 hours** for the socially relevant project during the summer vacation.

ii) Each class/section shall be assigned with a mentor.

iii) Departments shall concentrate on their major areas of respective departments concerned. For example, Dept. of Computer Science can take up activities related to computer Literacy to different sections of people like - youth, women, housewives, etc

iv) A log book to record the activities undertaken / involved shall be maintained by every student.

v) The log book has to be countersigned by the mentor concerned.

vi) A report shall be submitted by each student at the end of the semester.

vii) Based on the report and active participation of the student the semester end examination for 50 marks shall be awarded by a committee consisting of a mentor and a senior faculty member of the department.

Internship:

i) It shall be completed in collaboration with local industries, Govt. Organizations, construction agencies, Industries, Hydel and thermal power projects and also in software MNCs in the area of specialization of the UG programme.

ii) Students shall pursue this course during summer vacation just before it is offered as per course structure. The minimum duration of this course is at least 6 weeks.

iii) A supervisor shall be allotted to each batch of students to guide and for taking up the summer internship. The supervisor shall monitor the attendance of the students during the internship. Attendance requirements are as per the norms of the college.

iv) After successful completion, students shall submit a summer internship technical report to the department concerned.

v) A certificate from industry / skill development centre shall be included in the report.

vi) Semester end examination for 50 marks shall be conducted by a committee consisting of an external examiner, head of the department and supervisor for the internship. The report and the oral presentation shall carry 40% and 60% weightage respectively.

Project Work:

i) The major project work shall be carried out during the IV year 2nd semester.

ii) The project evaluation and semester end Viva–Voce examination for 140 marks shall be awarded by the committee consisting of an external examiner, head of the department and the supervisor of the project based on the report submitted and performance in Viva-Voce examination.

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iii) The evaluation of project work shall be conducted at the end of the fourth year second semester.

Mandatory Non-Credit Courses:

i) For courses like Environmental Studies and Constitution of India, semester end examination shall be conducted by the respective departments internally for 70 marks.

ii) The pattern for examination is same as the regular theory courses.

iii) There is no semester end examination for courses, such as Sports & Games/ Cultural and NSS/Fine arts/Yoga/Self Defense.

Massive Open Online Courses (MOOCs):

i) Each student shall register for one Massive Open Online Course (MOOC) as per the course structure.

ii) A student shall register for MOOC offered by NPTEL, CISCO, MICROSOFT and SAYLOR or any other agency with a prior approval from the departmental committee.

iii) The duration of the course shall be a minimum of 12 weeks.

iv) The Head of the Department shall appoint one mentor for each course.

v) The courses should be other than those offered under regular curriculum and are to be approved by the departmental committee consisting of the head of the department, mentor and one/two senior faculty members before the commencement of each semester.

vi) During the course, the mentor monitors the students' assignment submissions given by the agency.

vii) Students need to submit all the assignments given and need to take final exam at the proctor centre.

viii) The required credits shall be awarded on submission of certificate from the approved agency.

ix) In case if student does not qualify in the chosen subject, the same or an alternative equivalent subject may be registered again in the next semester with the recommendation of the HoD concerned and shall pass.

8. Criteria for Passing a Course, Award of Grades and Award of Division:

i) Criteria for Passing a Course:

a) A candidate shall be declared to have passed in individual theory / integrated theory and laboratory / project based theory / drawing course/design course/ practical/ mini project/main project, if he/she secures a minimum of 40% aggregate marks (continuous internal evaluation & semester end examination marks put together), subject to securing a minimum of 35% marks in the semester end examination.

b) A candidate shall be declared to have passed in skill development courses/ industrial internship/socially relevant project if he/she secures a minimum of 40% marks in the semester end examination.

c) For non-credit mandatory courses, like environmental studies and constitution of India, the student has to secure minimum 40% aggregate marks (continuous internal evaluation & semester end examination marks put together) for passing the course. For courses like Sports & Games/Cultural and NSS/Fine arts/ Yoga/Self Defense, student shall be declared to have passed in the courses if he/she secures a minimum of 40% of marks in continuous internal evaluation. No marks or letter grade shall be printed in the grade cards for all mandatory non-credit courses, but only Completed (Y)/Not-completed (N) will be specified. A student has to repeat the course whenever it is offered; if he does not get satisfactory grade or does not fulfill the attendance requirements in each non-credit course for getting the degree awarded.

d) On passing a course of a program, the student shall earn the credits assigned to that course.

ii) Method of Awarding Letter Grade and Grade Points for a Course:

a) A student shall be considered to have completed a course successfully and earned the credits if he/she secures an acceptable letter grade in the range A+ to E as given below.

b) Letter grade 'F' in any course implies failure of the student in that course and no credits earned. Absent is also treated as no credits earned.

A letter grade and grade points will be awarded to a student in each course based on his/her performance as per the grading system given below.

Marks Range Theory (Max - 100)	Marks Range Lab (Max. - 50)	Level	Letter Grade	Grade Points
≥ 90	≥ 45	Outstanding	A+	10
≥ 80 & ≤ 89	≥ 40 & ≤ 44	Excellent	A	9
≥ 70 & ≤ 79	≥ 35 & ≤ 39	Very Good	B	8
≥ 60 & ≤ 69	≥ 30 & ≤ 34	Good	C	7
≥ 50 & ≤ 59	≥ 25 & ≤ 29	Above Average	D	6
≥ 40 & ≤ 49	≥ 20 & ≤ 24	Average	E	5
< 40	< 20	Fail	F	0
		Absent	AB	0

iii) Calculation of Semester Grade Point Average (SGPA)* for Semester:

The performance of each student at the end of the each semester is indicated in terms of SGPA. The SGPA is calculated as given below:

$$\textbf{SGPA} = \frac{\sum (CR \; X \; GP)}{\sum CR} \quad \text{for each semester.}$$

where CR = Credits of a course
       GP = Grade Points awarded for a course

* SGPA is calculated for a candidate who passed all the courses in that semester.

Illustration of SGPA: Let us assume there are 6 subjects in a semester. The grades obtained as follows:

Course	Credits (CR)	Grade Point (GP)	CR x GP
Subject 1	3	8	24
Subject 2	2	9	18
Subject 3	4	7	28
Subject 4	3	6	18
Subject 5	3	9	27
$\sum$CR=15			$\sum$CR x GP = 115

$$SGPA = \frac{\sum CRxGP}{\sum CR} = \frac{115}{15} = 7.67$$

iv) Calculation of Cumulative Grade Point Average (CGPA) for Entire Program:

The CGPA is calculated as given below:

$$\textbf{CGPA} = \frac{\sum (CR \ X \ GP)}{\sum CR} \ \text{for entire program.}$$

where CR = Credits of a course
       GP = Grade points awarded for a course

Illustration of CGPA:

Semester1	Semester2	Semester3	Semester4	Semester5	Semester6	Semester7	Semester8
Credits:15	Credits:22	Credits:24	Credits:22	Credits:23	Credits:21	Credits:20	Credits:20
SGPA:7.67	SGPA:7.86	SGPA:7.87	SGPA:8.67	SGPA:8.78	SGPA:8.50	SGPA:8.60	SGPA:9.00

$$CGPA = \frac{(15x7.67) + (22x7.86) + (24x7.87) + (22x8.67) + (23x8.78) + (21x8.50) + (20x8.60) + (20x9.00)}{(15 + 22 + 24 + 22 + 23 + 21 + 20 + 20)} = 8.38$$

v) Award of Division:

After satisfying the requirements prescribed for the completion of the program, the student shall be eligible for the award of B.Tech. Degree and shall be placed in one of the following grades:

Class of Award	CGPA to be Secured	Remarks
First Class with Distinction	≥ 7.75 (Without any Supplementary Appearance)	From the CGPA secured from 160 Credits
First Class	≥ 6.75	
Second Class	$\geq 5.75 \ \& < 6.75$	
Pass Class	$\geq 5.00 \ \& < 5.75$	

9. Grade Card and Consolidated Grade Card

i) A grade card shall be issued for each semester separately both for regular and supplementary examinations irrespective of passing the examination.

ii) A grade card consists of a letter grade and credits earned for all courses of that semester along with SGPA and CGPA.

iii) A consolidated grade card consisting of all semesters' courses with the letter grade and credits secured for each course, CGPA and award of division shall be issued if he/she fulfills the academic regulations B.Tech. program.

10. Supplementary Examinations

Supplementary examinations will be conducted twice in a year at the end of odd and even semesters.

11. Conditions for Promotion

i) A student shall be eligible for promotion to next Semester of B.Tech. program, if he satisfies the conditions as stipulated in Regulation 6.

ii) The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in Regulation 6 for promotion into III Year I semester and IV year I semester.

a) 4 Year B.Tech Program:

i) A student shall be promoted from II year to III year only if he acquires the academic requirement of a minimum of 40% credits up to second year second semester as shown below.

1. Two regular and two supplementary examinations of I year I semester,
2. Two regular and one supplementary examinations of I year II semester,
3. One regular and one supplementary examinations of II year I semester
4. One regular examination of II year II semester,

   irrespective of whether the candidate takes the examination or not.

ii) A student shall be promoted from III year to IV year only if he acquires the academic requirement of a minimum of 40% credits upto third year second semester as shown below.

1. Three Regular and three supplementary examinations of I year I sem.,
2. Three Regular and two supplementary examinations of I year II sem.,
3. Two Regular and two supplementary examinations of II year I semester,
4. Two Regular and one supplementary examinations of II Year II semester,
5. One Regular and one supplementary examinations of III Year I semester,
6. One regular examination of III Year II semester,

irrespective of whether the candidate takes the examination or not.

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b) 3 Year B.Tech Program under Lateral Entry Scheme:

i) A student shall be promoted from III to IV year only if he acquires the academic requirement of a minimum of 40% credits up to third year second semester as shown below.

    1. Two regular and two supplementary examinations of II year I semester,

    2. Two Regular and one supplementary examinations of II year II semester,

    3. One regular and one supplementary examinations of III year I semester

    4. One regular examination of III year II semester,

irrespective of whether the candidate takes the examination or not.

12. Revaluation

i) Students can apply for revaluation of his/her answer script(s) of theory course(s) as per the notification issued by the Controller of Examinations.

ii) The Controller of Examinations shall arrange for revaluation of such answer script(s).

iii) An examiner, other than the first examiner, shall revaluate the answer script(s).

iv) If the variation in marks of two evaluations is less than 15% of total marks, the best mark of two evaluations shall be taken into consideration.

v) If the variation in marks of two evaluations is more than 15% of total marks, there shall be third evaluation by an examiner other than the first two examiners. The best marks of two evaluations (which are nearer) shall be taken into consideration.

vi) There is no revaluation for practical/ Mini Project/ Skill Development Courses/ Social relevant Project/ Main Project courses.

13. Re-admission Criteria

i) A candidate, who is detained in a semester due to the lack of attendance has to obtain written permission from the Principal for readmission into the same semester after duly fulfilling the required norms stipulated by the college and by paying the required tuition fee and special fee in addition to paying an administrative fee of Rs.1,000/-.

ii) A candidate who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated in regulation 11 by paying the required tuition fee & special fee in addition to paying an administrative fee of Rs.1000/-

14. Break in Study

Student, who discontinues the studies for what-so-ever reason, can get readmission into appropriate semester of B.Tech program only with the prior permission of the Principal of the College, provided such candidate shall follow the transitory regulations applicable to the batch he joins. An administrative fee

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of Rs.2,000/- per each year of break in study in addition to the prescribed tuition fee and special fees should be paid by the candidate to condone his break in study.

15. Transitory Regulations

When a student is detained due to lack of credits or shortage of attendance, he/she may be readmitted into the same semester in which he/she has been detained. However, the academic regulations under which the detained student was first admitted shall continue to be applicable to him/her.

Transfer candidates (from an Autonomous College affiliated to JNTUK)
A student who has secured the required credits up to previous semesters as per the regulations of other Autonomous Institutions shall only be permitted to be transferred to this college. A student who is transferred from the other Autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree shall be equal to 160 for regular students and 120 for lateral entry students.

16. Withholding of Results

If the student has not paid the dues, if any, to the College or if any case of indiscipline is pending against him, the result of such student will be withheld. His degree will also be withheld in such cases.

17. Malpractices and Punishments

i) Every student appearing for the Examinations is liable to be charged with committing malpractice(s), if he/she is observed as committing any one or more of the acts mentioned in of examination malpractices and punishments.

ii) The Principal shall refer the cases of malpractices in internal assessment tests and semester end examinations to a malpractice enquiry committee constituted by him for the purpose. Such committee shall follow the approved levels of punishment. The Principal shall take necessary action against the erring students based on the recommendations of the committee.

iii) Any action by the candidate trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder.

DISCIPLINARY ACTION FOR MALPRACTICES/IMPROPER
CONDUCT IN EXAMINATIONS

	Nature of Malpractices / Improper conduct	Punishment
If the candidate		
1.a	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 subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination.)	Expulsion from the examination hall and cancellation of the performance in that subject only.
b	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through Cell phones with any candidates 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 subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The hall ticket of the candidate shall be cancelled.

3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate who has been impersonated shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for the examinations of the remaining subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the impostor is an outsider, he will be handed over to the police and a case is registered against him.
4.	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 the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of performance in that subject.

6.	Refuses to obey the orders of the Chief Superintendent/Assistant Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in or around the examination hall or organises a walkout or instigates others to walkout or threatens the officer-in-charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the Officer-in-charge or any person on duty in or outside the examination hall of any of his relations or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the Officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat.

9	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 clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to the police and a police case is registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be referred to the Chief Superintendent of Examinations for future action towards suitable punishment.	

iv) Malpractices identified at spot centre during valuation

The involvement of the staff, who are in charge of conducting examinations, valuing examination papers and preparing / keeping records of documents related to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and appropriate disciplinary action will be taken after thorough enquiry.

18. Other Matters

i) Physically challenged candidates who have availed additional examination time and a scribe during their Intermediate/EAMCET examinations will be given similar concessions on production of relevant proof/documents. Students who are suffering from contagious diseases are not allowed to appear either for internal or semester end examinations.

ii) The students who participated in coaching / tournaments held at State / National / International levels through University / Indian Olympic Association during semester end external examination period will be promoted to subsequent semesters as per the guidelines of University Grants Commission Letter No. F.1-5/88 (SPE/PES), dated 18-08-1994.

iii) The Principal shall deal in an appropriate manner with any academic problem which is not covered under these rules and regulations, in consultation with the Heads of the Departments and subsequently such actions shall be placed before the Academic Council for ratification. Any emergency modification of regulation, approved in the meetings of the Heads of the Departments shall be reported to the Academic Council for ratification.

18. General

i) The Academic Council may, from time to time, revise, amend or change the regulations, schemes of examination and /or syllabi.

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

iii) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the Academic Council is final.

iv) Wherever the word he, him or his occurs, it will also include she, her and hers.

Honors Degree Guidelines

I. Introduction

The goal of introducing B.Tech. (Honors) 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. The programme is a best choice for academically excellent students having good academic record and interest towards higher studies and research. All the students pursuing regular B.Tech. with prerequisite CGPA are eligible to register Honors degree course. A student has to acquire 20 more credits, in addition to 160 credits required, for the award of the B.Tech. Honors degree. The additional courses shall be advanced subjects in the concerned department/discipline. The department concerned will determine required courses for award of Honor degree. The subjects in the Honor degree would be a combination of core (theory and lab) and some electives.

II. Objectives

The objectives of initiating the B.Tech. (Honors) degree certification are:

a) To encourage the under graduates towards higher studies and research

b) To prepare the students to specialize in core Engineering streams

c) To attain the high-level competence in the specialized area of under graduate programme

d) To learn the best educational and professional skills in the specialized area after the completion of his under graduate courses.

e) To provide the opportunity to learn the post graduate level courses in the specified under graduate programme

III. Eligibility

a) The following departments are offering B.Tech. (Honors);

- ♦ Civil Engineering
- ♦ Electrical and Electronics Engineering
- ♦ Mechanical Engineering
- ♦ Electronics and Communication Engineering
- ♦ Computer Science and Engineering

b) B. Tech students (both Regular and Lateral Entry) pursuing a major degree programme can register for Honors degree at their choice in the same department offering major degree from IV semester onwards.

c) Students registering for Honors degree shall select the subjects from same branches/department based on the recommendations of BoS committee. For example, if a student pursuing major degree in Electrical and Electronics Engg. shall the selects subjects in Electrical and Electronics Engg. only and he/she will get major and Honors degree in Electrical and Electronics Engineering.

d) Students registered for honors shall not be permitted to register for B. Tech (Minor).

e) Students who have a CGPA of 8.00 or above, without any backlogs, up to III semester for regular students and only III semester for lateral entry students will be permitted to register for honors degree.

f) CGPA of more than 8.00 has to be maintained in the subsequent semesters in major as well as honor without any backlogs in order to keep the honor degree registration active. If CGPA falls below 8.00 at any point after registering for the honors; the honors registration will cease to be active.

g) Student registered for Honors degree in a discipline must register and pass in all subjects with a minimum CGPA of 8.0 that constitute requirement for award of Honors degree.

h) The subjects completed under Honors degree programme shall not be considered as equivalent subjects in case the student fails to complete the major degree programme.

IV. Registering for Honor degree

a) Total number of seats offered for a Honors programme shall be a maximum of 35% of sanctioned intake of major degree programme.

b) There is no fee for registration of subjects for Honors degree programme

c) The department offering the honors degree will declare courses offered before the start of the semester.

d) The eligible list of students shall be displayed in the respective department notice board before the start of the semester.

e) The eligible interested students shall submit a registration form to the HoD of concerned department and the department shall maintain the record of students pursing the Honors degree. The process of registration should be completed within one week before the start of every semester.

f) If the student wishes to withdraw, he/she shall inform the same to HoD of concerned department within two weeks after registration of the Honors degree.

V. Attendance Requirements

a) The overall attendance in each semester of regular B. Tech courses and Honors courses shall be computed separately.

b) A student shall maintain an overall attendance of 75% in all registered courses of Honors to be eligible for attending semester end examinations. However, condonation for shortage of attendance up to 10% may be given as per college norms. On the recommendations of College Academic Committee, the student concerned will be permitted to take the semester end examinations, on payment of condonation fee of Rs. 500/-.

c) Student having less than 65% attendance in Honors courses shall not be permitted for end semester examinations.

d) A student detained due to lack of attendance in major B. Tech programme shall not be permitted to continue Honors programme.

e) If a student is detained due to lack of attendance in Honors degree courses, he/she shall not be permitted to continue Honors programme.

VI. Credits requirement

a) Honors degree shall not be awarded at any circumstances without completing the regular major B.Tech. programme in which a student got admitted.

b) A Student will be eligible to get Honors degree along with major degree engineering, if he/she gets an additional 20 credits offered through Honors degree courses.

c) Of the 20 additional credits to be acquired, 16 credits shall be earned by undergoing specified courses of Honors degree, with four courses(both theory and lab), each carrying 4 credits. The remaining 4 credits must be acquired with two courses through online from platforms like NPTEL, etc., which shall be domain specific, each with 2 credits and with a minimum duration of 12 weeks as recommended by the Board of Studies.

d) Students shall produce a certificate issued by the online platforms like NPTEL, etc. as a proof of credit attainment.

e) Transfer of credits from a particular Honors to regular B.Tech. and Vice-Versa shall not be permitted.

f) If a student fails in any registered course of the Honors degree, he/she shall not be eligible to continue the B.Tech. Honors degree. However, the additional credits and grades thus far earned by the student shall be included in the separate grade card but shall not be considered to calculate the CGPA.

VII. Examinations

a) The examination for the Honors courses offered shall be conducted along with regular B.Tech. programme.

b) The pattern of internal and semester end examinations for Honors degree courses will be similar to regular B.Tech. courses.

c) A separate grade card shall be issued for the Honors subjects passed in each semester.

d) There is no supplementary examination for the failed subjects in a Honors programme.

e) Examination Fee to be paid will be as per the college norms.

Note: *In the event of any tie during the seat allotment for a Honors degree, the concerned major degree department offering Honors shall conduct a test on the prerequisite subjects of Honors degree and final decision shall be taken.*

Minor Degree Guidelines

I. Introduction

Looking to global scenario, engineering students should have knowledge of subjects from other branches and some advanced subjects of their respective branch in which they are perusing the degree. To complement the same college has decided to take an initiative from 2020-21 in academics by introducing minor degree to the undergraduate students enrolled in the B.Tech. This gives a provision to the students to pursue minor other than the discipline in which student got admitted. An aspiring student can choose the courses and laboratories in any other discipline and can get a minor degree in the chosen specialization in addition to regular major B.Tech. degree. This way undergraduates are not restricted to learn about courses only in the discipline they get admitted to, but can choose courses of their interest to later on take up a career path of their liking. The students taking up a minor degree course will get additional credits. A student has to acquire 20 more credits, in addition to 160 credits required, for the award of the minor degree. The department concerned will determine the required courses for award of minor degree. The subjects in minor programme would be a combination of mostly core and some electives.

II. Objectives

The objectives of initiating the minor degree certification are:

a) To diversify the knowledge of the undergraduates.

b) To make the undergraduates more employable.

c) To have more educational and professional skills after the completion of his undergraduate courses.

d) To give a scope to specialize students in other streams of engineering in addition to the ones they are currently pursuing.

III. Eligibility

a) The following departments are offering B.Tech. (Minor);

- ♦ Civil Engineering
- ♦ Electrical and Electronics Engineering
- ♦ Mechanical Engineering
- ♦ Electronics and Communication Engineering
- ♦ Computer Science and Engineering
- ♦ Information Technology

b) The B.Tech. students (both Regular and Lateral Entry) pursuing a major degree programme can register for minor degree at their choice in any other department offering minor from IV semester onwards.

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c) Student pursuing major degree in any engineering branch is eligible to register for minor in any other engineering branch. For example, if a student pursuing major degree in Electrical and Electronics Engineering shall complete minor in Civil Engineering and he/she will get major degree of Electrical and Electronics Engineering with minor of Civil Engineering.

d) However, students pursuing major degree in a particular engineering branch are not allowed to register for minor in the same branch.

e) The students are permitted to opt for only a single minor degree in his/her entire tenure of B.Tech. programme.

f) The students registered for minor degree shall not be permitted to register for B.Tech. (Honors.)

g) Students who have a CGPA of 7.75 or above, without any backlogs, up to III semester for regular students and only III semester for lateral entry students will be permitted to register for a minor.

h) CGPA of more than 7.75 has to be maintained in the subsequent semesters in major as well as minor without any backlogs in order to keep the minor registration active. If CGPA falls below 7.75 at any point after registering for the minor; the minor registration will cease to be active.

i) A student registered for minor in a discipline must register and pass in all subjects with a minimum CGPA of 7.75 that constitute requirement for award of minor.

j) The subjects completed under minor degree shall not be considered as equivalent subjects in case the student fails to complete the major degree programme.

IV. Registering for Minor Degree

a) Total number of seats offered for a minor degree programme shall be a maximum of 35% of sanctioned intake of major degree programme.

b) There is no fee for registration of subjects for minor degree programme

c) The department offering the minor will declare courses offered before the start of the semester.

d) The eligible list of students shall be displayed in the respective department notice board before the start of the semester.

e) The eligible interested students shall apply to the HoD offering the minor degree through HoD of his/her parent department and after scrutiny the department offering minor will announce the final list of the selected students for the minor degree.

f) The selected students shall submit a registration form to the HoD offering the minor degree through HoD of his/her parent department. The process of registration should be completed within one week before the start of every semester.

g) Both parent department and department offering minor shall maintain the record of students pursing the minor degree.

h) If the student wishes to withdraw, he/she shall inform the same to HoD of department offering minor degree through HoD of parent department within two weeks after registration of the minor degree.

V. Attendance Requirement

a) The overall attendance in each semester of regular B.Tech. courses and minor courses shall be computed separately.

b) A student shall maintain an overall attendance of 75% in all registered courses of minor degree to be eligible for attending semester end examinations. However, condonation for shortage of attendance up to 10% may be given as per college norms. On the recommendations of College Academic Committee, the student concerned will be permitted to take the semester end examinations, on payment of condonation fee of Rs. 500/-.

c) Student having less than 65% attendance in minor courses shall not be permitted for end semester examinations.

d) A student detained due to lack of attendance in major B.Tech. programme shall not be permitted to continue minor degree programme

e) If a student is detained due to lack of attendance in minor degree courses, he/she shall not be permitted to continue minor programme

VI. Credits requirement

a) Minor degree shall not be awarded at any circumstances without completing the regular major B.Tech programme in which a student got admitted.

b) A Student will be eligible to get minor degree along with major degree engineering, if he/she gets an additional 20 credits offered through minor degree courses.

c) Of the 20 additional credits to be acquired, 16 credits shall be earned by undergoing specified courses of minor degree, with four courses, each carrying 4 credits. The remaining 4 credits must be acquired with two courses through online platforms like NPTEL, etc., which shall be domain specific, each with 2 credits and with a minimum duration of 12 weeks as recommended by the Board of Studies.

d) Students shall produce a certificate issued by the online platforms like NPTEL, etc. as a proof of credit attainment.

e) Transfer of credits from a minor to regular B.Tech and Vice-Versa shall not be permitted.

f) If a student fails in any registered course of the minor degree, he/she shall not be eligible to continue the B.Tech. minor degree. However, the additional credits and grades thus far earned by the student shall be included in the separate grade card but shall not be considered to calculate the CGPA.

VII. Examinations

a) The examination for the minor courses offered shall be conducted along with regular B.Tech. programme.

b) The pattern of internal and semester end examinations for minor degree courses will be similar to regular B.Tech. courses.

c) A separate grade card shall be issued for the minor degree subjects passed in each semester.

d) There is no supplementary examination for the failed subjects in a minor degree programme.

e) Examination Fee to be paid will be as per the College norms.

Note: *In the event of any tie during the seat allotment for a Minor degree, the concerned department offering Minor degree shall conduct a test on the prerequisite subjects of Minor degree and final decision shall be taken.*

COURSE STRUCTURE

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SYLLABUS

COURSE STRUCTURE

I Year - I Semester

Sl. No.	Course Code	Name of the Course / Laboratory	L	T	P	No.of Credits
1	EG3501	Functional English	3	-	-	3
2	MA3502	Descriptive Statistics	2	1	-	3
3	MA3504	Engineering Calculus	2	1	-	3
4	CT3502	Programming for Problem Solving	3	-	-	3
5	UH3501	Universal Human Values 2: Understanding Harmony	2	1	-	3
6	EG3502	Functional English Lab	-	-	2	1
7	MA3503	Statistics Using R Lab	-	-	2	1
8	CT3503	C Programming Lab	-	-	4	2
		Total	**12**	**3**	**8**	**19**
9	BA3501	Constitution of India (Mandatory Non-Credit Course)	2	-	-	-

I Year - II Semester

Sl. No.	Course Code	Name of the Course / Laboratory	L	T	P	No.of Credits
1	EG3503	Professional Communication	2	-	-	2
2	MA3505	Integral Transforms and Vector Calculus	3	1	-	4
3	MA3507	Linear Algebra	2	1	-	3
4	CT3504	Python Programming	3	-	-	3
5	CT3505	Data Structures	3	-	-	3
6	EG3504	Professional Communication Lab	-	-	4	2
7	CT3506	Python Programming Lab	-	-	4	2
8	CT3507	Data Structures Lab	-	-	4	2
		Total	**13**	**2**	**12**	**21**
9	EN3501	Environmental Studies (Mandatory Non-Credit Course)	2	-	-	-

L : Lecture   T : Tutorial   P : Practical

II Year - I Semester

Sl. No.	Course Code	Name of the Course / Laboratory	No.of Periods per week			No.of Credits
			L	T	P	
1	BA3502	Managerial Economics and Financial Analysis	3	-	-	3
2	MA3512	Advanced Statistics	3	-	-	3
3	CT3510	Digital Logic Design	3	-	-	3
4	CT3511	Object Oriented Programming through Java	3	-	-	3
5	CT3512	Database Management Systems	2	1	-	3
6	CT3513	Formal Languages and Automata Theory	2	1	-	3
7	CT3514	Java Programming Lab	-	-	4	2
8	CT3515	Database Management Systems Lab	-	-	4	2
9	SD3502	Logic Building and Algorithmic Programming	-	-	2	1
		Total	**16**	**2**	**10**	**23**
10	SG3501	Sports and Games / Cultural (Mandatory Non-Credit Course)	-	-	2	-

* **Integrated Course with Theory and Laboratory**

II Year - II Semester

Sl. No.	Course Code	Name of the Course / Laboratory	No.of Periods per week			No.of Credits
			L	T	P	
1	MA3511	Discrete Mathematical Structures	2	1	-	3
2	CT3518	Computer Organization	3	-	-	3
3	CT3520	Compiler Design	2	1	-	3
4	CT3521	Artificial Intelligence	3	-	-	3
5	CS3502	Software Engineering *	3	-	2	4
6		**Open Elective - I**	3	-	-	3
7	AD3501	Artifical Intelligence Lab	-	-	2	1
8	CT3524	Game Programming	1	-	2	2
9	SD3503	Programming for Corporate	-	-	2	1
		Total	**17**	**2**	**8**	**23**
10	NS3501	NSS / Fine Arts / Yoga / Self Defense (Mandatory Non-Credit Course)	-	-	2	-

* **Integrated Course with Theory and Laboratory**

L : Lecture   T : Tutorial   P : Practical

III Year - I Semester

Sl. No.	Course Code	Name of the Course / Laboratory	No.of Periods per week			No.of Credits
			L	T	P	
1		Operating Systems	2	1	-	3
2		Data Science	3	-	-	3
3		Web Designing and Development **	3	-	2	4
4		**Professional Elective - I**	3	-	-	3
5		**Open Elective - II**	3	-	-	3
6		Mobile Application Development	-	-	4	2
7		Data Science Lab	-	-	2	1
8		Competitive Coding	-	-	2	1
9		Society Impact Project	-	-	2	1
		Total	**14**	**1**	**12**	**21**

III Year - II Semester

Sl. No.	Course Code	Name of the Course / Laboratory	No.of Periods per week			No.of Credits
			L	T	P	
1		Computer Networks	3	-	-	3
2		Design and Analysis of Algorithms	2	1	-	3
3		Machine Learning	3	-	-	3
4		**Professional Elective - II**	3	-	-	3
5		**Open Elective - III**	3	-	-	3
6		Web Design Using Django	1	-	2	2
7		Machine Learning Lab	-	-	4	2
8		Linguistic Competency Building	-	-	2	1
9		Mini Project	-	-	4	2
		Total	**15**	**1**	**12**	**22**

** **Project base Theory Course**

L : Lecture   T : Tutorial   P : Practical

IV Year - I Semester

SI. No.	Course Code	Name of the Course / Laboratory	No.of Periods per week			No.of Credits
			L	T	P	
1		Big Data Analytics	3	-	-	3
2		Deep Learning	3	-	-	3
3		**Professional Elective - III**	3	-	-	3
4		**Professional Elective - IV**	3	-	-	3
5		**Professional Elective - V**	3	-	-	3
6		Big Data Analytics Lab	-	-	4	2
7		Deep Learning Lab	-	-	2	1
8		MOOCs	-	-	-	2
		Total	**15**	**-**	**6**	**20**

IV Year - II Semester

SI. No.	Course Code	Name of the Course / Laboratory	No.of Periods per week			No.of Credits
			L	T	P	
1		Internship /Industrial Training /Practical Training	-	-	4	2
2		Project Work	-	-	18	9
		Total	**-**	**-**	**22**	**11**

Open Elective - I

SI. No.	Course Code	Name of the Course / Laboratory	Department Offering the Subject	No.of Periods per week			No.of Credits
				L	T	P	
1	CE3513	Elements of Civil Engineering (other than CE)	CE	3	-	-	3
2	CE3514	Environment Laws and Policies (other than CE)	CE	3	-	-	3
3	EE3513	Electrical Materials (other than EEE)	EEE	3	-	-	3
4	EE3514	Control Systems Engineering(other than EEE&ECE)	EEE	3	-	-	3
5	ME3517	Automotive Engineering (other than ME)	ME	3	-	-	3
6	ME3518	Elements of Mechanical Transmission (other than ME)	ME	3	-	-	3
7	EC3520	Introduction to Embedded Systems (other than ECE/IoT)	ECE	3	-	-	3
8	EC3521	Fundamentals of Communication Systems (other than ECE/IoT)	ECE	3	-	-	3
9	CS3503	Information Retreival Systems (Other than CSE & AI&DS)	CSE	3	-	-	3
10	CT3522	Computer Graphics (Other than CSE, IT & AI&DS)	CSE	3	-	-	3
11	IT3504	System Software (Other than IT)	IT	3	-	-	3
12	IT3505	Free & Open Source Software (Other than IT)	IT	3	-	-	3
13	MA3516	Fuzzy Mathematics	BS&H	3	-	-	3

Open Elective - II

Open Elective - III

Professional Electives

Sl. No.	Course Code	Name of the Course / Laboratory	No.of Periods per week			No.of Credits
			L	T	P	
1		**Professional Elective - I** i) UML and Design Patterns ii) Computer Vision iii) Distributed Systems iv) Principles of Data Mining	3	-	-	3
2		**Professional Elective - II** i) MEAN Stack Technoliges ii) Parallel Processing iii) Ethical Hacking iv) Pattern Recognition	3	-	-	3
3		**Professional Elective - III** i) Soft Computing ii) Full Stack Technologies iii) Natural Languages Processing iv) Image and Video Analytics	3	-	-	3
4		**Professional Elective - IV** i) Internet of Things ii) Quantum Computing iii) Cloud Computing iv) Blockchain Technologies	3	-	-	3
5		**Professional Elective - V** i) Data Visualization ii) NoSQL Database iii) Cryptographyu and Network Security iv) Robotic Process Automation	3	-	-	3

L : Lecture   T : Tutorial   P : Practical

SYLLABUS

FUNCTIONAL ENGLISH
(Common to All Branches)
I Year – I Semester

Lecture	: 3	Internal Marks	: 30
Credits	: 3	External Marks	: 70

Course Objectives

- To equip the students for their present and future academic pursuits involving the following:
  - listening to (and viewing) classroom lectures and other academic presentations with a reasonable degree of accuracy, understanding, and appreciation, and responding to them appropriately;
  - speaking in academic (e.g. classroom discussions) and social contexts with a fair degree of fluency, accuracy and intelligibility, and with due attention to factors such as purpose, audience, context, and culture;
  - reading a wide range of informational and functional texts, including course books and reference materials, from print and non-print sources and using them for a variety of purposes; and
  - writing for academic purposes (e.g. assignments, examination answers) in an organized way following the rules of discourse and using vocabulary and grammar appropriately and accurately; and
- To develop in them the communication strategies and social graces necessary for functioning effectively in social, academic, and other situations in which they may be called upon to use English.

Course Outcomes

Upon successful completion of Functional English, the students will be able to

- speak with a reasonable degree of fluency using communication strategies (i.e. using language appropriately to carry out functions such as greeting, requesting information, seeking confirmation, disagreeing) as well conventions of politeness and courtesy
- speak with a reasonable degree of fluency and accuracy in contexts requiring tasks such as narrating and describing
- listen to short audio and video clips
  - in standard Indian accent with understanding of the types listed in D (1) (a) below; and
  - in native English accent (British and American), especially clips in which the speakers or voice actors speak slowly, and gain both understanding of messages and sensitivity to native-speaker accents
- read fluently comprehending texts of different kinds using multiple strategies to understand explicitly-stated information as well as underlying meanings

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- write coherent paragraphs with attention to elements of writing such as content, organization, language, style, and mechanics and the conventions of academic writing
- write survey reports with attention to conventions of report writing
- guard against mistakes Indians typically make in their speech and writing in English

Course Content

UNIT – I:

Listening	:	Listening Comprehension – Task 1 (IWE - Chapt II)
Speaking	:	Communication Functions – Conversation between Raghu and Sridhar (IWE - Chapt II)
Reading	:	Reading Comprehension – Task 1 (DPM)
Vocabulary	:	(a) GRE Words – 1.1, (b) Collocations – 2.1 (VB)
Grammar	:	Tenses – Simple Present and Present Continuous (IWE - Chapt II)
Writing	:	Paragraph-Writing (IWE - Chapt II)

UNIT – II:

Listening	:	Listening comprehension – Task 2 (WR)
Speaking	:	Communication Functions – Exercise (DPM)
Reading	:	Reading Comprehension – Task 2 (DPM)
Vocabulary	:	(a) Words Often Confused–3.1, (b) One-Word Substitutes–4.1 (VB)
Grammar	:	(a) Indianism and (b) *Have to* (IWE - Chapt II)
Writing	:	Paragraph-Writing (IWE - Chapt II)

UNIT – III:

Listening	:	Listening Comprehension – Task 3 (IWE - Chapt III)
Speaking	:	Communication Functions – Conversation between Shreya and Kalpana (IWE - Chapt III)
Intensive Reading	:	Reading Comprehension Task – 3 (DPM)
Extensive Reading	:	*The Adventures of Huckleberry Finn* by Mark Twain
Vocabulary	:	(a)Idioms – 5.1, (b) Phrasal Verbs – 6.1 (VB)
Grammar	:	Tenses – Simple Past and Present Perfect (IWE - Chapt III)
Writing	:	Paragraph-Writing – Coherence (IWE - Chapt III)

UNIT – IV:

Listening	:	Listening Comprehension – Task 4 (IWE - Chapt IV)
Speaking	:	Communication Functions – Conversation between professor and Mayur (IWE - Chapt IV)
Reading	:	Reading Comprehension – Task 4 (DPM)
Vocabulary	:	(a) GRE words–1.2, (b) Collocations–2.2, (c) Words Often Confused–3.2(VB)
Grammar	:	Expressing Futurity (IWE - Chapt IV)
Writing	:	Clutter-Free Writing (IWE - Chapt IV)

UNIT – V:

Listening : Listening comprehension – Task 5 (WR)

Speaking : (a) Communication Functions and (b) Telephone Etiquette – Exercises (IWE - Chapt IV)

Intensive Reading : Reading Comprehension – Task 5 (DPM)

Extensive Reading : *More Tales from Shakespeare* by Charles and Mary Lamb

Vocabulary: (a) One-Word Substitutes – 4.2, (b) Idioms – 5.2, (c) Phrasal verbs – 6.2 (VB)

Grammar : Structure – *Going to* (IWE - Chapt IV)

Writing : Technical Report Writing (DPM)

- IWE – *Innovate with English* by T Samson (Foundation)
- Chapt – Chapter
- DPM – Department-produced materials (handouts)
- WR – Web-resources
- VB – *Vocabulary Builder for Students of Engineering and Technology* by Vijaya Lakshmi et al (Maruthi)

Text books

1. T. Samson, Innovate with English, First Edn., Cambridge University Press India Pvt. Ltd. under the imprint of Foundation Books, Hyderabad, 2010.
   - Units TWO, THREE and FOUR only
2. M. Vijaya Lakshmi, et al., Vocabulary Builder for Students of Engineering and Technology, Second Edn., Maruthi Publications, Hyderabad, 2017.
3. The following simplified classics, one for each mid-semester, from the series, Great Stories in Easy English, published by S. Chand & Company Limited:
   - The Adventures of Huckleberry Finn by Mark Twain
   - More Tales from Shakespeare
4. Audio and video clips carefully selected by the Department in order to sensitize the students to native-speaker accents
5. Department-produced material on survey report writing

Testing Pattern

First Mid-Term Examination

The paper consists of four questions. All questions are compulsory; there is no choice.

I. Reading an unseen passage and answering two sets of questions on it:

a) Eight comprehension questions. Critical questions requiring analysis, inference, prediction, evaluation, etc. are to be set. Four of the eight questions will be multiple-choice questions. In case of non-multiple-choice questions, the length of each answer should not exceed 50 words. **Marks: 8 x ½ = 4**

b) Writing a discussion either on an aspect related to the ideas expressed in the passage but not explicitly dealt with in it, or on an idea not fully dealt with, allowing scope for discussion. **Marks: 1 x 4 = 4**

II. Twelve contextualized questions of the following from *Vocabulary Builder*: GRE Words: 1.1; Collocations: 2.1; Commonly confused words: 3.1; One-word substitutes: 4.1; Idioms: 5.1; and Phrasal verbs: 6.1 **Marks: 12 x ½ = 6**

III.

a) Correction of grammatical errors: Eight sentences with grammatical errors of the following types (dealt with in Units 2 and 3 of *Innovate with English*) will be given: simple present, present continuous, use of *have to* structure and Indianism **Marks: 8 x ½ = 4**

b) Eight objective-type questions based on one retold classic: *The Adventures of Huckleberry Finn*. **Marks: 8 x ½ = 4**

IV.

a) Completing a conversation (in which informational and interactional functions are performed) with appropriate expressions. **Marks: 8 x ½ = 4**

b) Reading two poorly-written paragraphs and performing the following tasks:
   i. Identifying the topic sentence of paragraph (a) and the sentences that do not support the topic sentence, and writing in the answer book the topic sentence and the irrelevant sentences. **Marks: 4 x ½ = 2**
   ii. Re-writing paragraph (b), which is poorly organized, into a coherent paragraph choosing appropriate sequence signals or connectives.
   Marks: 4 x ½ = 2

Second Mid-Term Examination

The paper consists of four questions All questions are compulsory; there is no choice.

I.a) Eight contextualized questions on the following from *Vocabulary Builder*: GRE Words: 1.1; Collocations: 2.1; Commonly confused words: 3.1; One- word substitutes: 4.1; Idioms: 5.1; and Phrasal verbs: 6.1 **Marks: 8 x ½ = 4**

b) Analyzing a service encounter – an interaction, either a direct personal one, or over the telephone (e.g. *making enquires at the reception counter in a hotel, an interaction with a salesman at a mall, asking for information on the telephone)* – and
   i. identifying the reasons for the failure or breakdown of communication in the conversation **Marks: 4 x ½ = 2**
   ii. rewriting the conversation making the communication successful. In the rewritten conversation, the partners in the conversation must sound polite and positive, using the communication strategies listed in the question.**Marks: 4 x ½ = 2**

II. Reading an unseen passage and answering two sets of questions on it:

a) Eight comprehension questions. Critical questions requiring analysis, inference, prediction, evaluation, etc. are to be set. Four of the Eight questions will be multiple-choice questions. In case of non-multiple-choice questions, the length of each answer should not exceed 50 words. **Marks: 8 x ½ = 4**

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b) Writing a discussion either on an aspect related to the ideas expressed in the passage but not explicitly dealt with in it, or on an idea not fully dealt with, allowing scope for discussion. **Marks: 1 x 4 = 4**

III.

a) Writing a technical report on the given situation. The report must:

follow the conventions of technical report writing

use language and style appropriate to technical report writing

Marks: 1 x 4 = 4

b) Writing a paragraph of 100 - 150 words on the given topic (e.g. *Should there be a dress code in colleges?*). The paragraph must have:

adequate and relevant ideas on the topic with the ideas properly organized using strategies such as coherence and cohesion;

a topic sentence; and

proper choice of vocabulary and grammatical accuracy. **Marks: 1 x 4 = 4**

IV.

a) Correction of grammatical errors: six sentences with grammatical errors of the following types (dealt with in Unit 4 of *Innovate with English*) will be given: futurity and Indianism. **Marks: 6 x ½ = 3**

b) Six objective-type questions based on one retold classic: *More Tales from Shakespeare.* **Marks: 6 x ½ = 3**

Semester End Examination

Answer any five questions. Question one is compulsory.

I. Reading an unseen (unfamiliar) passage, preferably one taken from a newspaper or a magazine, on a topical event or situation and answering three sets of questions on it:

a. Seven comprehension questions:

- Critical questions requiring analysis, inference, prediction, evaluation, etc. are to be set; 'information' questions involving a mere reproduction of the content should be avoided.

- Three of the seven questions should be multiple-choice questions.

- In case of non-multiple-choice questions, the length of each answer should not exceed 50 words. **Marks: 7 x 1 = 7**

b. Finding four one-word substitutes in the passage for the expressions given.

Marks: 4 x ½ = 2

c. Writing a discussion either on an aspect related to the ideas expressed in the passage but not explicitly dealt with in it, or on an idea not fully dealt with, allowing scope for discussion. **Marks: 1 x 5 = 5**

II. Reading an incomplete conversation that takes place in an academic or social or professional context (where informational and interactional functions are performed) and answering the following questions on it:

a. Completing the conversation with appropriate expressions. The expressions are to be chosen from among the ones given in a box. In the answer book, the examinee is expected to number the blanks as 1, 2, 3, etc., and write against each the expression he/she has chosen. **Marks: 7 x 1 = 7**

b. Writing a dialogue extending the scope of the original conversation following the instructions given in the question on how it should be extended. The instructions must include five communication strategies/functions, and the examinee is expected to use them in his/her dialogue. **Marks: 1 x 7 = 7**

III. Analyzing a service encounter – an interaction, either a direct personal one, or over the telephone, e.g. *making enquiries at the reception counter in a hotel, an interaction with a salesman at a mall, asking for information on the telephone* – and

a. identifying the reasons for the failure or breakdown of communication in the conversation **Marks: 1 x 7 = 7**

b. rewriting the conversation making the communication successful. In the rewritten conversation, the partners in the conversation must sound polite and positive, using the communication strategies listed in the question.

Marks: 1 x 7 = 7

IV. Reading two badly-written paragraphs and performing the following tasks:

a. Identifying the topic sentence of paragraph (a) and the sentences that do not support the topic sentence, and writing in the answer book the topic sentence and the irrelevant sentences. **Marks: 1 x 7 = 7**

b. Re-writing paragraph (b), which is poorly organized, into a cohesive paragraph choosing appropriate sequence signals. **Marks: 1 x 7 = 7**

V.

a. Writing a paragraph of 150 words on the given topic (e.g. *Should there be a dress code in colleges?*). The paragraph must have:

- adequate and relevant ideas on the topic with the ideas properly organized using strategies such as coherence and cohesion;

- a topic sentence; and

- proper choice of vocabulary and grammatical accuracy. **Marks: 1 x 7 = 7**

b. Writing a survey report using the data on the table(s)/graph(s) given. The report must:

- indicate acquaintance with the conventions of academic writing; and

- the ability to interpret data intelligently.

However, high standards of performance need not be expected as the students are in the first year of their course. It also follows that complex tables/graphs should be avoided. **Marks: 1 x 7 = 7**

VI. Contextualized vocabulary questions with two items on each one of the following from *Vocabulary Builder* (listed as 2 under F. TEXTBOOKS above):

- GRE Words (Units 1.1 and 1.2)
- Collocations (Units 2.1 and 2.2)
- Commonly Confused Words (Units 3.1 and 3.2)
- One-Word Substitutes (Units 4.1 and 4.2)
- Idioms (Units 5.1 and 5.2)
- Phrasal Verbs (Units 6.1 and 6.2)

For example, in the question on idioms, two sentences/contexts with an idiom in each may be given, and the examinee will have to identify the most appropriate meaning of the idiom from among the four options given. **Marks: 14 x 1 = 14**

VII. Correction of grammatical errors:

- Either a conversation with fourteen grammatical errors of the types dealt within the Textbook 1 (*Innovate with English*), or isolated sentences with fourteen grammatical errors will be given.

- The errors will include at least seven typical instances of Indianism widely believed to be inappropriate in standard English.

- If isolated sentences with errors are given, they are not to be given in isolation from their contexts; a conversation with errors of the kind specified above will serve the purpose better.

- The examinees are expected to rewrite the sentences in the answer book, correcting them. **Marks: 14 x 1 = 14**

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DESCRIPTIVE STATISTICS

I Year – I Semester

Lecture : 2	Tutorial : 1	Internal Marks : 30
Credits : 3		External Marks : 70

Course Objectives

- To understand the significance of statistics in our day to day life and its use.
- To emphasize the use of various statistical methods like measures of central tendency, dispersion, correlation and graphical representation of bi-variate data.
- To explore the concept of probability in real time engineering problems.

Course Outcomes

Upon successful completion of the course, the students will be able to

- demonstrate different types of data
- measure central tendency of the given data and draw useful conclusions.
- compute correlation in bi-variate data and find linear regression equation for predicting y values from the x values in a set of correlation data.
- describe different types of attributes and methods of measures of association between the attributes.
- explain the probability and the underlying assumption of random sampling.

Course Content

UNIT– I: Statistical Methods

Definition and scope of Statistics, concepts of statistical population and sample. Classification and ategorization of data, Measurements of scales. Presentation of data.

UNIT– II: Measures of Central Tendency and Dispersion

Measures of Central Tendencies: Mean, Median, Mode, Geometric mean and Harmonic mean. Measures of Dispersion: Range, Quartile deviation, Mean deviation, Standard deviation, Coefficient of variation, Moments, Skewness and Kurtosis, Sheppard's corrections.

UNIT– III: Bi-variate data

Definition, scatter diagram, Simple correlation, Partial and Multiple correlations (3 variables only), Rank correlation. Simple linear regression.

UNIT– IV: Curve Fittting and Attributes

Principle of least squares and fitting of polynomials and exponential and power curves.

Theory of attributes: Independence and association of attributes, consistency of data, measures of association and contingency, Yule's coefficient of colligation.

UNIT– V: Probability

Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability. Conditional Probability, addition and multiplication laws of probability, independent events – applications. Baye's theorem and its applications.

Text Books

1. Feller, W. (2014): An Introduction to Probability theory and application, Wiley.
2. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & 11, 8th Edn. The World Press, Kolkata.

Reference Books

1. S.P.Gupta, (2014): Statistical Methods, 43rd Edition, Sultan Chand & Sons.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
3. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.
4. Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New D

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ENINGEERING CALCULUS

I Year – I Semester

Lecture : 2	Tutorial : 1	Internal Marks	: 30
Credits : 3		External Marks	: 70

Course Objectives

- To understand the procedure of solving exact and non-exact differential equations.
- To familiarize with Higher order linear differential equations.
- To understand the concepts of partial derivatives and know the procedure to find the maxima and/or minima for a given surface.
- To familiarize with linear and non-linear partial differential equations.
- To know the concepts of multiple integrals.

Course Outcomes

Upon successful completion of the course, the students will be able to

- solve exact and non- exact differential equations and to use them in various practical situations.
- apply 1st & 2nd order differential equations to solve various engineering problems.
- evaluate maxima and/or minima for a given surface.
- solve first order linear & non-linear partial differential equations.
- evaluate areas, volumes using double and triple integrals.

Course Content

UNIT – I: 1st Order Linear ODEs

Exact and non-exact differential equations, Applications – Law of natural growth and decay, Newton's Law of cooling.

UNIT – II: Higher Order Linear ODE

Solving Homogeneous differential equations, and Non-Homogeneous differential equations when RHS terms are of the form $e^{ax} \sin ax$, $\cos ax$, polynomial in x, $e^{ax}v(x)$, $xv(x)$. Method of variation of parameters. Overview of Cauchy's and Legendre equations.

UNIT – III: Partial Differentiation

Total derivative, chain rule, Jacobians, Application- finding maxima and minima of a function of two or three variables.

UNIT – IV: First order PDE

Overview of formation of PDEs by eleminatingaribitrary constants and functions. Solutions of first order linear PDE – Linear (Lagrange's Equation) and Non-Linear PDE by Charpit's method.

UNIT – V: Multiple Integrals

Areas, volumes using double integrals and triple integrals (Polar and Cartesian Coordinates), Changeof Order of integration..

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 8th edition, MaitreyPrintech Pvt. Ltd, Noida, 2009.
2. B.S. Grewal, Higher Engineering Mathematics, 42 nd edition, Khanna Publishers, New Delhi, 2012.

Reference Books

1. Schaum's Series, Differential Equations, Tata-McGraw Hill Company Limited.
2. Bali &Iyengar,Text Book of Engineering Mathemtics, Laxmi Publications (P) Ltd.

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PROGRAMMING FOR PROBLEM SOLVING
(Common to CSE, AI&DS & IT)
I Year – I Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives
- To emphasize the use of algorithm and flowchart in problem solving.
- To apply C language in problem solving.

Course Outcomes
Upon successful completion of the course, the students will be able to
- outline problem solving steps and solve sample problems
- use control statements for writing the programs.
- apply the concepts of arrays and strings in problem solving.
- decompose a problem into functions to develop modular reusable code.
- utilize user- defined data types and text I/O operations for efficient handling of data.

Course Content

UNIT – I: Problem Solving Steps and Basics of C
Problem Solving Steps: Understanding problem, developing algorithm, flowchart, coding, debugging and testing.

General form of a C program, Identifiers, Data Types, Variables, Constants, Operators, I/O statements, Expressions, Precedence and Associativity, Type Conversion.

Problem Solving: Sample problems such as evaluating formulae.

UNIT – II: Control Statements
Selection: Making Decisions – Single-way, Two-Way Selection, Multi-way Selection, Dangling else Problem.

Repetition: Concept of loop, Loops in C: while, do-while and for.

Jump Statements: Return, goto, break, exit and continue.

Problem Solving: Factorial computation, generation of Fibonacci sequence, reversing digits of an integer, generating prime numbers.

UNIT – III: Arrays and Strings
Arrays: Arrays Concepts, Using Arrays in C, Array Applications, Two-Dimensional Arrays and Multidimensional arrays.

Strings: Strings Concepts, C Strings, String Input / Output Functions, Arrays of Strings, String Handling Functions.

Problem Solving: Computing mean and variance of a set of numbers, reverse the elements in an array, addition and multiplication of two matrices, insert substring into main-string, reverse of given string without using string handling functions.

UNIT – IV: Pointers and Functions

Pointers: Declarations, initialization, Pointer Arithmetic, Memory allocation Functions, Arrays and Pointers, Lvalue and Rvalue.

Functions: Designing Structured Programs, User-Defined Functions, Standard Functions, Parameter Passing Techniques, Passing Array to Functions, Passing Pointers to Function, Recursion, storage classes.

Problem Solving: Using functions print the sum of all elements of the array using pointers, convert decimal number to binary number using function, calculate the GCD of two non-negative integers using recursion.

UNIT – V: User Defined Data Types and File Handling

User Defined Data Types: The Type Definition (typedef), Enumerated Types, Structure: Declaration, Initialization, accessing structures, Operations on Structures, Nested Structures, Structure Containing Arrays, Pointers and Structures, Arrays of Structures, Unions.

File Handling: Files, Streams, Standard Library Input / Output Functions, Formatting Input/ Output Functions, Character Input / Output Functions and random access to files.

Problem Solving: To implement a structure to read and display the name, salary and address of an Employee (Use nested structure for address),Copy the contents of one file to another, count the number of characters, words and lines in a file.

Text Books

1. Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, Cengage, 2020.
2. Programming in C, 2nd Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education.

Reference Books

1. Programming in C, Reema Thareja, OXFORD.
2. C Programming, E Balaguruswamy, 3rd edition, TMH
3. How to Solve it by Computer, R G Dromey, Prentice-Hall of India, 1999.

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UNIVERSAL HUMAN VALUES 2: UNDERSTANDING HARMONY
(Common to EEE, ECE, CSE & AI&DS)
I Year – I Semester

Lecture : 2	Tutorial : 1	Internal Marks	: 30
Credits : 3		External Marks	: 70

Course Objectives

- To help students understand the need, basic guidelines, content and process of value education.
- To help students initiate a process of dialog with in themselves to know what they really want to be in their life and profession.
- To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
- To understand the harmony in nature and existence.
- To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

Course Outcomes

Upon successful completion of the course, the students will be able to

- be aware of themselves and surroundings
- be responsible in life
- develop personality to be happy continuously and prosper
- handle the problems with sustainable solutions.
- possess human nature in mind
- apply what they have learnt to their own self in real life situations

Course Content

UNIT – I : Value Education

Significance of Universal human values, Value Education – Importance, content, Process. Self-exploration, Basic human aspirations, Right understanding, Natural acceptance.

Suggested topics for Tutorial/Practice sessions:

Learning HVLS from the Inspiring Life Sketches of great personalities:

Isaac Newton, Michael Faraday, JJ Thomson, Einstein, Madam Curie, Mahatma Gandhi, Abraham Lincoln, JF Kennedy, Martin Luther King, BR Ambedkar, Charles Darwin, Karl Marx, Helen Keller, Sam Pitroda, Mark Zuckerberg, SudhaMurty, Leonardo Davincy, Michelangelo, The eternal 3: Socrates, Plato, Aristotle, Alexander, Swami Vivekananda, Abdul Kalam, AB Vajapayee, Sergei Bubka.

UNIT – II: Harmony In Myself

Co-existence of the self and the Body, Understanding the needs of Self (I') and Body'-Sukh and Suvidha, Body as an instrument of 'I', Harmony in 'I' - Sanyam and Svasthya, correct appraisal of our Physical needs.

Suggested topics for Tutorial/Practice sessions:

Leadership through Literature: ValmikiRamayan, Vyasa MahaBharath- Bhagavad Gita, Answers of Yudhistir to Questions by Yaksha, Kaalidas- Raghu Vamsam, Abhignyana Saakuntalam and Maalavika Agnimitram, Homer- Iliad and Odyssey, Professionalism- Learning from the Jews, Buddha, The Bible- Jesus Christ, Solomon's wisdom, The Koran- Prophet Mohammad, Guru Nanak, John Milton, Shakespeare, Sigmond Freud, Robin Sharma, Ravindranath Tagore, Sadguru Jaggi Vasudev, War and Peace by Leo Tolstoy, Unto the Last by Ruskin, Social Contracts by Rousseu, If by Rudyard Kipling, The 7 Habits of highly effective people by Stephen R Covey. Art of Rhetoric by Aristotle.

UNIT – III: Harmony in the Family and Society

Family as the basic unit of human interaction, Harmony in the family, Justice, Trust, Respect, Intention vs competence, Respect is Differentiation.Extending relationship from family to society.Comprehensive human goal – identification, programs for achievement of the goal.Dimensions of Human endeavour, Harmony from family order to world family order.

Suggested topics for Tutorial/Practice sessions:

Ideal Home: Characteristics of Happy families, Personal hygiene and habits, Harmony, Health and happiness, Advantages of combined families.Vasudhaika Kutumbam- Universalism.Vilasa Vidya- Importance of hobbies, Music therapy. Influence of friends and peer groups- ideal friend, Friendship and faith, Avoiding vices, Advance Crime detection technologies, Law and legislation pertaining to students.

UNIT – IV: Harmony in the Nature and Existence

Harmony in the nature – orders in nature, existence as co-existence, co-existence of units in space, holistic perception of harmony at all levels of existence.

Suggested topics for Tutorial/Practice sessions:

Leadership through languages: Atleast 5 poems / rhymes and 10 Sentences of each among atleast 10 of the following languages: Sanskrit, Telugu, Tamil, Malayalam, Kannada, Oriya, Bengali, Hindi, Urdu, Punjabi, Maratthi, Gujarati, Latin, Greek, Chinese, Japanese, Italian, Spanish, French and German. Bionics: Technology from animals. Interpretation of Paintings.

UNIT – V: Implications of the Right Understanding

Values in different dimensions of Human living,definitiveness of ethical human conduct,development of Human consciousness ,implications of value based living. Identification of comprehensive Human goal, Humanistic Education,

humanistic constitution,humanistic universal order and its implications. Competence in professional Ethics, Holistic technologies and systems.

Suggested topics for Tutorial/Practice sessions:

Personality Traits: Ich Bin- Who am I? Know thyself. Self esteem, Sanyam: Self learning, self motivation, self control and self discipline, Thinking aloud, Team work, Discipline, Courage, Creativity, Sense of humour, Equanimity- love for animals and nature, Gratitude, Time and money management, Leadership skills, Importance of sports and games, Importance of Swimming, Writing and Public speaking skills, Quotable quotations: Those who quote only are quoted. Mpemba Effect – The Rags to riches concept. Commonalities of great personalities. Estimation of value of a person and his habits. SWOT Analysis.

Text Books

1. R.R Gaur, R.Sangal and G.P.Bagaria; "A Foundation Course in Human Values and Professional Ethics", 2011, Excel Books, New Delhi.

Reference Books

1. A N Tripathy, 2003, Human Values, New Age International Publishers.
2. KVSG Murali Krishna, Mastering LIFE SKILLS ,Environmental Protection Society, Kakinada, 2015.
3. M Govindrajran, S Natrajan& V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Note: Tutorial/Practice sessions may be conducted with reference to Many Historical aspects, having relevance to the topic of discussion. Few of such topics are suggested.

Methodology Suggested for Instruction:

- Teacher is a mentor or guide or Supervisor
- Student –Teacher interactive sessions in the class.
- Student must be made to think and express his views boldly.
- Every student has to present individual PPT about the content of the subject
- Assignments need to be submitted by students and evaluated by teacher into dedication specifying critical review.

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FUNCTIONAL ENGLISH LAB
(Common to All Branches)
I Year – I Semester

Practical	: 2	Internal Marks	: 30
Credits	: 1	External Marks	: 70

Course Objectives

- Functional English (Lab) seeks to develop in the students the communication strategies and social graces necessary in order to function effectively in social and other situations in which they may be called upon to speak in English; and
- It seeks to develop in them a greater awareness of English pronunciation and provides for focused practice with the sounds of English and intonation patterns improve their pronunciation skills and to enable them to speak with a reasonable degree of intelligibility.

Course Outcomes

Upon successful completion of Functional English (Lab), the students will be able to

- give short impromptu speeches with confidence and fluency.
- take part in conversations in different functional contexts using English following appropriate communication strategies.
- use conventions of politeness and courtesy in speech and enhance the effectiveness of their communication in English.
- articulate the sounds of English (vowels, consonants, and diphthongs) with accuracy.
- check the pronunciation of words in a dictionary using their knowledge of phonemic symbols.
- pause at appropriate places in their speech in English, enhancing thereby the comprehensibility of their communication.
- speak English with adequate attention to stress, rhythm, and intonation.
- speak without their pronunciation being marred by regional peculiarities, achieving thereby greater intelligibility in their communication with non-Telugu speakers of English.
- read out texts of different kinds fluently with appropriate pauses, stress, and intonation.

Course Content

UNIT – I: a.Greeting, introducing and taking leave   b. Pure vowels

UNIT – II: a.Giving information and asking for information b. Diphthongs

UNIT – III: a. Inviting, accepting and declining invitations b. Consonants

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UNIT – IV: a. Commands, instructions and requests   b. Accent and rhythm

UNIT – V: a. Suggestions and opinions   b. Intonation

Text Books

1. Hari Prasad, et al., *Strengthen Your Communication Skills*, First Edn., Maruthi Publications, Hyderabad, 2014.

2. Handouts produced by the Department on "difficult sounds," consonant clusters, the other problems of Telugu learners of English, listening comprehension, and oral reading.

3. The following pieces of software:
   - 'Multimedia Language Lab' provided by K-Van Solution, Hyderabad
   - 'Foundation Course in Communication Skills' provided by the Andhra Pradesh State Council of Higher Education (APSCHE), Government of Andhra Pradesh.

4. Audio and video clips such as 'BBC English'

Testing Pattern

I. Internal	**30 marks**
a. Regular performance in the Language/Communications Lab	15 marks
b. Completing the tasks in the lab manual	05 marks
c. Testing of listening : Listening to a short audio clip of a speech/conversation in British accent and answering questions at the 'information' level.	05 marks
d. Test of reading: Role-playing a dialogue with proper pronunciation and with reasonable attention to tone groups, stress, rhythm and intonation.	05 marks
II. External	**70 marks**
a. Test of writing	
Writing a dialogue on the situation set	10 marks
Answering 'Yes/No' questions on pronunciation	05 marks
Marking sentence stress and intonation	05 marks
Writing English word for the word in phonetic transcription	05 marks
b. Test of speaking	25 marks
Role-playing a situational dialogue (e.g. 'At the railway station,' 'At the restaurant') with proper pronunciation and with reasonable attention to tone groups, stress, rhythm, and intonation	
c. Viva voce (with an external examiner)	20 marks
Speaking for one minute on a given topic	

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STATISTICS USING R LAB

I Year – I Semester

Practical	: 2	Internal Marks	: 30
Credits	: 1	External Marks	: 70

Course Objectives

- To understanding of descriptive statistics by practical application of quantitative reasoning and data visualization
- To familiarize with problem solving using R.

Course Outcomes

Upon successful completion of the course, the students will be able to

- Represent the data in graphical form to and make sense of it
- Compute measures of central tendency
- Compute measures of dispersion
- Implement characteristics of a distribution
- Implement regression analysis

List of Experiments

Write R Programming for the following

1. Graphical representation of data.
2. Problems based on measures of central tendency.
3. Problems based on measures of dispersion.
4. Problems based on combined mean and variance and coefficient of variation.
5. Problems based on moments, skewness and kurtosis.
6. Fitting of polynomials, exponential curves.
7. Karl Pearson's correlation coefficient.
8. Correlation coefficient for a bivariate frequency distribution.
9. Lines of regression, angle between two lines of regression and estimated values of variables.
10. Spearman rank correlation with and without ties.
11. Partial and multiple correlations.
12. Planes of regression and variances of residuals for given simple correlations.

Reference Books

1. R for everyone: Advanced Analytics and Graphics(Addison-Wesley Data & Analytics Series) 2nd Edition

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2.   BeginningR the Statistical Programming Language, Dr. Mark Gardener.

3.   Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.

4.   Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd.

5.   Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New D

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C PROGRAMMING LAB
(Common to CSE, AI&DS & IT)
I Year – I Semester

Practical	: 4	Internal Marks	: 30
Credits	: 2	External Marks	: 70

Course Objectives

- To design algorithms and flowcharts for problem solving.
- To develop C programs using arrays, strings, pointers and functions.

Course Outcomes

Upon successful completion of the course, the students will be able to

- apply problem solving steps to solve a problem.
- develop C programs using selection and iterative statements.
- decompose a problem into functions to develop modular reusable code.
- apply structures and unions to solve a problem.
- implement file operations on a given file.

List of Exercises

Exercise 1: Basics of C

a) Write a C program to compute the perimeter and area of a rectangle with a length of 7cms and breadth of 5 cms.

b) The area of a triangle is given by Area = $\sqrt{p(p-a)(p-b)(p-c)}$, where p is half of the perimeter, i.e., (a + b + c) / 2. Let a, b, c be the lengths of the sides of the given triangle. Write a C program to calculate the area of triangle using this Heron's Formula.

Exercise 2: Selection Statements

a) A triangle is a polygon with three edges and three vertices. It is one of the basic shapes in geometry. A triangle with vertices A, B, and C is denoted $\triangle ABC$. Triangles can be classified according to the lengths of their sides, an equilateral triangle has all sides the same length, an isosceles triangle has two sides of equal length and a scalene triangle has all its sides of different lengths. Write a Menu-Driven Program to display various geometrical shapes of a triangle.

b) Write a C program to find maximum and minimum of three numbers using ternary operator.

c) Read two integer operands and one operator form the user, perform the operation and then print the result. (Consider the operators +, -, *, /, % and use Switch Statement).

Exercise 3: Iterative Statements-I

Develop a C program for the following:
  a) Reversing digits of an integer.
  b) An Armstrong number is a number that is sum of its own digits each raised to the power of number of digits. Write a C program to check whether the given number is Armstrong number or not.
     for example:
     $9 = 9^1 = 9$
     $371 = 3^3 + 7^3 + 1^3 = 27 + 343 + 1 = 371$
     $8208 = 8^4 + 2^4 + 0^4 + 8^4 = 4096 + 16 + 0 + 4096 = 8028$

Exercise 4: Iterative Statements-II

Develop a C program for the following:
  a) Display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 + ... + 1/n$ terms.
  b) To print following Inverted half pyramid using numbers.
     1 2 3 4 5

     1 2 3 4

     1 2 3

     1 2

     1
  c) To print the Pascal triangle based on given number of rows.

Exercise 5: Arrays

Design a C program for the following:
  a) To print all unique elements in an array.
  b) Computing mean and variance of a set of numbers.
  c) To perform matrix multiplication using two dimensional arrays.

Exercise 6: Strings

Develop a C program for the following:
  a) To check whether the given string is a palindrome (Without using String Handling functions).
  b) To insert sub-string into main string.

Exercise 7: Functions

Implement a C program for the following:
  a) To convert decimal number to binary number.
  b) To get the nth largest element of an array.
  c) GCD of two non-negative integers using recursion.

Exercise 8: Pointers

Implement a C program for the following:
   a) To print the sum of all elements of the array.
   b) To count the number of vowels and consonants in a string.
   c) To find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc() function.

Exercise 9: Structures-I

Develop a C program for the following:
   a) To implement a structure to read and display the name, salary and address of an Employee (Use nested structure for address).
   b) To display the Name, Marks in five subjects and total marks of given number of students. (Using array of structures).

Exercise 10: Structures-II

Develop a C program that uses functions to perform the following operations using Structure:
   a) Addition of two complex numbers
   b) Subtraction of two complex numbers
   c) Multiplication of two complex numbers.
   d) Division of two complex numbers.

Exercise 11: Files

Implement a C program for the following:
   a. To copy contents of one file to another.
   b. To count the number of characters, words and lines in agiven text file.

References

   1. Programming for Problem Solving, Behrouz A. Forouzan, Richard F.Gilberg, Cengage, 2020.
   2. Programming in C, 2nd Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education.
   3. C Programming, E Balaguruswamy, 3rd edition, TMH
   4. R G Dromey, How to Solve it by Computer, Prentice-Hall of India, 1999.

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CONSTITUTION OF INDIA
(Common to EEE, ECE, CSE & AI&DS)
I Year – I Semester

Lecture	: 2	Internal Marks	: 30
Credits	: -	External Marks	: 70

Course Objectives
- To impart knowledge on basic engineering applications.
- To enable the student to understand the importance of constitution.
- To understand the structure of Executive, Legislature and Judiciary.
- To understand Philosophy of fundamental rights and duties.
- To understand the autonomous nature of constitution bodies like Supreme Court and High Court Controller and Auditor General of India and Election Commission of India.
- To understand the Central and State relation, financial and administrative.

Course Outcomes
Upon successful completion of the course, the students will be able to
- understand history and philosophy of constitution with reference to Preamble, Fundamental Rights and Duties
- understand the concept of Unitary and Federal Government along with the role of President, Prime Minister and Judicial System.
- structure of the state government, Secretariat, Governor and Chief Minister and their functions.
- learn local administration viz. Panchayat, Block, Municipality and Corporation.
- learn about Election Commission and the process and about SC, ST, OBC and women.

Course Content
UNIT – I:
Introduction to Indian Constitution: 'Constitution' meaning of the term, Indian Constitution – Sources and Constitutional History, Features – Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.
UNIT – II:
Union Government and its Administration Structure of the Indian Union: Federalism Centre – State relationship, President: Role, Power and Position. Prime Minister (PM) and Council of Ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha. The Supreme Court and High Court: Powers and Functions.
UNIT – III:
State Government and its Administration Governor – Role and Position – Chief Minister (CM) and Council of Ministers. State Secretariat: Organisation, Structure and Functions.

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UNIT – IV:

A Local Administration – District's Administration Head – Role and Importance, Municipalities – Mayor and Role of Elected Representative – Chief Executive Officer (CEO) of Municipal Corporation Panchayati Raj : Functions Panchayati Raj Institution (PRI), Zilla Panchayat, Elected Officials and their roles, CEO Zilla Panchayat: Block level orgnisational Hierarchy – (Different Departments), Village level – Role of Elected and Appointed officials – Importance of grass root democracy.

UNIT – V:

Election Commission: Election Commission – Role of Chief Election Commissioner and Election Commissionerate State Election Commission: Functions and Commissions for the welfare of SC/ST/OBC and Women.

Reference Books

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt.Ltd., New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government and Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai. Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication).
6. J.C. Johari, Indian Government and Politics Hans.
7. J.Raj, Indian Government and Politics.
8. M.V. Pylee, Indian Constitution, Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd., New Delhi.
9. Noorani, A.G. (South Asia Human Rights Documentation Centre), Challenges to Civil Right). Challenges to Civil Rights Guarantees in India, Oxford University Press 2012.

E-Resources:

1. nptel.ac.in/courses/109104074/8.
2. nptel.ac.in/courses/109104045.
3. nptel.ac.in/courses/101104065.
4. www.hss.iitb.ac.in/en/lecture-details.
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution.

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PROFESSIONAL COMMUNICATION
(Common to All Branches)
I Year – II Semester

Lecture	: 2	Internal Marks	: 30
Credits	: 2	External Marks	: 70

Course Objectives

- To equip the students with common employability skills (the skills required for gaining employment and performing successfully in different careers) which can enable them to perform communication tasks of increasing length and complexity.
- To develop in them the interactional communication strategies and social graces which have the potential to add to the effectiveness of professional communication.

Course Outcomes

Upon successful completion of Professional Communication, the students will be able to

- speak with a reasonable degree of fluency and accuracy in professional communication situations (such as arriving at a consensus through discussion, making a presentation, and taking part in a telephone conversation)
- add to the effectiveness of their oral communication by using communication strategies, conventions of politeness and courtesy, and stress and intonation.
- listen to short audio and video clips in native English accent (British and American), and gain both understanding of messages and sensitivity to native-speaker accents
- read fluently, comprehending texts of different kinds using multiple strategies and higher-order skills
- produce written discourses of different kinds (e.g. texts expressing opinions and making a convincing case for one's standpoint, professional emails, and summaries of lengthy texts) with attention to elements of writing such as content, organization, language, style, and mechanics
- guard against grammatical errors Indians typically make in their speech and writing in English

Course Content

UNIT – I:

Listening : Listening comprehension – Task 1 (IWE – Chapt VII)
Speaking : Communication Strategies: Conversation Amith& Mahesh (IWE – Chap VII)
Reading : Reading Comprehension – Task 1 (IWE – Chapt VII)
Vocabulary: (a) GRE words – 1.3, (b) Collocations – 2.3 (VB)
Grammar : *If* Clause (IWE – Chapt VII)
Writing : Email writing (IWE – Chapt VII)

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UNIT – II:
Listening : Listening comprehension – Task 2 (WR)
Speaking : Exercise on Communication Strategies (IWE – Chapt VII)
Reading : Reading Comprehension – Task 2 (DPM)
Vocabulary: Words often confused – 3.3, One-word substitutes – 4.3 (VB)
Grammar : Modal verbs (IWE – Chap VII)
Writing : Email writing and Argumentative Essay (IWE – Chapt VII)

UNIT – III:
Listening : Listening comprehension – Task 3 (WR)
Speaking : Communication Strategies – Exercise (DPM)
Intensive Reading : Reading Comprehension – Task 3 (DPM)
Extensive Reading: *Pride and Prejudice* by Jane Austen
Vocabulary: (a) Idioms – 5.3, (b) Phrasal verbs – 6.3 (VB)
Grammar : Indianism (IWE – Chapt VII)
Writing : Argumentative Essay (DPM)

UNIT – IV:
Listening : Listening comprehension – Task 4 (IWE – Chapt VIII)
Speaking : Communication Strategies and Presentation: Conversation between Suchitra, Lakshmi, Guhan and Karan ((IWE – Chapt VIII)
Reading : Reading Comprehension – Task 4 (DPM)
Vocabulary: (a) GRE Words – 1.4, (b) Collocations – 2.4, (c) Words Often Confused – 3.4 (VB)
Grammar : Indefinite Articles (IWE – Chapt VIII)
Writing : Presentation – Analysis (DPM)

UNIT – V:
Listening : Listening comprehension – Task 5 (WR)
Speaking : Communication Strategies – Exercise (IWE – Chapt VIII)
Intensive Reading : Reading Comprehension Task – 5 (DPM)
Extensive Reading : *Gulliver's Travels* by Jonathan Swift
Vocabulary: (a) One-Word Substitutes – 4.4, (b) Idioms – 5.4, (c) Phrasal-verbs – 6.4 (VB)
Grammar : Definite Articles (IWE – Chapt VIII)
Writing : Presentation – Rewriting

- IWE – *Innovate with English* by T Samson (Foundation)
- Chapt - Chapter
- DPM – Department-produced materials (handouts)
- WR – Web-resources
- VB– *Vocabulary Builder for Students of Engineering and Technology* by Vijaya Lakshmi et al (Maruthi)

Textbooks

1. T. Samson, *Innovate with English*, First Edn., Cambridge University Press India Pvt. Ltd. under the imprint of Foundation Books, Hyderabad, 2010.
   - Unit SEVEN and EIGHT only
2. M. Vijaya Lakshmi, et al., *Vocabulary Builder for Students of Engineering and Technology, Second Edn.,* Maruthi Publications, Hyderabad, 2017.
3. The following simplified classics, one for each mid-semester, from the series, *Great Stories in Easy English*, published by S. Chand & Company Limited:
   - *Pride and Prejudice* by Jane Austen
   - *Gulliver's Travels* by Jonathan Swift
4. Audio and video clips carefully selected by the Department in order to sensitize the students to native-speaker accents.
5. Department-produced materials on reading comprehension.

Testing Pattern

First Mid-Term Examination

The paper consists of four questions. All questions are compulsory; there is no choice.

I. Reading an unseen passage and answering two sets of questions on it:

a) Eight comprehension questions. Critical questions requiring analysis, inference, prediction, evaluation, interpretation of the writer's ideas, etc. are to be set. Four of the Eight questions will be multiple-choice questions. In case of non-multiple-choice questions, the length of each answer should not exceed 50 words. **Marks: 8 x ½ = 4**

b) Writing an essay expressing a point of view on one or more of the issues flagged up in the question and making a convincing case for the standpoint. Length: 100 – 150 words. **Marks: 1 x 4 = 4**

II. Reading a poorly-written e-mail message and doing the following tasks:

a) Analyzing the reasons for the e-mail failing to meet the standards of professional e-mail communication. The analysis must identify and discuss at least five reasons. (Length: 100 – 150 words) **Marks: 1 x 3 = 3**

b) Rewriting the e-mail using the standards of professional e-mail communication. **Marks: 1 x 3 = 3**

III.

a) Eight contextualized questions on the following from *Vocabulary Builder*: GRE Words: 1.3; Collocations: 2.3; Commonly confused words: 3.3; One- word substitutes: 4.3; Idioms: 5.3; and Phrasal verbs: 6.3 **Marks: 8 x ½ = 4**

b) Correction of grammatical errors: Eight sentences with grammatical errors of the following types (dealt with in Unit 7 of *Innovate with English*) will be given: *if*-clause and Indianism **Marks: 8 x ½ = 4**

IV.

a) Completing a conversation (where informational and interactional functions are performed) with suitable expressions. **Marks: 8 x ½ = 4**

b) Answering eight 'true-or-false' questions on communication strategies and functions given in form of short dialogues. **Marks: 8 x ½ = 4**

Second Mid-Term Examination

The paper consists of four questions. All questions are compulsory; there is no choice.

I. Reading a poorly-written e-mail message and doing the following

a) Analyzing the reasons for the e-mail failing to meet the standards of professional e-mail communication. The analysis must identify and discuss at least five reasons. (Length: 100 – 150 words) **Marks: 1 x 4 = 4**

b) Rewriting the e-mail using the standards of professional e-mail communication **Marks: 1 x 4 = 4**

II. Reading an unseen passage and answering two sets of questions on it.

a) Eight comprehension questions. Critical questions requiring analysis, inference, prediction, evaluation, interpretation of the writer's ideas, etc. are to be set. Four of the Eight questions will be multiple-choice questions. In case of non-multiple-choice questions, the length of each answer should not exceed 50 words. **Marks 8 x ½ = 4**

b) Writing an essay expressing a point of view on one or more of the issues flagged up in the question and making a convincing case for the standpoint. Length: 100 – 150 words. **Marks: 1 x 4 = 4**

III.

a) Eight contextualized questions on the following from *Vocabulary Builder*: GRE Words: 1.4; Collocations: 2.4; Commonly confused words: 3.4; One- word substitutes: 4.4; Idioms: 5.4; and Phrasal verbs: 6.4 **Marks: 8 x ½ = 4**

b) Correction of grammatical errors: Eight sentences with grammatical errors of the following types (dealt with in Unit 8 of *Innovate with English*) will be given: articles and Indianism. **Marks: 8 x ½ = 4**

IV. Reading an expository text and doing two tasks:

a) Making notes (identifying the main points of the text and writing them down in note form) **Marks: 1 x 3 = 3**

b) Summarizing the text using the notes already made **Marks: 1 x 3 = 3**

Semester End Examination

Answer any five questions: **Question I is compulsory.**

I. Reading a poorly-writen e-mail message and doing the following task: (Compulsory)

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a. Analyzing the reasons for the email failing to meet the standards of professional email communication. The analysis must identify and discuss at least seven reasons. (Length: 100-150 words) **Marks: 1 x 7 = 7**

b. rewriting the email using the standards of professional email communication.
Marks: 1 x 7 = 7

II. Reading the text of a presentation made in a professional context and answering the following questions:

a. Analysing the passage from the point of view of language and style and identifying the reasons for the presentation falling short of the standards of professional presentations (Length of the answer: 100 – 150 words) **Marks: 1 x 7 = 7**

b. Rewriting the text of the presentation in the light of the analysis made in (a) above and following the conventions of professional presentations as far as language and style are concerned. **Marks: 1 x 7 = 7**

III. Reading an unseen (unfamiliar) passage on an issue related to engineering and technology or on a professional issue or situation and answering two sets of questions on it:

a. Seven comprehension questions: **Marks: 7 x 1 = 7**

- Critical questions requiring analysis, inference, prediction, evaluation, interpretation of the writer's ideas, pinpointing the writer's attitude/bias, etc. are to be set; 'information' questions involving a *mere* reproduction of the content should be avoided.
- At least three of the seven questions should be multiple-choice questions.
- In case of non-multiple-choice questions, the length of each answer should not exceed 50 words.

b. Writing an essay expressing a point of view on one or more of the issues flagged up in the question and making a convincing case for the standpoint. Length: 200 – 250 words. **Marks: 1 x 7 = 7**

IV. Filling in blanks in sentences using GRE words, collocations, one-word substitutes, commonly-confused words, idioms, and phrasal verbs. The contexts will be clearly given for each expression, and the questions will be multiple-choice ones. **Marks: 14 x 1 = 14**

- GRE Words (Units 1.3 and 1.4)
- Collocations (Units 2.3 and 2.4)
- Commonly Confused Words (Units 3.3 and 3.4)
- One-Word Substitutes (Units 4.3 and 4.4)
- Idioms (5.3 and 5.4)
- Phrasal Verbs (Units 6.3 and 6.4)

V. Reading a on a professional or semi-professional issue and answering two questions on it:
   a. Matching suitable expressions selected from the dialogue with the given communication strategies. **Marks: 7 x 1 = 7**
   b. Extending the scope of the dialogue using at least five of the given communication strategies/functions. **Marks: 1 x 7 = 7**

VI. Correction of grammatical errors:
   - Either a conversation with twelve grammatical errors (in the areas of articles, modal verbs, prepositions, phrasal verbs, and Indianism), or isolated sentences with twelve grammatical errors will be given.
   - If isolated sentences with errors are given, they are not to be given in isolation from their contexts; a conversation with errors of the kind specified above will serve the purpose better.

   The examinees are expected to rewrite the sentences in the answer book, correcting hem. **Marks: 14 x 1 = 14**

VII. Reading an expository text and doing two tasks:
   a. Making notes (identifying the main points of the text and writing them down in note form) **Marks: 6 x 1 = 6**
   b. Summarizing the text using the notes already made. **Marks: 1 x 8 = 8**

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INTEGRAL TRANSFORMS AND VECTOR CALCULUS
(Common to All Branches)
I Year – II Semester

Lecture : 3	Tutorial : 1	Internal Marks : 30
Credits : 4		External Marks : 70

Course Objectives

- To gain the knowledge of Laplace and inverse transforms.
- To understand the concepts of Fourier series and Fourier Transforms.
- To know about vector differentiation and integration.

Course Outcomes

Upon successful completion of the course, the students will be able to

- evaluate improper integrals using Laplace transforms.
- apply Laplace transforms to find the solutions of initial and boundary value problems.
- find the Fourier series representation of a function in one variable and apply Fourier transform in various engineering problems.
- apply the concepts of vector differentiation in their engineering fields.
- verify the relation between line, surface and volume integrals using integral theorems.

Course Content

UNIT – I: Laplace Transforms

Laplace transforms of standard functions – Shifting Theorems - Multiplication and division by t, transforms of derivatives and Evaluation of Improper Integrals - Unit step function – Dirac Delta function.

UNIT – II: Inverse Laplace Transforms

Inverse Laplace transforms – by partial fractions –Convolution theorem (without proof).

Application: Solution of Initial value problems and Boundary value problems.

UNIT – III: Fourier Series and Fourier Transforms

Fourier Series: Fourier series in an arbitrary interval, Half-range sine and cosine series.

Fourier integral theorem (only statement). Fourier transforms and inverse Fourier transforms, Fourier sine and cosine transforms and inverses. Properties of Fourier transforms.

UNIT – IV: Vector Differentiation

Gradient – unit normal – angle between surfaces – directional derivative . Divergence – solenoidal vector. Curl – irrotational vector – scalar potential. Laplacian operator.

UNIT – V: Vector Integral theorems

Greens theorem , Stokes theorem and Gauss Divergence Theorem - related problems. Applications: Work done, flux across the surface.

Text Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th edition, Maitrey Printech Pvt. Ltd, Noida, 2014.

2. B.S. Grewal, Higher Engineering Mathematics, 44th edition, Khanna Publishers, New Delhi, 2020.

Reference Books

1. Schaum's Series, Differential Equtions, Tata-Mc Graw Hill Company Limited.

2. Bali & Iyengar,Text Book of Engineering Mathemtics, Laxmi Publications (P) Ltd.

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LINEAR ALGEBRA

I Year – II Semester

Lecture : 2	Tutorial	: 1	Internal Marks	: 30
Credits : 3			External Marks	: 70

Course Objectives

- To discuss the consistencyof the system of equations and to find the solution.
- To know the procedure of finding the coordinates of a vector for a given basis.
- To understand the kernel and image of a Linear Transformation.
- To know about the orthogonal projection and orthonormal basis.
- To understand the procedure of diagonalization.

Course Outcomes

Upon successful completion of the course, the students will be able to

- identify whether the given system of equations are consistent or not. If so, ableto find the solution.
- describe the coordinates of a vector for a given basis.
- find the kernel and image of a Linear Transformation.
- compute the orthogonal projection and find the orthonormal basis by Gram–Schmidt orthogonalization process.
- perform the diagonalization of matrices.

Course Content

UNIT – I: System of Linear Equations

Matrices and elementrary row operations, Rank, Echelon form, Normal form, System of linear equations – Homogeneous, Non -homogeneous equations, Consistency..

UNIT – II: Vector Spaces

Vector Spaces and Subspaces, Linear combination of vectors, Linear dependence, Basis and Dimension, Definition of a Line, Introduction to Affine Spaces, Quotient Space.

UNIT – III: Linear Transformations

Representation of Linear Maps by matrices, Kernel and Image of a Linear Transformation, Linear Isomorphism, and Geometric Ideas.

UNIT – IV: Inner Product Spaces

The Euclidean Plane and the Dot Product, General Inner Product Spaces, Orthogonality, Orthogonal Projection onto a line, Orthnormal Basis, Orthogonal Complements and Projections, Coordinates Associated with an Orthonormal Basis, Some Geometric Applications.

UNIT – V: Diagonalization (Theorems and Properties are Without Proofs)

Rotation of Axes of Conics, Eigenvalues and Eigenvectors, and its properties, Cayley-Hamilton Theorem, Diagonalization of Symmetric Matrices.

Text Books

1. S. Kumaresan, Linear Algebra-A Geometric Approach, PHI publication, Eastern Economy Edition.
2. V. Krishnamurthy, V.P Mainsa and I.L. Arora, An Inrodunction to Linear Algebra, Affiliated East-West press, Reprint 2005.

Reference Books

1. B. S. Grewal, Higher Engineering Mathematics, 42nd editionKanna publications.
2. Seymour Lipschutz, Linear Algebra, Schaum's solved problem series, Tata McGraw Hill Edition.
3. Gilbert Strang, Introduction to Linear Algebra, Wellesley-Cambridge Press(2016)

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PYTHON PROGRAMMING
(Common to CSE & AI&DS)

I Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To explore various problem solving approaches in python programming.
- To apply object-oriented programming concepts in problem solving.

Course Outcomes

Upon successful completion of the course, the students will be able to

- describe the basic elements of python programming for logic building.
- use functions and modules to develop python programs.
- differentiate mutable and immutable data types.
- develop code to handle exceptions and files.
- apply object-oriented concepts to develop programs.

Course Content

UNIT – I: Basics of Python Programming and Control Statements

Features and history of python, literal constants, data types, variables, operators, operator precedence, expressions, type conversion, command line arguments, input and output operation.

Conditional Statements: simple-if, if-else, nested-if and if-elif-else.

Iterative Statements: while, for and else with for and while, un-conditional branching: break, continue and pass statement.

UNIT – II: Functions and Modules

Functions: Function definition, call, return statement, local and global variables, Types of arguments, Types of Functions: Anonymous, Fruitful, Recursive function and Passing functions as arguments.

Modules: The from…import statement, making your own modules, dir() function, modules and namespaces, types of namespaces: global, local and built-in, packages and Modules, introduction to PIP, installing packages via PIP.

UNIT – III: Data Structures

Mutable and Immutable data structures, declaring and using numeric data types: int, float, complex. Strings, list, tuple, dictionary, set and string: usage, conversions, built-in methods and differences, list and dictionary comprehensions.

UNIT – IV: Exception and File Handling

Exception Handling-Difference between an error and exception, handling Exception, try except block, Raising Exceptions and User Defined Exceptions.

File Handling - Significance of files, types of files, file path, file modes, Understanding read functions: read(), readline() and readlines() Understanding write functions: write() and writelines(), manipulating file pointer using seek.

UNIT – V: Object Oriented Concepts

OOP principles, classes, objects, 'self' variable, methods, constructor method, inheritance, overriding methods, data hiding.

Text Books

1. "Python Programming – Using Problem Solving Approach ",Reema Thareja, Oxford University Press, 2014 Edition.
2. "Python Programming: A Modern Approach", Vamsi Kurama, Pearson.

Reference Books

1. "Core Python Programming" Wesley J. Chun, 2nd Edition, Prentice Hall.
2. "Python: The Complete Reference", Martin C. Brown, 2001 Edition, McGraw Hill.
3. 'Fundamentals of Python – First Programs", Kenneth A. Lambert, 2012 Edition, Cengage.
4. "Python Crash Course:AHands-on, Project-Based Introduction to Programming", Eric Matthes.

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DATA STRUCTURES
(Common to CSE, AI&DS & IT)

I Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives
- To impart the concepts of data structures.
- To solve computational problems with the help of data structures.

Course Outcomes

Upon successful completion of the course, the students will be able to
- implement and analyse searching and sorting techniques.
- implement algorithms for linked lists.
- apply algorithms of stacks and queues.
- develop data structures to make use of trees and heaps.
- develop algorithms for traversal of graphs and hashing for efficient storage of data.

Course Content

UNIT – I: Searching and Sorting

Introduction: Concept of data structures, overview of data structures.

Searching: Linear Search, Binary Search.

Sorting (Internal): Basic concepts, Sorting by: insertion (Insertion sort), selection (selection sort), exchange (Bubble sort).

UNIT – II: Linked lists

Linked Lists- Basic concepts, operations on Single linked list, Circular linked list and Double linked list.

UNIT – III: Stacks and Queues

Stack: Introduction, representation using Arrays and Linked List, operations on stack, Applications of Stacks- Expression Conversion and evaluation – corresponding algorithms.

Queue: Introduction, representation using Arrays and Linked List, operations on Queue, Circular Queue.

UNIT – IV: Trees

Binary Trees: Basic tree concepts, Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals, Creation of binary tree from in-order and pre (post) order traversals.

Binary Search Trees: Basic concepts, BST operations: Search, insertion, deletion and traversals.

Heap Trees: Basic Concepts, operations, Application-Heap sort.

UNIT – V: Graphs and Hashing

Graphs: Basic concepts, representations of graphs, graph traversals-Breadth First Search and Depth First Search techniques.

Hashing: Basic concepts, Hashing Functions (Division Method, Multiplication Method), Collision Resolution Techniques- Open Hashing and Closed Hashing.

Text Books

1. Horowitz, Sahani, Anderson Freed, "Fundamentals of Data Structure in C", 2nd edition, University Press.
2. Richard F, Gilberg, Forouzan, "Data Structures", 2nd edition, Cengage.

Reference Books

1. G. A. V. Pai, "Data Structures and Algorithms", TMH, 2008.
2. DebasisSamanta, "Classic Data Structures", 2nd edition, PHI, 2011.

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PROFESSIONAL COMMUNICATION LAB
(Common to All Branches)
I Year – II Semester

Practical	: 4	Internal Marks	: 30
Credits	: 2	External Marks	: 70

Course Objectives

- Professional Communication (Lab) is a career-oriented programme. It seeks to develop in the students the competence required to perform professional communication tasks of increasing length and complexity, which can help them secure employment and perform successfully in their careers.

Course Outcomes

Upon successful completion of Professional Communication Lab, the students will be able to

- enhance the effectiveness of their communication through body language;
- take part in interactional communication (i.e. communication that serves the purpose of social interaction or small talk) with fluency
- take part in transactional communication (i.e. communication that serves the purpose of carrying out functions such as giving directions, complaining, and apologizing) with fluency
- speak professionally in telephone conversations;
- make effective presentations using a range of strategies, including a good organization of the content, impressive opening and closing, the use of suitable visual aids, the use of stories/anecdotes to illustrate a point, effective use of body language, and good handling of the question-and-answer session;
- take part in group discussions and debates successfully;
- answer questions at an elementary level in job interviews (e.g. Can you tell us something about yourself? What kinds of things do you worry about? What are your key skills? What skills do you need to improve? What do you see as your strengths? What do you like doing in your spare time? How would you describe the way you work? Tell us about a time when you showed strong leadership skills. Tell us about a time when you had to make a difficult decision. How do you see yourself in five years' time?) ;and
- use team-building skills with impact in different situations.

Course Content

UNIT–VI	: Body Language
UNIT–VII	: Dialogues
UNIT–VIII	: Presentation Skills
UNIT–IX	: Group Discussion
UNIT–X	: Interviews and Telephonic Interviews
UNIT–XI	: Debates

Text Books
1. Hari Prasad, et al., *Strengthen Your Communication Skills*, First Edn., Maruthi Publications, Hyderabad, 2014.
2. The following pieces of software:
    *   'Multimedia Language Lab' provided by K-Van Solution, Hyderabad
    *   'Foundation Course in Communication Skills' provided by the Andhra Pradesh State Council of Higher Education (APSCHE), Government of AP.

Testing Pattern

1. Internal   30 marks
   a. Regular performance in the Communications Lab   15 marks
   b. Completing the tasks in the lab manual   05 marks
   c. Making a PowerPoint presentation (Pair/Group)   10 marks
      (Note: A hard copy of the presentation is to be submitted)

2. External   70 marks
   a. Test of writing
      A telephone conversation   10 marks
      The minimum number of exchanges to be specified
      *   Writing a resume   10 marks
      The length (1page / 2 pages) is to be specified. The features to be included in the resume are also to be specified; the examinees will, however, have the option of including more features within the length specified.
      *   Answering 3 job-interview questions   15 marks
      Questions at an elementary level. In other words, questions that require candidates to talk about themselves, their ambitions, , why they chose to study engineering, their strengths and weaknesses, their hobbies and interests, their personality, their perception of their leadership skills, and their key skills. Industry/job-related questions could be avoided.
      Sample questions:
      Can you tell us something about yourself?
      What kinds of things do you worry about?
      What are your key skills?
      What skills do you need to improve?
      What do you see as your strengths?
      What do you like doing in your spare time?
      How would you describe the way you work?
      Tell us about a time when you showed strong leadership skills.
      Tell us about a time when you had to make a difficult decision.
      How do you see yourself in five years' time?
   b. Test of speaking
      Group discussion   20 marks
      Time: 10-15 minutes (approx.) per group
   c. Viva voce with an external examiner   15 marks

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PYTHON PROGRAMMING LAB
(Common to CSE & AI&DS)
I Year – II Semester

Practical	: 4	Internal Marks	: 30
Credits	: 2	External Marks	: 70

Course Objectives
- To familiarize with the basic commands of the python.
- To develop python programs to solve problems.

Course Outcomes
Upon successful completion of the course, the students will be able to
- make use of control statements in decision making for various case studies.
- handle exceptional cases at run-time.
- use file handling operations for storing and retrieving of data.
- apply object-oriented concepts to develop reusable code.

List of Experiments

Exercise 1: Basics and operations
a) Write a python program to find sum of two numbers using command line arguments.
b) Write a Python program to compute distance between two points taking input from the user. Formula for Pythagorean theorem for compute distance between two points is: $\sqrt{((x2 - x1) ** 2) + ((y2 - y1) ** 2)}$.

Exercise 2: Selection statements
a) Write a python program to test whether a given number is even or odd using if-else statement.
b) To calculate grade of students in python, you have to ask from user to enter marks obtained in 5 subjects and calculate the sum of all the marks and then average marks to find the grade according to the average marks obtained by student as shown in the given below:

Percentage	Grade
≥ 90	O
≥ 80 & <90	A+
≥ 70 & <80	A
≥ 60 & <70	B+
≥ 50 & <60	B
≥ 40 & <50	C
<40	F

Exercise 3: Iterative Control Statements
a) Write a python program to print out the decimal equivalents of 1/2, 1/3, 1/4, . . . ,1/10   using for loop.
b) Write a python program to find the sum of all the primes below hundred.

Exercise 4: Functions
a) Write a python program to compute cumulative product of a list of numbers (write function cumulative_product).
b) Write a python program that uses function to find the sum of the even-valued terms in the Fibonacci sequence whose values do not exceed ten thousand.

Exercise 5: Packages and Modules
a) Create and access a user defined package ArithmeticPackage where the package contains a module named ArithmeticDemo, which inturn contains a method called sumtwo() , subtwo(), multwo() and divtwo() which takes two numbers as parameter and returns the result.
b) Write a python program to compute GCD, LCM of two numbers (Each function shouldn't exceed one line use predefined module).

Exercise 6: Strings
a) Write a python program to accept a string from a user and re-display the same after removing vowels from it.
b) Write a python program to calculate the length of a string using recursion and check whether the given number is palindrome or not.

Exercise 7: Data Structures-Tuple, List and Dictionary
a) Write a function ball_collide that takes two balls as parameters and computes if they are colliding. Your function should return a Boolean representing whether or not the balls are colliding. **Hint:** Represent a ball on a plane as a tuple of (x, y, r), r being the radius, if (distance between two balls centers) <= (sum of their radii) then (they are colliding)
b) Write a python program to find mean, median, mode for the given set of numbers in a list.
c) Write a Python Program to count the number of characters in the string and store them in a dictionary.

Exercise 8: Exception Handling
a) Write a python program to handle multiple errors with one except statement.
b) Write a python program to create a user-defined exception named "ShortInputException" that raises when the input text length is less than 3.

Exercise 9: File Handling
a) Write a program to print each line of a file in reverse order.
b) To install the package pandas write a python program to calculate the mean and standard deviation for list of numbers stored in excel file named data.xlsx.(Use JupyterNotebook or Spyder tool in Anaconda Navigator)

Exercise 10: Object Oriented Programming

a) Write a python program to store the name and marks of students using classes. (Use list to store marks in 3 subjects).

b) WeCare insurance company wants to calculate premium of vehicles.
Vehicles are of two types – "Two-Wheeler" and "Four-Wheeler". Each vehicle is identified by vehicle id, type, cost and premium amount. Premium amount is 2% of the vehicle cost for two wheelers and 6% of the vehicle cost for four wheelers. Calculate the premium amount and display the vehicle details. Write a Python program to implement the class chosen with its attributes and methods.

Note: 1. Consider all instance variables to be private and methods to be public
2. Include getter and setter methods for all instance variables.

References Books

1. "Python Programming – Using Problem Solving Approach ",Reema Thareja, Oxford University Press, 2014 Edition.

2. "Python Programming: A Modern Approach", Vamsi Kurama, Pearson.

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DATA STRUCTURES LAB
(Common to CSE, AI&DS & IT)
I Year – II Semester

Practical	: 4	Internal Marks	: 30
Credits	: 2	External Marks	: 70

Course Objectives
- To implement different searching and sorting algorithms.
- To implement linear and non-linear data structures.

Course Outcomes
Upon successful completion of the course, the students will be able to
- implement sorting and searching algorithms.
- develop suitable code to simulate the operations on linked lists.
- implement stacks and queues using arrays and linked lists.
- write code using a stack for arithmetic expressions evaluation and conversion.
- perform operations on binary search trees and graphs.
- create a hash table and perform operations on it.

List of Exercises
Write a C program for the following
Exercise – I:
1. Develop recursive and non-recursive functions to perform search for a Key value in a given list using

       (i) Linear Search   (ii) Binary Search

Exercise – II:
2. Implement the following sorting techniques to sort a given list of integers in ascending order

       (i) Bubble sort   (ii) Insertion sort   (iii) Selection sort

Exercise – III:
3. Use functions to
  (i) Create a singly linked list.   (ii) Insert an element into a singly linked list.
  (iii) Delete an element from a singly linked list.

Exercise – IV:
4. Use functions to
  (i) Create a circular linked list.   (ii) Insert an element into a circular linked list.
  (iii) Delete an element from a circular linked list.

5. Use functions to
  (i) Create a Doubly linked list.   (ii) Insert an element into a doubly linked list.
  (iii) Delete an element from a doubly linked list.

Exercise – V:

6. Implement stack (its operations) using arrays.
7. Implement Queue (its operations) using linked lists.

Exercise – VI:

8. To Convert infix expression into postfix expression.
9. To evaluate postfix expression.

Exercise – VII:

10. Create a Binary Search Tree of integers and perform the following operations
    (i)insert (ii) delete (iii). Search (iv) traversals (pre-order, in-order, post-order)

Exercise – VIII:

11. Implement the DFS and BFS Traversals on Graphs.

Exercise – IX:

12. Implement Heap sort to sort given set of integers.
13. Create a Hash Table to perform the following operations

> (i) Insertion   (ii) Deletion   (iii) Search

Reference Books

1. Horowitz, Sahni, Anderson Freed, "Fundamentals of Data Structure in C", 2nd edition, University Press.
2. Richard F, Gilberg ,Forouzan, "Data Structures", 2nd edition, Cengage.

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ENVIRONMENTAL STUDIES
(Common to EEE, ECE CSE & AIDS)
I Year – II Semester

Lecture	: 2	Internal Marks	: 30
Credits	: -	External Marks	: 70

Course Objectives
- To impart the basic knowledge about the environment and ecology.
- To develop an attitude of concern for biodiversity and its conservation.
- To create awareness on environmental pollution and waste management.

Course Outcomes
Upon successful completion of the course, the students will be able to
- create awareness among the people in protection of environment.
- analyze structure and functional attributes of an ecosystem.
- explain the values of biodiversity.
- identify the sources of environmental pollution, assess their effects and suggest suitable control measures.
- adopt sustainable waste management practices.

Course Content

UNIT – I: Multidisciplinary Nature of Environmental Studies
Definition – Scope – Importance - Need for Public Awareness – Multidisciplinary nature of Environmental Studies – Role of a citizen in protection of environment

UNIT – II: Ecosystem
Concept of an ecosystem – Structural features of an ecosystem – Functional attributes of an ecosystem: Trophic structure – Food Chains – Food Web – Ecological Pyramids – Energy Flow– Biogeochemical Cycles – Ecological Succession.

UNIT – III: Biodiversity & Its Conservation
Definition – Levels of Biodiversity – Bio-geographical zones of India – Values of biodiversity (Consumptive use value, Productive use value, Social value, Ethical value, Aesthetic value, Option values, Ecosystem service values) – India as a mega diversity nation–Hot spots of biodiversity-Threats to biodiversity – Endangered &Endemic species of India – Conservation of biodiversity.

UNIT – IV: Environmental Pollution
Definition, causes, effects & control measures of : Air pollution – Water pollution – Noise pollution-Soil pollution. Global climatic issues: IPCC- Introduction – Role of IPCC-Global warming – Acid rains – Ozone layer depletion.

UNIT – V: Waste Management

Waste water treatment – Municipal solid waste management – Biomedical waste management – Hazardous waste management – E-waste management – Environmental legislations: Wild life (Protection) Act,1972 – Water (Prevention and Control of Pollution) Act, 1974 –Forest (Conservation) Act,1980 –Air (Prevention and Control of Pollution) Act, 1981 – Environmental(Protection) Act,1986.

Text Books

1. Anubha Kaushik, C.P.Kaushik, Environmental Studies, Fourth Edition, New Age International Publishers.
2. P.Anandan, R.Kumaravelan, Environmental Science & Engineering, Scitech Publications (INDIA) Pvt. Ltd.

Reference Books

1. Shashi Chawala, Environmental Studies, Tata McGraw Hill Education Private Limited.
2. Deeksha Dave & P. Udaya Bhaskar, Environmental Studies, Cengage Learning.
3. Dr.Suresh, K.Dhameja, Society and Environment, S.K. Kataria & Sons.
4. Benny Joseph, Environmental studies, Tata McGraw Hill Publishing Company Limited.

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to CSE, IT and AI&DS)
II Year – I Semester

Lecture	: 3	Internal Marks	: 30
Credits	: 3	External Marks	: 70

Course Objectives
- To expose the importance of managerial economics and its role in achieving business objectives.
- To analyze the financial performance of a business unit.

Course Outcomes
Upon successful completion of the course, the students will be able to
- apply managerial economic concepts in business decision making.
- categorize production with respect to time and cost.
- relate market structures and pricing of a product.
- establish suitable business organization with available resources.
- apply accounting rules in determining the financial results and prepare financial statements.

Course Content

UNIT – I: Introduction to Managerial Economics
Definition, nature and scope of managerial economics, Demand analysis- Demand determinants, law of demand and its exceptions, elasticity of demand, methods of demand forecasting.

UNIT – II: Theory of Production and Cost Analysis
Production function, isoquants and isocosts, MRTS, least cost combination of inputs, Cobb-Douglas production function, laws of returns.
Cost analysis- Cost concepts & break even analysis with simple problems.

UNIT – III: Introduction to Markets and Pricing Strategies
Market structures: Types of competition, features of perfect competition, monopoly and monopolistic competition.
Pricing strategies: cost based, demand based, competitive based and strategy based pricing.

UNIT – IV: Introduction to Business Organizations
Factors affecting the choice of business organizations, Forms of business organizations - Sole proprietorship, partnership, joint stock company.

UNIT – V: Introduction to Accountancy

Introduction to accountancy, types of accounts, journal, ledger and trial balance,final accounts with simple adjustments.

Text Books

1. A R Aryasri, "Managerial Economics and Financial Analysis", 2nd edition, TATA McGraw Hill.
2. H. Craig Peterson, Sudhir K. Jain and W. Cris Lewis, "Managerial Economics", 4th edition, Pearson Education.

Reference Books

1. R. L. Varshney, "Managerial Economics", Sultan Chand.
2. Ambrish Gupta, "Financial Accounting for Management-An Analytical Perspective", 5th edition, Pearson Education.

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ADVANCED STATISTICS

II Year – I Semester

Lecture	: 3	Internal Marks	: 30
Credits	: 3	External Marks	: 70

Course Objectives

- To impart knowledge on statistical inference.
- To familiarize with multivariate statistical analysis and statistical quality control.

Course Outcomes

Upon successful completion of the course, the students will be able to

- find probabilities using different probability distributions.
- apply suitable statistical tests for large samples.
- apply suitable statistical tests for small samples.
- classify the multivariate techniques.
- draw the statistical decisions using the control charts.

Course Content

UNIT – I: Probability Distributions

Discrete Distributions: – Binomial and Poisson distributions. Continuous distributions - Exponential and Normal distributions.

UNIT – II: Statistical Inference – I(Large Samples)

Null hypothesis - Alternative hypothesis- level of significance. Type-I and Type-II errors- One tailed and two tailed tests- Testing of hypothesis concerning means and proportions.

UNIT – III: Statistical Inference - II (Small Samples)

Concept of degrees of freedom t- test, F-test, χ^2-test (independence of attributes) and their applications.

UNIT – IV: Multivariate Statistical Analysis

Introduction – Classifying Multivariate Techniques – Dependence Techniques – Interdependence techniques - Analysis of Dependence: – Multiple Regression - Analysis of interdependence : - Factor Analysis.

UNIT – V: Statistical Quality Control

Definitions of Quality and Quality Improvement, Statistical Methods and Management aspects for   quality control and improvement; Statistical Process Control and Product Control, Applications of SPC, Control Chart for variables – mean and range charts. Control Chart for attributes - p, np and c.

Text Books

1. Dr. T. K. V. Iyengar, Dr. B. Krishna Gandhi, S. Ranganatham and Dr. M.V. S. S. N. Prasad, Probability and Statistics, S. Chand & Company Ltd., New Delhi.
2. S.C. Gupta & V.K. Kapoor, Applied Statistics, S.Chand & Company Ltd., New Delhi.
3. Business Research Methods, William G. Zikmund, Barry J. Babin, Jon C.Carr, Mitch Griffin, 9th Edition.

Reference Books

1. Montgomery, Douglas C (2009), "Introduction to Statistical Quality Control" John Wiley and Sons, Inc. (ISBN: 978-0-470-16992-6).
2. Richard A. Johnson, Dean W. Wichern "Applied Multivariate Statistical Analysis (AMSA)" 3rd Edition, , Inc. (ISBN – 81 – 203- 1045-4).

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DIGITAL LOGIC DESIGN
(Common to CSE, IT and AI&DS)
II Year – I Semester

Lecture : 2 Tutorial : 1	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To familiarize with the concepts of designing digital circuits.

Course Outcomes

Upon successful completion of the course, the students will be able to

- perform number system conversions, signed number arithmetic using complements.
- simplify Boolean functions using Boolean laws, theorems and k- maps
- implement combinational logic for adders and subtractors.
- design combinational logic circuits such as decoders, encoders, multiplexers and demultiplexers.
- design registers and counters using flip flops.

Course Content

UNIT – I: Number Systems

Binary, octal, decimal, hexadecimal number systems, conversion of numbers from one radix to another radix, r's, (r-1)'s complements, signed binary numbers, addition and subtraction of unsigned and signed numbers, weighted and un-weighted codes.

UNIT – II: Logic Gates and Boolean Algebra

NOT, AND, OR, universal gates, X-OR and X-NOR gates, Boolean laws and theorems, complement and dual of a logic function, canonical and standard forms, two level realization of logic functions using universal gates,minimizations of logic functions (POS and SOP) using Boolean theorems, K-map (up to four variables), don't care conditions.

UNIT – III: Combinational Logic Circuits - 1

Design of half adder, full adder, half subtractor, full subtractor, ripple adders and subtractors, ripple adder / subtractor.

UNIT – IV: Combinational Logic Circuits - 2

Design of decoders, encoders, priority encoder, multiplexers, demultiplexers, higher order decoders, demultiplexers and multiplexers, realization of Boolean functions using decoders, multiplexers.

UNIT – V: Sequential Logic Circuits

Classification of sequential circuits, latch and flip-flop, RS- latch using NAND and NOR Gates, truth tables, RS, JK, T and D flip-flops, truth and excitation tables, conversion of flip- flops, flip-flops with asynchronous inputs (preset and clear).

Design of registers, shift registers, bidirectional shift registers, universal shift register, design of ripple counters, synchronous counters and variable modulus counters, ring counter, Johnson counter.

Text Books

1. M. Morris Mano, Michael D Ciletti, "Digital Design", 5th edition, PEA.

Reference Books

1. Kohavi, Jha, "Switching and Finite Automata Theory", 3rd edition, Cambridge.
2. Leach, Malvino, Saha, "Digital Principles and Applications", 7th edition, TMH.
3. Roth, "Fundamentals of Logic Design", 5th edition, Cengage.

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OBJECT ORIENTED PROGRAMMING THROUGH JAVA
(Common to CSE, IT and AI&DS)
II Year – I Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives
- To make acquainted with the concepts of object oriented programming.
- To apply concepts of Java to solve problems.

Course Outcomes
Upon successful completion of the course, the students will be able to
- describe OOP concepts and features of Java.
- apply class and inheritance concepts in developing the Java code.
- create user interfaces and packages for a given problem.
- develop code to handle exceptions and implement multi-threading to make applications more dynamic.
- design GUI applications with event handling mechanism.

Course Content
UNIT – I: Fundamentals of OOP and Java
Need of OOP, principles of OOP languages, procedural languages vs. OOP, Java virtual machine, Java features.
Java Programming constructs: variables, primitive data types, identifiers, keywords,literals, operators, arrays, type conversion and casting, Wrapper Classes and Data Conversion methods, control flow statements, I/O statements and output formats.

UNIT – II: Class Fundamentals and Inheritance
Class fundamentals, declaring objects and methods, recursive methods, nested method calling,returning of objects, Parameter passing techniques, Instance initializer blocks, constructors, overloading-methods and constructors,this and static keywords,nested classes, Mutable and Immutable Strings.
Inheritance- Basics, types, method overriding, dynamic method dispatch, super and final keywords and access controls with inheritance, abstract classes, Object class.

UNIT – III: Interfaces and Packages
Interfaces: Defining an interface, implementing interfaces, nested interfaces, variables in interfaces and extending interfaces, multiple inheritance, class within interface and interface within class, up-casting and down-casting, marker interfaces, interfaces with default and static methods,Introduction to Collection framework, lambda expressions in Java.

Packages: Predefined packages: java.util.Date, java.util.Random,java.util.Arrays, creating and accessing user defined packages, package hierarchy, and multiple classes in single packageand access controls with packages.

UNIT – IV: Exception Handling and Multi-Threading

Exception Handling- Fundamentals, Types of exceptions, using try and catch, multiple catch clauses, nested try statements, try with resources, throw, throws, finally, re-throwing an exception, user-defined exceptions, Throwable class.

Multi-threading-Introduction to multi-tasking, multi-threading vs multi-tasking, thread life cycle, Thread Creation,Thread class constructors, Thread priorities and its methods,synchronizing threads, daemon threads, Garbage Collection, thread groups.

UNIT – V: GUI, Event Handling

Applets- Concepts of application and applets and applet life cycle, creating applets, applet parameters.

Event Handling- Events, event sources, event classes, event listeners, delegation event model, handling mouse and keyboard events, adapter classes

AWT: AWT hierarchy, Basic user Interface components, Layout managers, Introduction to swings.

Text Books

1. Herbert Schildt," Java The Complete Reference", 7th edition.
2. SachinMalhotra, Saurabh Chaudhary, "Programming in Java", 2nd edition, Oxford.

Reference Books

1. Herbert Schildt," Java The Complete Reference", 9th edition.
2. "JAVA 8 Programming", Black Book, Dreamtech press publishers.
3. Y.Daniel Liang, "Introduction to Java Programming", 7th edition, Pearson.

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DATABASE MANAGEMENT SYSTEMS
(Common to CSE and AI&DS)
II Year – I Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To impart knowledge on database design.
- To familiarize with SQL.

Course Outcomes

Upon successful completion of the course, the students will be able to

- analyze information storage problem and derive a model in the form of an entity relationship diagram.
- develop simple and complex queries using Structured Query Language (SQL).
- apply principles of normalization for designing a good relational database schema.
- compare different techniques related to transaction management and concurrency control.
- construct multi-level indices for fast retrieval of data and use recovery techniques to recover the database from a crash.

Course Content

UNIT – I: Introduction to Database

Introduction, Advantages of using DBMS, Data Models, Levels of Abstraction, Entity- Relationship Model: Attributes and Keys, Relationship Types, Weak Entity set, Strong Entity Set, Enhanced E–R Modeling: Specialization and Generalization, Database design for Banking Enterprise, Reduction to relational schemas.

UNIT – II: Relational Model and SQL

Relational Model: Basic Concepts, Schema and Instances, Keys, Relational Algebra, SQL: DDL, DML, Integrity constraints, Defining different constraints on a table, Set operations, Aggregate Functions, Group by and Having clauses, Nested queries.

UNIT – III: Database Design

Functional dependencies: Partial, full, transitive and trivial dependencies, Axioms, Decomposition: Lossless Join and Dependency Preserving decomposition, Attribute Closure, **Normal forms:** 1NF, 2NF, 3NF and BCNF.

UNIT – IV: Transaction Management and Concurrency Control

Transaction Management: Transaction concept, ACID properties, Transaction State Diagram, Schedules-Serial, Concurrent and Serializable Schedules, Serializability- Conflict and View serializability, Recoverability.

Concurrency Control: Concurrency Control- Concurrent Execution of Transactions, Anomalies due to Concurrent Execution, Lock-based protocols- 2PL, Strict 2PL and Rigorous 2PL, Timestamp-based protocols, Thomas Write Rule, Deadlock Handling-Deadlock Prevention, Deadlock detection and recovery.

UNIT – V: Indexing and Crash Recovery

Indexing - Order indices, Multi level indices, Dynamic Multilevel indices using B+ Trees.

Crash Recovery - Failure classification, Different types of Recovery techniques: deferred update, immediate update, Shadow paging, Checkpoints.

Text Books

1. Korth and Sudarshan, "Database system concepts", 6th edition, MH.
2. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", MH

Reference Books

1. Elmasri Navate, "Fundamentals of Database Systems", Pearson Education
2. C.J.Date, "Introduction to Database Systems", Pearson Education
3. Peter Rob and C Coronel, "Database Systems Design, Implementation, and Management", 7th edition.

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FORMAL LANGUAGES AND AUTOMATA THEORY
(Common to IT and AI&DS)
II Year – I Semester

Lecture : 2	Tutorial : 1	Internal Marks : 30
Credits : 3		External Marks : 70

Course Objectives
- To introduce the classification of machines by their power to recognize languages and to solve problems in computing.
- To familiarize with deterministic and non-deterministic machines.

Course Outcomes
Upon successful completion of the course, the students will be able to
- design finite automata for regular languages.
- write regular expressions for regular languages or for DFA by applying Arden's theorem.
- generate grammar for a given language.
- design PDA for context free languages.
- design Turing Machine for the phrase-structured languages.

Course Content

UNIT – I: Finite Automata
Strings, alphabet, language, operations, finite state machine, finite automaton model, transition diagrams, acceptance of strings and languages, deterministic finite automaton and non-deterministic finite automaton,NFA to DFA conversion, NFA with epsilon transitions - significance, equivalence between NFA with and without E-transitions, minimization of FSM, equivalence between two FSM's, finite automata with output- Moore and Mealy machines, applications of FA.

UNIT – II: Regular Languages
Regular sets, regular expressions, identity rules, Equivalence of two RE, construction of finite automata for a given regular expressions and its inter conversion, pumping lemma of regular sets, closure properties of regular sets (proofs not required), applications of regular languages.

UNIT – III: Grammar Formalism
Grammars, Chomsky hierarchy of languages, regular grammars - right linear and left linear grammars, equivalence between regular linear grammar and FA, Contextfree grammars, derivation trees, sentential forms, rightmost and leftmost derivation of strings, ambiguity in context free grammars, Minimization of context free grammars.

UNIT – IV: Pushdown Automata

Chomsky normal form, Greibach normal form, pumping Lemma for context free languages, closure properties of CFL (proofs not required), applications of CFLs. Push Down Automata: Definition, model of PDA, Instantaneous Description, Language Acceptance of Pushdown Automata, Design of Pushdown Automata.

UNIT – V: Turing Machine

Model, design of TM, types of Turing machines (Proofs not required), recursively enumerable languages and recursive languages.

Computability Theory: Decidability of problems, undecidability of posts correspondence problem.

Text Books

1. John E.Hopcroft, Rajeev Motwani and Jeffrey D.Ullman J.D., "Introduction to Automata Theory Languages and Computation", 2nd edition, Pearson Education.
2. Mishra and Chandrashekaran, "Theory of Computer Science - Automata, Languages, and Computation", 3rd edition, PHI.

Reference Books

1. Daniel I.A. Cohen, "Introduction to Computer Theory", 2nd edition, Wiley.
2. Sipser, "Introduction to Theory of Computation", 3rd edition, Cengage.
3. Lewis H.R., Papadimitriou C.H, "Elements of Theory of Computation", 2nd edition, PHI.

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JAVA PROGRAMMING LAB
(Common to CSE, IT and AI&DS)
II Year – I Semester

Practical: 4	Internal Marks : 15
Credits : 2	External Marks : 35

Course Objectives
- To demonstrate object oriented programming concepts.
- To introduce the creation of GUI using AWT components.

Course Outcomes
Upon successful completion of the course, the students will be able to
- apply the concept of object oriented approach in problem solving.
- create packages for reusability.
- examine exceptions and multi-tasking.
- create GUI applications to handle events

List of Exercises
Exercise-1
1. John found another manuscript of ancient mathematicians. According to this manuscript an integer k is a lucky number if $k = a_1 + a_2 + ... + a_n$, where : $a_i = 7^p$. p may be any positive integer. if i and j are distinct, $a_i != a_j$

   For example 7 is a lucky number: $7 = 7^1$. 56 is a lucky number $56 = 7^2 + 7^1$.

   John has an array of n integers. He wants to determine how many members of this array are lucky. He is not good at programming and needs your help. Write a program which takes an integer n and array consisting of n integers and determines quantity of lucky integers in this array.

   Input
   The first line of input contains integer n: number of elements in the array.
   The second line of input contains n space separated integers.
   Output
   Print the number of lucky integers in a given array.
   Constraints
   1 <= n <= 100
   1 <= arr[i] <= 1000000. arr[i] is the ith element of array.
   Example #1
   Input
   2
   49 50
   Output

1

$49 = 7^2$. 50 can't be represented as a sum of distinct powers of 7.

Example #2

Input

2

7 49

Output

2

$7 = 7^1$ and $49 = 7^2$.

2. Write a Java program that reads an integer number (between 1 and 255) from the user and prints the binary representation of the number. The answer should be printed as a String.

Note: The output displayed should contain 8 digits and should be padded with leading 0s(zeros), in case the returned String contains less than 8 characters. *For example*, if the user enters the value 16, then the output should be 00010000 and if the user enters the value 100, the output should be 01100100 (Hint : You may use String.format() method for the expected output)

Exercise-2

3. Software is being developed by a university that displays SGPA of your current semester. You are given the task to develop a module that calculates the SGPA with respect to the secured grade points corresponding to given number of credits in each subject. The credits for the courses are:

Graphics: 2, PPS: 4, JAVA: 3, Chemistry: 3, English: 2, Technical Skills: 1.5, Data Structures: 4

Complete your Module by displaying the SGPA of current semester.

4. You are given a string consisting of n lowercase Latin letters. You must find the count of number of larger alphabets for every character of the string (according to lexicographical order).

Input

The first line of input contains an integer n, the length of the given string. The second line of input contains a string.

Output

Print the count of number of larger alphabets for every character of the string on a single line. Separate elements by white spaces.

Constraints

1 <= n <= 100

Example#1

Input

3

abc

Output
2 1 0
Explanation: a - 2: 'a' < 'b', 'a' < 'c'. 'b' - 1: 'b' < 'c'. 'c' - 0: There is no letter in this string, which is larger than 'c'.
Example#2
Input
5
aaabb
Output
2 2 2 0 0
Explanation: a - 2: 'a' < 'b' (b at index 3 and index 4). There is no letter in this string, which is larger than 'b'.

Exercise-3

5. Tom and Jerry found two bags of apples. The bag that Jerry chose contains 5 apples and the bag chosen by Tom has 3 apples. Tom wants to have more apples, so he swaps the bags. Write a program to display the apples in the two bags before and after swapping.

   Hint :-(Try using call by value and call by reference; Write which can be used to swap)

6. Access the instance variables by using 'this' and super keywords.

Exercise-4

7. Create an abstract class named shape, that contains an empty method named numberOfSides(). Define three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method numberOfSides(), that contains the number of sides in the given geometrical figure.

8. You are supposed to calculate the area of a polygon based on number of inputs given by the user. Polygon can be a square, a rectangle or a triangle.

Exercise-5

9. Write an interface called Playable, with a method *void play();*
   Let this interface be placed in a package called music.
   Write a class called Veena which implements Playable interface. Let this class be placed in a package music.string
   Write a class called Saxophone which implements Playable interface. Let this class be placed in a package music.wind
   Write another class Test in a package called live. Then,
   a. Create an instance of Veena and call play() method
   b. Create an instance of Saxophone and call play() method
   c. Place the above instances in a variable of type Playable and then call play()

---

10. Create and access a user defined package where the package contains a class named CircleDemo, which in turn contains a method called circleArea() which takes radius of the circle as the parameter and returns the area of the circle.

Exercise-6

11. Handle the following exceptions using exception handling mechanism in java. (Note: Handle all exceptions in single program using command line arguments)

    a. ArithmeticException   **b.** ArrayIndexOutOfBoundsException

    c. NullPointerException   **d.** IOException

    e. NumberFormatException

12. Write a java program to create three userdefined exceptions and throw the exceptions using throw and write appropriate catch and finally blocks to handle.

Exercise-7

13. Create three threads (by using Thread class and Runnable interface) where the first thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.

14. Create three threads- with different priorities – MAX, MIN, NORM- and start the threads at the same time. Observe the completion of the threads.

Exercise-8

15. Handle keyboard events, which echoes keystrokes to the applet window and shows the status of each key event in the status bar.

16. Display the position of x and y co-ordinates of the cursor movement using mouse.

Exercise-9

17. Design GUI to handle Choice Control event.

18. Design simple arithmetic Calculator using Grid Layout manager.

Text Books

1. Herbert Schildt, "Java - The Complete Reference", 7th edition, TMH.

2. Sachin Malhotra, Saurabh choudhary, "Programming in Java", 2nd edition, Oxford.

Reference Books

1. E. Balagurusamy, "Programming with Java".

2. "Java 8 Programming", Black Book DreamTech,

3. P.Radha Krishna, "Object Oriented Programming through Java", Universities Press.

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DATABASE MANAGEMENT SYSTEMS LAB
(Common to CSE and AI&DS)
II Year – I Semester

Practical: 4	Internal Marks : 15
Credits : 2	External Marks : 35

Course Objectives
- To familiarize with creation of database and formulate SQL solutions to manipulate the database.
- To disseminate knowledge on triggers and PL/SQL programs in a database environment.

Course Outcomes
Upon successful completion of the course, the students will be able to
- create relational database with the given constraints.
- formulate simple and complex queries using features of SQL.
- create views on relational database based on the requirements of users.
- develop PL/SQL programs for processing multiple SQL statements.
- implement triggers on a relational database.

List of Experments
1. Execute **DDL, DML, DCL** and **TCL** Commands on below given relational schema. **EMP**(Empno, Ename, Job, Salary, Mgr, Comm, Hiredate, Deptno).
2. Implement the following integrity constraints on the following database **EMP** (Empno, Ename, Job, Salary, Mgr, Comm, Hiredate, Deptno) **DEPT**(Deptno, Dname, Location)
   a. Primary Key b. Foreign Key   c. Unique   d. Not NULL   e. Check.
3. Execute basic **SQL** statements using the following

a) Projection	b) Selection
c) arithmetic operators	d) Column aliases
e) Concatenation operator	f) Character Strings
g) Eliminating Duplicate Rows	

   h) Limiting Rows Using
   - Comparison operators
   - Logical Operators
   - LIKE,BETWEEN AND,IN operators

   i) ORDER BY Clause
   - Sorting in Ascending Order
   - Sorting by Column Alias
   - Sorting in Descending Order
   - Sorting by Multiple Columns
4. Execute the following **single row functions** on a Relation.

- Character Functions
  - Case-manipulation functions(LOWER, UPPER, INITCAP)
  - Character-manipulation functions(CONCAT, SUBSTR, LENGTH, INSTR, LPAD | RPAD, TRIM, REPLACE)
- Number Functions(ROUND, TRUNC, MOD)
- Date functions
  - Months_Between
  - Add_Months
  - Next_Day
  - Last_Day
  - Round
  - Trunc
  - Arithmetic with Dates

5. Execute the following Multiple row functions (Aggregate Functions) on Relation.
   - Group functions(AVG, COUNT, MAX, MIN, SUM)
   - DISTINCT Keyword in **Count** Function
   - Null Values in Group Functions
   - NVL Function with Group Functions

6. Create Groups of Data using **Group By** clause
   - Grouping by One Column
   - Grouping by More Than One Column
   - Illegal Queries Using Group Functions
   - Restricting groups using HAVING Clause
   - Nesting Group Functions

7. Retrieve Data from Multiple Tables using the following join operations
   - Cartesian Products
   - Equijoin
   - Non-equijoin
   - Outer join
   - Self join

8. Execute Set operations on various Relations.
   - UNION
   - UNION ALL
   - INTERSECT
   - MINUS

9. Execute Sub Queries and Co-Related Nested Queries on Relations.
   - Implement
     - Single-row subquery
     - Multiple-row subquery
   - Using Group Functions in a Subquery
   - Using HAVING Clause with Subqueries
   - Using Null Values in a Subquery
   - Data retrieval using Correlated Subqueries
     - EXISTS Operator
     - NOT EXISTS Operator

10. Perform following operations on views
    - Simple Views
    - Complex Views
    - Modifying a View

- DML Operations on a View
- Denying DML Operations on view
- Removing a View

11. Develop the following PL/SQL programs
    - Simple PL/SQL programs
    - PL/SQL programs Using Control structures.
        - Conditional structures
        - Iterative structures
    - PL/SQL program using the following exception handling mechanisms.
        - Pre defined exceptions
        - user defined exceptions

12. Implement a PL/SQL block using triggers for transaction operations of a typical application.

Note: For above experiments purpose use Sailors or Bank or Employee database from given text books.

Reference Books

1. Korth and Sudarshan, "Database system concepts", 3rd edition, MH.
2. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", 3rd edition, MH
3. Benjamin Rosenzweig, Elena Silvestrova, "Oracle PL/SQL by Example", 3rd edition, Pearson Education.
4. Scott Urman, "Oracle Database Log PL/SQL Programming", Tata Mc-Graw Hill.
5. Dr. P.S. Deshpande, "SQL and PL/SQL for Oracle 10g".

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LOGIC BUILDING AND BASIC CODING PRINCIPLES

II Year – I Semester

Practical	: 2	Internal Marks	: 30
Credits	: 1	External Marks	: 70

DISCRETE MATHEMATICAL STRUCTURES
(Common to CSE and AI&DS)
II Year – II Semester

Lecture : 2	Tutorial : 1	Internal Marks	: 30
Credits : 3		External Marks	: 70

Course Objectives

- To impart the knowledge on mathematical reasoning, relations, graphs and recurrence relations.

Course Outcomes

Upon successful completion of the course, the students will be able to

- use mathematical logic for analyzing propositions and proving theorems.
- describe the properties of relations, functions and lattice theories.
- categorize different types of algebraic structures and describe their properties.
- apply the concepts of graph theory in modeling and solving non-trivial problems incomputer networks.
- apply pigeon hole principle in computer applications and solve recurrence relations.

Course Content

UNIT – I: Mathematical Logic

Propositional Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Tautological Implications, Theory of Inference for Statement Calculus.

UNIT – II: Relations, Functions and Lattice Theory

Relations: Properties of Binary Relations, Equivalence, Compatibility and Partial order relations, Hasse Diagram.
Functions: Inverse, Composite functions. Lattice – Definition. Principle of duality, types of lattices – distributive & modular lattices.

UNIT – III: Algebraic Structures

Introduction to algebraic systems, Quasi- group, Semi-group,Monoid, Group and abelian group. Subgroupsand Cyclic Groups.

UNIT – IV: Graph Theory

Introduction to Graphs. Representation of Graphs: Adjacency Matrices, Incidence Matrices. Isomorphism in Graphs. Eulerian Graphs, Planar Graphs, Hamiltonian Graphs and chromatic number of a graph.

UNIT – V: Pigeon hole principle and Recurrence Relations

Pigeonhole principle and its applications.Recurrence relations - Homogeneous and Non-Homogeneous recurrence relations using method of characteristic roots and generating functions.

Text Books

1. J.P.Trembley, R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill, New Delhi.
2. Mott, Kandel, Baker, "Discrete Mathematics for Computer Scientists & Mathematicians", 2nd edition, PHI.

Reference Books

1. J K Sharma, "Discrete Mathematics", 2nd edition, Macmillan Publications.
2. Schaum's Outlines," Discrete Mathematics", 2nd edition, Tata McGraw Hill, New Delhi.
3. Rosen, "Discrete Mathematics and its Application with combinatorics and Graph Theory", 7th editon, Tata McGraw Hill, New Delhi.

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COMPUTER ORGANIZATION
(Common to CSE, IT and AI&DS)
II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives
- To familiarize with organizational aspects of memory, processor and I/O.

Course Outcomes
Upon successful completion of the course, the students will be able to
- identify different types of instructions.
- differentiate micro-programmed and hard-wired control units.
- analyze the performance of hierarchical organization of memory.
- summarize different data transfer techniques.
- demonstrate arithmetic operations on fixed- and floating-point numbers and illustrate concepts of parallel processing.

Course Content

UNIT – I: Register Transfer Language and Micro Operations
Introduction- Functional units, computer registers, register transfer language, register transfer, bus and memory transfers, arithmetic, logic and shift micro operations, arithmetic logic shift unit.
Basic Computer Organization and Design: Instruction codes, instruction cycle. Register reference instructions, Memory – reference instructions, input – output and interrupt.

UNIT – II: CPU and Micro Programmed Control
Central Processing unit: Introduction, instruction formats, addressing modes. Control memory, address sequencing, design of control unit - hard wired control, micro programmed control.

UNIT – III: Memory Organization
Memory hierarchy, main memory, auxiliary memory, associative memory, cache memory, cache coherence

UNIT – IV: Input-Output Organization
Peripheral Devices, input-output interface, asynchronous data transfer, modes of transfer- programmed I/O, priority interrupt, direct memory access, Input –Output Processor (IOP).

UNIT – V: Computer Arithmetic and Parallel Processing
Data representation- fixed point, floating point, addition and subtraction, multiplication and division algorithms.

Parallel Processing-Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline.

Text Books

1. M. Moris Mano, "Computer Systems Architecture", 3rd edition, Pearson/PHI.

Reference Books

1. Carl Hamacher, ZvonksVranesic, SafeaZaky, "Computer Organization", 5^{th}edition, McGraw Hill.
2. William Stallings, "Computer Organization and Architecture", 8^{th}edition, Pearson/PHI.

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COMPILER DESIGN
(Common to CSE, IT and AI&DS)
II Year – II Semester

Lecture : 2 Tutorial : 1	Internal Marks	: 30
Credits : 3	External Marks	: 70

Course Objectives

- To familiarize with lexical analyzer and different parsers.
- To introduce various storage allocation strategies, code generation and code optimization techniques.

Course Outcomes

Upon successful completion of the course, the students will be able to

- list compilation process steps of a language and represent tokens using regular expressions.
- design a parser to verify the syntax of a programming language.
- design syntax directed translation schemes for a given context free grammar.
- construct symbol table to access identifier information and perform various operations on it.
- apply code optimization techniques to enhance the efficiency of the intermediate code and generate code using generic code generation or DAG.

Course Content

UNIT – I: Lexical Analysis

Overview of language processing, preprocessors, compiler, assembler, interpreters, linkers and loaders, phases of a compiler. Lexical Analysis- role of lexical analysis, token, patterns and lexemes, transition diagram for recognition of tokens, reserved words and identifiers.

UNIT – II: Parsing

Syntax analysis, role of a parser, classification of parsing techniques.
Top-down parsing: Recursive descent parsing, first and follow, LL(1) grammars, non-recursive predictive parsing.
Bottom-up Parsing:Shift-Reduce parsing, operator precedence parsing, LR Parsers: construction of SLR, CLR (1), LALR parsers.

UNIT – III: Semantic Analysis

SDT, evaluation of semantic rules, Symbol tables- use of symbol tables, contents of symbol-table, operations on symbol tables, symbol table organization for block and non-block structured languages.

UNIT – IV: Intermediate Code Generation

Intermediate code- Three address code-quadruples, triples, abstract syntax trees. Machine-independent code optimization- common sub expression elimination, constant folding, copy propagation, dead code elimination, liveness analysis,loop optimization-strength reduction, code motion.

UNIT – V: Code Generation

Code Generation- issues in code generation, generic code generation, code generation from DAG. Machine dependent code optimization: Peephole optimization.

Text Books

1. Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman, "Compilers, Principles Techniques and Tools", 2nd edition, Pearson.
2. V. Raghavan, "Principles of compiler design", 2nd edition, TMH.

Reference Books

1. Kenneth C Louden, "Compiler Construction, Principles and Practice", 1st edition, Cengage.
2. Jean-Paul Trembly, Paul G. Sorenson, "The Theory and Practice of Compiler writing", 1st edition, McGraw-Hill.
3. Nandini Prasad, "Principles of Compiler Design", 2nd edition, Elsevier.

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ARTIFICIAL INTELLIGENCE

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To familiarize with the basic principles of AI towards problem solving, inference, and learning.
- To investigate applications of AI in intelligent agents, expert systems and other machine learning models.

Course Outcomes

Upon successful completion of the course, the students will be able to

- analyze and formalize the problems as a state space, graph, or tree.
- use search algorithms to discover solution to a given problem.
- solve problems with uncertain information using probabilistic reasoning.
- formalize sequential decision making using Markov decision process.
- apply reinforcement learning to take suitable action to maximize reward in particular situation.

Course Content

UNIT – I: Introduction

Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

UNIT – II: Search Algorithms

Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, Best first search, A* algorithm, Game Search.

UNIT – III: Probabilistic Reasoning

Probability, conditional probability, Bayes Rule, Bayesian Networks- representation, construction and inference, temporal model, hidden Markov model.

UNIT – IV: Markov Decision Process

MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

UNIT – V: Reinforcement Learning

Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning- Q learning.

Text Books

1. Stuart Russel, Peter Norvig, "Artificial intelligence, A modern Approach", 2nd edition, PEA.
2. Rich, Kevin Knight, Shiv Shankar B Nair, "Artificial Intelligence"- 3rd edition, TMH.

Reference Books

1. Saroj Kaushik, "Artificial Intelligence"- CENGAGELearning.
2. Patterson, "Introduction to Artificial Intelligence", PHI.
3. George F Lugar, "Artificial intelligence, structures and Strategies for Complex problem solving", 5th edition, PEA.

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SOFTWARE ENGINEERING
(Common to CSE and AI&DS)
II Year – II Semester

Lecture : 3 Practical : 2	Internal Marks : 30
Credits : 4	External Marks : 70

Course Objectives
- To familiarize with the software engineering principles to be followed in software development.
- To impart knowledge on software project management.

Course Outcomes
Upon successful completion of the course, the students will be able to
- apply suitable process model for software development based on stake holder requirements.
- estimate cost and schedule required to develop a software.
- analyze customer requirements and prepare SRS document.
- use software design principles in the design of a software.
- test a software using different testing techniques.

Course Content
UNIT – I: Introduction and Software Life Cycle Models
Evolving - From an art form to an Engineering Discipline. Life Cycle Models- Classical waterfall model, Iterative waterfall model, Prototyping model, Agile development models.

Lab Experiment
1. Assume that a software development company is already experienced in developing payroll software and has developed similar software for several customers (organizations). Assume that the software development company has received a request from certain customer (organization), which was still using manually processing of its pay rolls. For developing payroll software for this organization, which life cycle model should be used? Justify your answer.
2. Identify the criteria based on which a suitable life cycle model can be chosen for a given project development. Illustrate your answer using suitable examples.

UNIT – II: Software Project Management
Project Planning, Metrics for Project size Estimation- Lines of code- Function Point, COCOMO- Basic- Intermediate- Complete, Scheduling- work breakdown structure- Critical path method- PERT charts.

Lab Experiment
1. Compute the FP value for the grade calculation of students. Assume that it is an average complexity size project. The information domain values are as follows:

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a. Number of user inputs = 13
b. Number of user outputs = 4
c. Number of user inquiries = 2
d. Number of files = 5
e. Number of external interfaces = 2
f. The total value of complexity adjustment attribute is 13

2. Assume that a system for simple student registration in a course is planned to be developed and its estimated size is approximately 10,000 LOC. The organization proposed to pay 25,000 per month to software engineers. Compute the development effort, development time, and the total cost for product development.

3. Suppose a library management system (LMS) is to be designed for an academic institution. From the project proposal, the following five major components are identified:online data entry 1.0 KLOC,data update 2.0 KLOC, file input and output 1.5 KLOC, library reports 2.0 KLOC, query and search 0.5 KLOC.The data base size and application experience are very important.Use of software tool and main storage is highly considerable.Virtual machine and its volatility can be kept low.All other cost drivers have nominal requirements.Use the COCOMO model to estimate the development effort and the development time.

UNIT – III: Requirements Analysis and Specification

Requirements gathering and analysis, software requirement specification- users of SRS document- characteristics of a good SRS document, Attributes of Bad SRS documents, important categories of customer Requirements, Functional requirements, Traceability, organization of the SRS document.

Lab Experiment

1. Suppose you have been appointed as the analyst for a large software development project. Discuss the aspects of the software product you would document in the software requirement specification (SRS) document? What would be the organization of your SRS document? How would you validate your SRS document? (Take any real time problem and prepare SRS document)

UNIT – IV: Software Design and Modelling

Software Design: Approaches to software design- function oriented design- object oriented design.

Object Modelling Using UML: Basic object orientation Concepts, Use case Model, Class diagram, Interaction diagrams, Activity Diagram, state chart Diagram, Component and Deployment diagrams.

Lab Experiment

1. To create a UML diagrams of ATM APPLICATION.
2. To create a UML diagram of BANKING SYSTEM.
3. To create a UML diagram of LIBRARY MANAGEMENT SYSTEM.

UNIT – V: Testing

Testing, Black-Box Testing- Equivalence class partitioning- Boundary value analysis, White-Box Testing- Basic concepts- statement coverage- branch coverage- multiple condition coverage- path coverage- McCabe's cyclomatic complexity metric, Integration testing, System Testing.

Lab Experiment

Design of Test cases based on requirements and design.

Text Books

1. Rajib Mall, "Fundamentals of Software Engineering",4th edition, PHI
2. Roger S Pressman,"Software engineering A practitioner's Approach", 6th edition McGraw Hill International Edition.

Reference Books

1. K.K Aggarwal and Yogesh Singh, "Software Engineering", 3rd edition, NewAge Publications.
2. Ian Sommerville, "Software Engineering", 7th edition, Pearson education.
3. Pankaj Jalote,, "Software Engineering, A Precise Approach", Wiley India, 2010.
4. Booch, James Rumbaugh, Ivar Jacobson, "The Unified Modeling Language User Guide", 2nd edition, Pearson Education.

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ARTIFICIAL INTELLIGENCE LAB

II Year – II Semester

Practical	: 2	Internal Marks	: 15
Credits	: 1	External Marks	: 35

Course Objectives

- To familiarize with different search techniques used in problem solving.
- To disseminate knowledge on Bayesian networks and reinforcement learning.

Course Outcomes

Upon successful completion of the course, the students will be able to

- conduct uninformed and informed search and game search.
- construct a Bayesian network for the given data and infer from the Bayesian network.
- develop programs to do reinforcement learning in a grid world.

List of Experiments

1. Write a programme to conduct uninformed and informed search.
2. Write a programme to conduct game search.
3. Write a programme to construct a Bayesian network from given data.
4. Write a programme to infer from the Bayesian network.
5. Write a programme to run value and policy iteration in a grid world.
6. Write a programme to do reinforcement learning in a grid world.

Reference Books

1. Stuart Russel, Peter Norvig, Artificial intelligence, A modern Approach, 2nd edition, PEA.
2. Saroj Kaushik, Artificial Intelligence- CENGAGE Learning.
3. George F Lugar, Artificial intelligence, structures and Strategies for Complex problem solving, 5th edition, PEA.

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GAME PROGRAMMING
(Common to CSE and AI&DS)
II Year – II Semester

Lecture : 1 Practical : 2	Internal Marks	: 15
Credits : 2	External Marks	: 35

Course Objectives

- To be able to develop gaming applications.

Course Outcomes

Upon successful completion of the course, the students will be able to

- install and make use of Unity 3D Editor in developing gaming apps.
- developing game objects using scripts.
- develop a 2D gaming application on windows.
- develop a 3D gaming application on windows.

Course Content

Introduction

- Course Overview
- Installation (on Windows)
- Creating Project(2D/3D) template
- Explaining difference between 2D and 3D
- Unity3D Editor Quick Reference (Brief)
- Interface Overview, The Scene View, The Game View, The Hierarchy Window, The Project Window, The Inspector Window, Game Objects and Components, Lights, Materials, Models and Materials, The Standard Shader.
- Physics 2D & 3D (1. Colliders 2. Colliders as Triggers 3. Rigidbodies 4. Adding Physics Forces 6. Physics Materials 7. Physics Joints 8. Detecting Collisions with OnCollisionEnter)

Script (C#) in Unity 3D

- Installation of visual studio (on Windows)
- Creating and Using Scripts
- Variables in Unity 3D
- Controlling GameObjects using components
- Numbers in Unity 3D
- Conditionals in Unity 3D
- Array and Loops in Unity 3D
- Functions and Methods in Unity 3D

Developing Unity 2D game
- Creating 2D platform game
- Player Moving
- Platform Moving and Adding Bullets
- Adding Animations to Player and Platforms
- Add Coins
- Score and health bar
- Enemy creation
- Destorying Enemy Using Player
- Level Creation and adding Audio
- Adding Andriod Buttons

Developing Unity 3D Game
- Creating 3D game template
- Project Structure should include (Materials, Prefabs, Scripts, scene)
- Introduction to 3D Game - Infinite Runner
- Environment and Player: Setting up the Game, Moving the Player.
- Camera and Play Area: Moving the Camera, Setting up the Play Area
- Collecting Gems and Scoring: Creating Collectable Objects, Collecting the Pick Up Objects, Displaying the Score and Text

Text Book
1. Alex Okita "Learning C# Programming with Unity 3D",CRC Press.

Web Links
1. https://www.studytonight.com/game-development-in-2D/

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PROGRAMMING FOR CORPORATE

II Year – II Semester

Practical	: 2	Internal Marks	: 30
Credits	: 1	External Marks	: 70

ELEMENTS OF CIVIL ENGINEERING

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To introduce basics of Civil Engineering concepts in the fields of surveying, building materials, water resources, Water Supply, Sanitary, Electrical Works in Building and Highway Engineering.

Course Outcomes

Upon successful completion of the course, the students will be able to

- familiarize with basics of civil engineering.
- carryout various civil engineering survey works.
- identify the various properties of building materials and various types of buildings.
- get acquainted with fundamentals of Water Resources, Water Supply, Sanitary and Electrical Works in Building.
- enumerate the fundamental concepts highway engineering.

Course Content

UNIT - I: Introduction

Introduction of Civil Engineering, Scope of Civil Engineering, Role of Civil Engineer in Society. Impact of infrastructural development on economy of country.

UNIT - II: Surveying and Leveling

Introduction: Definition of Surveying, Fundamental principles of surveying, Classification of surveying.

Linear Measurement: Methods, Instruments used in chain surveying, Selection of stations, Chaining and Ranging

Angular Measurement: Instruments used, Types of compass, Types of meridians and bearings, Measurement of bearings, computation of angles. Compass traversing local attraction.

Leveling: Objectives and applications-terminology-Instruments,component parts of dumpy level, Types of leveling, levelling staff.

UNIT - III: Building Materials and Construction

Materials: Introduction to construction materials - Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen.

Construction: Classification of buildings, Building components and their functions.

UNIT - IV: Water Resources, Water Supply, Sanitary and Electrical Works in Building

Hydrologic cycle, water use and its conservation, Introduction to dams, barrages and check dams.

Introduction, water supply system, water supply layout of a building, housedrainage, traps, electrical works in building.

UNIT - V: Transportation Engineering

classification of roads, Introduction of flexible and rigid pavements, Introduction to road traffic and traffic control mechanism.

Text Books

1. Elements of Civil Engineering, Mimi Das Saikia, Bhargab Mohan Dasand Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Basic Civil Engineering, Dr. B.C Punmia,Ashok.K. Jain and Arun K. Jain: Laxmi Publications,Delhi.
3. Surveying Vol. I, Dr. B. C. Punmia, Ashokkumar Jain, ArunkumarJain, 17th Edition Publisher: Laxmi Publications ,Delhi.

Reference Books

1. Surveying and Leveling, R. Subramanian, Publisher: Oxford University.
2. Building drawing, M.G.Shah, C.M.Kale and S.Y.Patki Publisher: TataMcGraw Hill.

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Open Elective - I

ENVIRONMENTAL LAWS AND POLICIES

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To equip the students to have a basic awareness on environmental and socioeconomic Factors.
- To impart the knowledge of environmental pollution problem.
- To elucidate the rules and regulations of patents and trade laws.

Course Outcomes

Upon successful completion of the course, the students will be able to

- comprehend different moral perspectives and one's own Ethical standards.
- understand the concept of safety and risk.
- explain different initiatives to protect nature.
- identify the role of Environmental Engineering.
- understand different types of infringement of Intellectual Property Rights.

Course Content

UNIT - I: Introduction

Introduction to trade and environment - International environmental laws, Right to Environment as Human Right, International Humanitarian Law and Environment, Environment and conflicts management, Famous international protocols like Kyoto.

UNIT - II: Environmental Laws

Overview of environment, Nature and eco system, Concept of laws and policies, Origin of environmental law, Introduction to environmental laws and policies, Environment and Governance, Sustainable development and environment, Understanding climate change, Carbon crediting, Carbon foot print etc.

UNIT - III: Air and Noise Pollution Control Laws

Air pollutants, Sources, classification, Combustion, Processes and pollutant emission, Effects on Health, vegetation, materials and atmosphere, Reactions of pollutants in the atmosphere and their effects-Smoke, Smog and ozone layer disturbance, Greenhouse effect. Air sampling and pollution measurement methods, Principles and instruments, Overview of air pollution control laws and their mitigation measures. Sound power, Sound intensity and sound pressure levels; Plane, Point and line sources, Multiple sources; Outdoor and indoor noise propagation;

Psychoacoustics and noise criteria, Effects of noise on health; Special noise environments: Infrasound, Ultrasound, Impulsive sound and sonic boom; Noise standards and limit values; Noise instrumentation and monitoring procedure, Noise control methods.

UNIT - IV: Water Quality Laws

Introduction to water quality laws development, calibration and verification cost: benefit analysis using models, Laws for estuary and lakes, Waste water treatment legislation; Introduction to water quality management systems and procedures, Consequence Analysis; Socioeconomic aspects, Measures of effectiveness of pollution control activities.

UNIT - V: Environmental Impact Assessment and Life Cycle Analyses

Evolution of EIA: Concepts of EIA methodologies, Screening and scoping; Rapid EIA and comprehensive EIA; General framework for environmental impact assessment, Characterization and site assessment. Environmental Risk Analysis, Definition of risk, Matrix method - Checklist method, Fault tree analysis, Environmental Audit: Cost Benefit Analysis; Life Cycle Assessment; Resource balance, Energy balance & management review; Operational control; Case studies on EIA.

Text Books

1. Kuehn, T.H., Ramsey, J.W. and Threlkeld, J.L., Thermal Environmental Engineering, 3rd Edition, Prentice Hall, 1998.
2. A Textbook of Environmental Chemistry, by O. D. Tyagi and M. Mehra
3. Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, economical and Working Environment, 120th ASEE Annual Conference and Exposition.

Reference Books

1. Larry W. Canter, "Environmental Impact Assessment", 1st edition, McGraw-Hill (international edition).
2. David P. Lawrence, "Environmental Impact Assessment - Practical Solutions to Recurrent Problems", 1st Edition, Wiley-Interscience.
3. Advanced Air and Noise Pollution Control, Lawrence K. Wang, Norman C. Pereira, Yung-Tss Hung, 2005 Edition, Humana Press.
4. Municipal Solid Waste Management, P. Jayarami Reddy, 1st Edition, B.S. Publications.

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Open Elective - I

ELECTRICAL MATERIALS

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To introduce the concepts of dielectric and ferro-magnetic materials.
- To impart knowledge on semiconductor materials, materials used in batteries and solar cells.
- To familiarize the materials required for specific electrical applications.

Course Outcomes

Upon successful completion of the course, the students will be able to

- describe the properties of liquid, gaseous and solid dielectric materials used in electrical applications.
- analyze the properties of Ferro electric, Peizo electric and Pyro electric materials.
- classify different magnetic materials and examine the effects of aging and impurities on magnets.
- elucidate various semiconductor materials and their applications in integrated circuit.
- choose appropriate material for a given electical and special purpose application.

Course Content

UNIT - I: Dielectic Materials

 Dielectric as Electric Field Medium, leakage currents, dielectric loss, dielectric strength, breakdown voltage, breakdown in solid dielectrics, flashover, liquid dielectrics, electric conductivity in solid, liquid and gaseous dielectrics.

UNIT - II: Ferromagnetic Materials

Properties of ferromagnetic materials in static fields, spontaneous, polarization, curie point, anti-ferromagnetic materials, piezoelectric materials, pyroelectric materials, applications of Ferro-electric materials.

UNIT - III: Magnetic Materials

Classification of magnetic materials, spontaneous magnetization in ferromagnetic materials, Magnetostriction, magnetically soft and hard materials, ageing of magnets, Superconductivity and its origin, Zero resistance and Meissner Effect.

UNIT - IV: Semiconductor Materials

Properties of semiconductors, Classification of Semiconductors, Silicon wafers - Wafer manufacturing process, Resistor, Fabrication processes of MOSFET on IC.

UNIT - V: Materials for Electrical Applications

Materials used for Resistors, rheostats, heaters, stranded conductors, fuses, electric contact materials, Solid Liquid and Gaseous insulating materials. Effect of moisture on insulation, Testing of Transformer oil as per ISI standards - Galvanization methods, Materials for battery and solar cells.

Text Books

1. R K Rajput: A course in Electrical Engineering Materials, Laxmi Publications. 2009.
2. David Linden, Thomas B. Reddy "The Handbook of Batteries" McGraw-Hill Hand Books 2010.
3. T K BasaK: A course in Electrical Engineering Materials:, New Age Science Publications 2009.

Reference Books

1. TTTI Madras: Electrical Engineering Materials
2. Adrianus J.Dekker: Electrical Engineering Materials , THM Publication

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CONTROL SYSTEMS ENGINEERING

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To equip the students with the basic concepts of control systems by developing mathematical models for physical systems.
- To familiarize with the time domain behavior of linear control systems.
- To impart knowledge on analytical methods to quantify stability of linear control systems.
- To introduce the state space analysis to continues time systems.

Course Outcomes

Upon successful completion of the course, the students will be able to

- apply the basic concepts and properties of feedback control systems for mathematical modeling of physical systems.
- explore the transfer function analysis using singal flow graph representation of control systems.
- employ the time domain analysis to quantify the performance of linear control systems and specify suitable controllers.
- perform frequency domain analysis of control systems required for stability analysis.
- use the concept of state variable theory to determine the dynamic behavior of linear control systems.

Course Content

UNIT - I: Introduction

Concepts of Control Systems- Open loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back characteristics, Effects of feedback. Mathematical models – Differential equations, Impulse Response and transfer function for physical systems.

UNIT - II: Control Systems Components

Transfer Function of DC Servo motor - AC Servo motor -, Block diagram representation of systems considering -Block diagram algebra – Representation by signal flow graphs - Reduction is using Mason's gain formula.

UNIT - III: Time Response Analysis

Standard test signals - Time response of first order systems – Characteristic equation of feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants.

UNIT - IV: Stability Analysis in S-Domain

The Concept of Stability – Routh's Stability Criterion – Qualitative Stability and Conditional Stability –Limitations of Routh's Stability.

Root Locus Technique: The root locus concept - construction of root loci – simple problems.

UNIT - V: State Space Analysis of Continuous Systems

Concept of state, state variables and state model, derivation of state models from physical systems, solving the Time invariant state equations- State Transition Matrix and its Properties, concept of controllability and observability.

Text Books

1. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International Limited Publishers, 6th edition, 2017.
2. Automatic control system – B.C.Kuo , john wiley and son's 8th edition, 2003.

Reference Books

1. Modern control engineering – K.Ogata , prentice Hall of India Pvt. Ltd., 5th Edition, 2015.
2. Control system – N.K.Sinha, New Age International (p) Limited Publishers, 3rd Edition, 1998.
3. Control system engineering – Norman S-Nice, Willey Studio Edition, 4th Edition. Feed back and control system – Joseph J Distefa.
4. Modern control systems - Richard C. Dorf and Robert H. Bishop, Pearson Prentice Hall Publications, 12th Edition, 2010.

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Open Elective - I

AUTOMOTIVE ENGINEERING

II Year – II Semester

Lecture	: 3	Internal Marks	: 30
Credits	: 3	External Marks	: 70

Course Objectives

- To introduce various components and sub systems of an automobile.
- To impart knowledge on various safety systems of an automobile and emission norms.

Course Outcomes

Upon successful completion of the course, the students will be able to

- outline the various components and sub systems of an automobile.
- specify different safety norms for the operation of an automobile.

Course Content

UNIT - I:

Introduction: classification of automobiles, components of four wheeler automobile- chassis, body, power unit, power transmission- front wheel drive, rear wheel drive, four-wheel drive.

Fuel supply systems: Simple fuel supply system in petrol and diesel engines. working of simple carburettor, direct fuel injection system in diesel engine.

UNIT - II:

Lubricating System: Functions & properties of lubricants, methods of lubrication splash, pressure, dry sump and wet sump lubrication.

Cooling System: Necessity, methods of cooling - air cooling & water cooling, components of water cooling, radiator, thermostat.

UNIT - III:

Ignition System: Functions, requirements, types of an ignition system, battery ignition system - components, Magneto ignition system, electronic ignition system.

Transmission system: Types and functions of the clutches- single plate clutch, multi plate clutch, centrifugal and semi centrifugal clutch, types of gear boxes- Sliding mesh, Constant mesh, Synchromesh, propeller shaft, universal joint and differential.

UNIT - IV:

Suspension System: Objectives of suspension system, front suspension systemrigid axle suspension system, independent suspension system, rear axle suspension, torsion bar, shock absorber.

Braking System: Mechanical brakes, hydraulic brakes-master cylinder, wheel cylinder, tandem master cylinder, brake fluid, air brakes and vacuum brakes.

UNIT - V:

Emissions from Automobile: Emission norms - Bharat stage and Euro norms. engine emissions - exhaust and non-exhaust.

Safety Systems: seat belt, air bags, bumper, antilock brake system (ABS), wind shield, suspension sensor, traction control, central locking, electric windows, speed control.

Text Books

1. Kirpal Singh, "Automobile Engineering Vol-1 & vol-2", Standard Publishers Distributors, 14 th edition, 2017 .
2. William H Crouse & Donald LAnglin, Automotive Mechanics, Tata Mc Graw Hill Publications, 10th edition, 2017.

Reference Books

1. R.B Gupta , Automobile Engineering, Satya Prakashan Publications, 6th edition,2016.
2. Newton steeds & Garrett, "The Motor vehicle", Society of Automotive Engineers, 13th edition,2001.
3. G.B.S. Narang, "Automobile Engineering", Khanna Publishers, 5th edition, 1995.

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ELEMENTS OF MECHANICAL TRANSMISSION

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To familiarize with the principles of mechanical power transmission elements.

Course Outcomes

Upon successful completion of the course, the students will be able to

- choose suitable shaft couplings for a given application.
- propose suitable transmission element for a given application.
- identify suitable power screw for motion transmission.

Course Content

UNIT - I: Shaft Couplings

Shaft couplings: Rigid couplings – muff, split muff and flange couplings, flexible coupling-modified flange coupling.

UNIT - II: Belt Drives

Flat Belts: Introduction, selection of a belt drive, types of belt drives, length of belts, materials, belt joints, types of flat belt drives, power transmitted.

UNIT - III: V-Belt, Rope Drives & Chain Drives

V-belts: Introduction, Types of V-belts, ratio of driving tensions for V-belt, power transmitted.

Rope Drives: Introduction, classification of rope drives, power transmitted.

Chain drives: Introduction, chain drives, polygonal effect, selection of roller chains, length of chain.

UNIT - IV: Power Screws

Forms of threads, multi-start threads, right hand and left hand threads, nut, compound screw, differential screw.

UNIT - V: Gears and Gear Trains

Types, terminology, materials, law of gearing, velocity of sliding, forms of teeth, path of contact, arc of contact, interference, gear Trains - types, differential of an automobile.

Text Books

1. Bhandari, "Design of Machine Elements", Tata McGraw Hill book Co.,5th Edition, 2020.

2. P.C. Sharma & D.K. Agarwal, "Machine Design", S.K.Kataria & Sons ,13th Edition, 2018.

Reference Books

1. Sharma & Purohit, "Design of Machine Elements", PHI, 10th Edition,2011.

2. Kannaiah, "Design of Machine Elements", Scitech Publications, 2nd Edition, 2015.

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INTRODUCTION TO EMBEDDED SYSTEMS

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To introduce the classification, characteristics, applications of embedded systems.
- To provide clear understanding about the role of firmware in correlation with hardware systems.
- To familiarize with the architecture of 8051 microcontroller.

Course Outcomes

Upon successful completion of the course, the students will be able to

- compare embedded and general computing systems.
- select the processors for an embedded system application.
- understand the architecture and instruction set of 8051 microcontroller.
- program the timers/counters and serial communication components of 8051 microcontroller.

Course Content

UNIT - I: Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT - II: Typical Embedded System: Core of the Embedded System

Elements of Embedded Systems, General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT - III: Embedded Firmware

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT - IV: Introduction to 8051 Microcontroller

Overview of 8051 microcontroller, Architecture, I/O Ports, Memory organization, Addressing modes and Instruction set of 8051, Simple programs.

UNIT - V: 8051 Real Time control

Interrupts- 8051 Interrupts, Interrupt Vector table of 8051, IE Register, IP register;Timers and Counters-Timer 0, Timer 1, TMOD Registers, TCON Register,Mode1 Programming; Serial Port- SBUF, SCON Registers, Doubling baud rate using PCON register, program for serial data transmission.

Text Books

1. K.V Shibu, "Introduction to Embedded System", TMH Education private limited, 2009.
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontrollers and Embedded Systems", 2nd Edition, Pearson Education.

Reference Books

1. Kenneth. J. Ayala, Dhananjay V. Gadre, "The 8051 Microcontroller & Embedded Systems Using Assembly and C", 1st edition, Cengage learning, 2010.
2. Rajkamal," Embedded Systems" 2nd Edition, TMH, 2008.
3. Frank Vahid, Tony Givargis, "Embedded System Design", 2nd Edition, John Wiley Publishers.

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Open Elective - I

FUNDAMENTALS OF COMMUNICATION SYSTEMS

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To introduce various analog and digital modulation and demodulation techniques
- To familiarize with various multiplexing schemes and cellular telephone systems

Course Outcomes

Upon successful completion of the course, the students will be able to

- understand the concepts of basic communication system
- compare different multiplexing techniques.
- differentiate DSB-SC, SSB and frequency modulation schemes.
- distinguish ASK, PSK and FSK modulations.
- know the concepts of the cellular telephone systems

Course Content

UNIT - I: Introduction to Communication Systems

Introduction, Communication Process: Elements of communication system, Concept of Bandwidth and frequency spectrum, Sources of information: Classification of signals, Baseband and Band pass signals, Communication channels, Classification of communication systems.

UNIT - II: Basic Models of Communication

Need of modulation, Different types of modulation systems, Multiplexing, Basic Models of Communication. Primary Communication Resources, Survey of communication applications, Analog and digital signals, Conversion of analog signals to digital signals, electromagnetic spectrum (EM) Spectrum.

UNIT - III: Linear Modulation

Basics of Amplitude Modulation: Definition and Physical Appearance, Single tone an AM wave, Frequency Spectrum and Bandwidth of an AM wave, Modulation Index, Power distribution in an AM wave; Forms of an AM signal (theoretical concepts): Double Side Band-suppressed Carrier (DSB-SC), Single Side Band (SSB).

Artificial Intelligence and Data Science 138

UNIT - IV: Angle Modulation

Basics of Frequency Modulation: Definition and Physical Appearance, Frequency Deviation Curve, Equation of FM wave, Frequency Deviation, Modulation Index, Deviation Ratio; Comparison of FM and AM Signals.

Phase Modulation: Definition and Physical Appearance, Equation of PM wave.

UNIT - V: Digital Transmission

Digital communication system model, advantages and disadvantages of digital communication, pulse code modulation (PCM), ASK, FSK, PSK, Basics of cellular telephone systems.

Text Books

1. Wayne Tomasi, "Electronics Communication systems", Pearson Education, 5th edition, 2004.
2. Dr. Sanjay Sharma, "Communication Systems: Analog and Digital", Katson Books, 7th Reprint Edition, 2018.

Reference Books

1. Simon Haykin, John Wiley, "Principles of Communication Systems", 2nd Edition, John Wiley & Sons.
2. V. Chandra Sekar, "Analog Communication", Oxford University Press, 2010.
3. Dr. Sanjay Sharma, "Digital Communications", Katson Books.
4. B.P.Lathi, "Modern Analog and Digital Communication", 3rd Edition, Oxford reprint, 2004.

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Open Elective - I

INFORMATION RETRIEVAL SYSTEMS

II Year – II Semester

Lecture	: 3	Internal Marks	: 30
Credits	: 3	External Marks	: 70

Course Objectives

- To introduce basic concepts in information retrieval.
- To familiarize with applications of information retrieval techniques in the Internet or Web environment.

Course Outcomes

Upon successful completion of the course, the students will be able to

- identify the basic theories in information retrieval systems.
- use inverted file as an index data structure to retrieve the documents from the database.
- create signature files for fast retrieval of text data.
- build PAT treesand PAT arrays for the given text document.
- use stemming algorithms to improve the performance of IR systems.

Course Content

UNIT - I: Introduction to Information Storage and Retrieval System

Introduction, Domain Analysis of IR systems and other types of Information Systems, IR System Evaluation. Introduction to Data Structures and Algorithms related to Information Retrieval: Basic Concepts, Data structures, Algorithms.

UNIT - II: Inverted files

Introduction, Structures used in Inverted Files, Building Inverted file using a sorted array, Modifications to Basic Techniques.

UNIT - III: Signature Files

Introduction, Concepts of Signature Files, Compression, Vertical Partitioning, Horizontal Partitioning.

UNIT - IV: New Indices for Text

PAT Trees and PAT Arrays: Introduction, PAT Tree structure, algorithms on the PAT Trees, Building PAT trees as PATRICA Trees, PAT representation as arrays.

UNIT - V: Stemming Algorithms

Introduction, Types of Stemming Algorithms, Experimental Evaluations of Stemming to Compress Inverted Files.

Text Books

1. Frakes W.B., Ricardo Baeza-Yates, "Information Retrieval Data Structures and Algorithms", Prentice Hall, 1992.
2. Ricardo Baeza-Yates, Bertheir Ribeiro-Neto, "Modern Information Retrieval", Pearson Education.
3. Robert Korfhage, "Information Storage & Retrieval", John Wiley & Sons.

Reference Books

1. Kowalski, Gerald, Mark T Maybury, "Information Retrieval Systems-Theory and Implementation", Kluwer Academic Press, 1997.
2. Information retrieval Algorithms and Heuristics, 2nd edition, Springer.

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COMPUTER GRAPHICS

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To emphasize on functionalities of various graphic systems and geometric transformations
- To familiarize on visible surface detection methods and computer animations.

Course Outcomes

Upon successful completion of the course, the students will be able to

- outline different graphical display devices and drawing algorithms.
- illustrate different 2-D geometrical transformations on graphical objects
- interpret different line and polygon clipping algorithms
- infer different 3- D transformations and viewing functions on objects.
- summarize different surface detection methods and computer animations

Course Content

UNIT - I: Introduction

Introduction: Application of computer graphics, raster scan and random scanDisplays.

Filled Area Primitives: Points and lines, inside and outside tests, line drawing algorithms, Scan line polygon fill algorithm.

UNIT - II: 2-D Geometrical Transforms

Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transformations.

UNIT - III: 2D Viewing

The viewing pipeline, window to view-port coordinate transformation, Cohen-Sutherland line clipping algorithm, Sutherland – Hodgeman polygon clipping algorithm.

UNIT - IV: 3D Geometric Transformations

Translation, rotation, scaling, reflection and shear transformations, composite transformations, types of projections.

UNIT - V: Visible Surface Detection Methods and Animation

Classification – types, back-face detection, depth-buffer, BSP tree, area sub-division method.

Animations: General computer animation, raster animation, key frame systems, Graphics programming using Open GL.

Text Books

1. Donald Hearn, M. Pauline Baker, "Computer Graphics *C* version", 2nd e edition, Pearson Education.
2. Francis S.Hill, Stephen M. Kelley, "Computer Graphics using Open GL", 3rd edition, Pearson Education.

Reference Books

1. Foley, VanDam, Feiner, Hughes, "Computer Graphics Principles and Practice", 2nd edition, Pearson Education.
2. Rajesh K Maurya, "Computer Graphics with Virtual Reality Systems", Wiley.

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SYSTEM SOFTWARE

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To familiarize with the implementation details of assemblers, loaders, linkers, and macro processors.

Course Outcomes

Upon successful completion of the course, the students will be able to

- outline the relationship between system software and machine architecture.
- analyze working of assembler for a simplified Instructional computer.
- describe the important features of linkage Editors and Dynamic Linking .
- identify the mostly used macro processors algorithms and data structures.
- compare the functions of Absolute Loader , Bootstrap Loaders.

Course Content

UNIT - I: Introduction

System software and machine architecture, The Simplified Instructional Computer (SIC), Machine architecture, Data and instruction formats, addressing modes, instruction sets, I/O and programming System.

UNIT - II: Assemblers

Basic assembler functions, SIC assembler, assembler algorithm and data structures, machine dependent assembler features.

UNIT - III: Implementation of Assemblers

Instruction formats and addressing modes, program relocation, machine independent assembler features, literals, symbol, defining statements, expressions, one pass assemblers, multi pass assemblers, implementation example, MASM assemble.

UNIT - IV: Loaders & Linkers

Basic loader functions, design of an absolute loader, simple bootstrap loader, machine dependent loader features, relocation, loader options, program linking, algorithm and data structures for linking loader, linkage editors, dynamic linking, implementation example.

UNIT - V: Macro Processors

Basic macro processor functions, macro definition and expansion, macro processor algorithm and data structures, machine independent macro processor features, concatenation of macro parameters, generation of unique labels, conditional macro expansion.

Text Books

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 3rd edition, Pearson Education Asia, 2000.

Reference Books

1 D. M. Dhamdhere, "Systems Programming and Operating Systems", 2nd Revised edition, Tata McGraw-Hill, 1999.
2. John J. Donovan "Systems Programming", Tata McGraw-Hill Edition, 1972.

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FREE & OPEN SOURCE SOFTWARE

II Year – II Semester

Lecture : 3	Internal Marks	: 30
Credits : 3	External Marks	: 70

Course Objectives

- To impart the opportunities for open source software in the global market.
- To familiarize with different steps in implementing the open source.

Course Outcomes

Upon successful completion of the course, the students will be able to

- state the need and applications of open source software.
- compare and Contrast between Open source and commercial software
- demonstrate LINUX operating systems concepts.
- create database in MYSQL and perform operations on it.
- design and develop a web application using PHP.

Course Content

UNIT - I: Introduction

Introduction to Open sources, Need of Open Sources, Advantages of Open Sources and Application of Open Sources.

UNIT - II: LINUX

LINUX Introduction, General Overview, Kernel Mode and user mode, Process, Advanced Concepts-Personalities, Cloning, Signals.

UNIT - III: PHP

PHP- Introduction, Programming in web environment, variables, constants, data types, operators Statements, Arrays.

UNIT - IV: MySQL

MySQL: Introduction, Setting up account, Starting, terminating and writing your own SQL programs, Record selection Technology, Working with strings, Date and Time, Generating Summary, Working with metadata.

UNIT - V: Advanced PHP

OOP–String Manipulation, PHP and SQL database, PHP Connectivity, Debugging and error handling.

Text Books

1. M.N.Rao, "Fundamentals of Open Source Software", PHI Learning.
2. Steve Suchring,"MySQLBible", John Wiley, 2002

Reference Books

1. Remy Card, Eric Dumas and Frank Mevel, "The Linux Kernel Book", Wiley Publications, 2003.

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FUZZY MATHEMATICS

II Year – II Semester

Lecture : 3	Internal Marks : 30
Credits : 3	External Marks : 70

Course Objectives

- To impart the knowledge of fuzzy set theory and its applications in Engineering.

Course Outcomes

Upon successful completion of the course, the students will be able to

- state the need and applications of open source software.
- distinguish between crisp set and fuzzy set.
- know different operations on fuzzy relations.
- use defuzzification methods to crisp sets.
- draw inferences using fuzzy logic.
- develop membership value assignments.

Course Content

UNIT - I: Classical Sets And Fuzzy Sets

Classical sets – Operations – Properties. Fuzzy sets – Operations – Properties – membership functions - Features of the membership function.

UNIT - II: Fuzzy Relations

Fuzzy Cartesian product and composition - Fuzzy relations - Operations - Properties of fuzzy relations - Fuzzy tolerance and equivalence relations.

UNIT - III: Fuzzification And Defuzzification

Fuzzification - defuzzification to crisp set - Defuzzification to scalars (centroid method, centre of sums method, mean of maxima method).

UNIT - IV: Fuzzy Logic

Classical logic – Fuzz logic – Approximate reasoning ["if ... then" approach and "if ... then ....else" approach] – Other forms of the implication operation.

UNIT - V: Development Of Membership Functions

Membership value assignments – Inference – Rank ordering – Neural networks – Genetic algorithms – Inductive reasoning.

Text Books

1. Timothy J.Ross., Fuzzy Logic with Engineering Applications - Second Edition, Wiley Publications, 2015, New Delhi.

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2. S.Rajasekaran, G.A.Vijayalakshmi Pai, Neural networks, Fuzzy logic, and genetic algorithms synthesis and applications- – Prentice-Hall of India private limited, 2008, New Delhi.

Reference Books

1. H.J. Zimmarman, Fuzzy set theory and its applications, 4th edition —— Springer, 2013. New Delhi.
2. S.Nanda and N.R.Das "Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi.

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