R G M COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
NANDYAL-518501, KURNOOL DIST., A.P., INDIA

DEPARTMENT OF
CIVIL ENGINEERING (CE)

(ESTD-1995)

I B.TECH SYLLABUS 2019

Applicable for students admitted into
B.Tech (Regular) from 2019-20
B.Tech (Lateral Entry Scheme) from 2020-21
REGULATIONS, Course Structure & Detailed Syllabus

R G M COLLEGE OF ENGINEERING AND TECHNOLOGY

AUTONOMOUS

DEPARTMENT OF CIVIL ENGINEERING

(Affiliated to J.N.T.U.A, Anantapuramu)

ACADEMIC REGULATIONS, COURSE STRUCTURE AND DETAILED SYLLABI

B.Tech. (Regular) from 2019-20 and B.Tech. (Lateral Entry Scheme) from 2020-21

For pursuing four year Bachelor Degree Program (under graduate) of study in Engineering (B.Tech.), Two year Master (post graduate) Degree of study in Engineering (M.Tech.), Two year Master (post graduate) degree of study in Business Administration (MBA), Three-year Master (post graduate) Degree of study in Computer Applications (MCA) offered by Rajeev Gandhi Memorial College of Engineering and Technology, Nandyal -518501 under Autonomous status and herein referred to as RGMCET (Autonomous).

All the rules specified herein approved by the Academic Council will be in force and applicable to students admitted from the Academic Year 2019-20 onwards. Any reference to “Institute” or “College” in these rules and regulations shall stand for Rajeev Gandhi Memorial College of Engineering and Technology (Autonomous).

All the rules and regulations, specified hereafter shall be read as a whole for the purpose of interpretation. As and when a doubt arises, the interpretation of the Chairman, Academic Council is final. As per the requirements of statutory bodies, the Principal, Rajeev Gandhi Memorial College of Engineering and Technology shall be the Chairman, Academic Council.

The candidate seeking admission into the first year of study of four year B.Tech degree Program should have:

i) Passed either Intermediate Public Examination (IPE) conducted by the Board of Intermediate Education, Andhra Pradesh with Mathematics, Physics and Chemistry as optional subjects (or any equivalent examination certified by Board of Intermediate Education) or a Diploma in Engineering in the relevant branch conducted by the Board of Technical Education, Andhra Pradesh (or any equivalent examination certified by State Board of Technical Education) for admission.

ii) Secured a rank in the EAMCET examination conducted by AP State Council for Higher Education (APSCHE) for allotment of a seat by the Convener, EAMCET, for admission.

Admission Procedure:

As per the norms of A.P. State Council of Higher Education (APSCHE), Government of Andhra Pradesh, admissions are made to the first year of Four year B.Tech. Degree program as follows:-

a) As per the norms of Government of Andhra Pradesh, A-Category (based on the rank obtained in EAMCET) seats will be filled by the Convener, EAMCET.

b) As per the norms of Government of Andhra Pradesh, B-Category seats will be filled by the management.

Admission to the Second year of Four year B.Tech. Degree Program in Engineering:

i) Candidates qualified in ECET and admitted by the Convener, ECET, in such cases for admission, when needed permission from the statutory bodies is to be obtained.

ii) 10% of the sanctioned strength in each program of study (of RGMCET) shall be filled by the Convener, ECET as lateral entry.

List of Programs offered

1. B.Tech – Regular & Lateral Entry
2. M.Tech – Regular
3. MBA – Regular
4. MCA – Regular

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Academic Regulations for 2019 B. Tech. (Regular)

(Effective for the students admitted into the I year from the Academic Year 2019-2020)

The B.Tech. Degree be conferred by the Jawaharlal Nehru Technological University Anantapur, Anantapuramu, students who are admitted to the program and fulfill all the requirements for the award of the Degree as specified below:

1.0 Award of B.Tech. Degree

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

1.2 Pursued a course of study for not less than prescribed course work duration and not more than double the prescribed course work duration.

1.3 Registered for 160 credits and secured 160 credits with compulsory subjects as listed in Table-1.

Table 1: Compulsory Subjects

S.No	SUBJECT PARTICULARS
1	All the subjects offered in B.Tech course / MOOCs
2	Mandatory Learning Courses [Environmental Science, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]
3	All practical subjects
4	All Skill Development Courses/ value added courses
5	Mini projects
6	Comprehensive Viva-Voce
7	Seminar
8	Internship
9	Extra Academic Activities-EAA
10	Life Science
11	Project work Phase-I
12	Project Work Phase-II

2.0 Forfeit of seat

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

3.0 Courses of study

The following courses of study are offered at present as specializations for the B.Tech. Course: and any other course as approved by the authorities of the University from time to time.

1. **Civil Engineering**
2. **Computer Science and Engineering**
3. **Electrical and Electronics Engineering**
4. **Electronics and Communication Engineering**
5. **Mechanical Engineering**

Table 2: Credits

Subject	Semester			
	Periods/ Week	Credits	Internal Marks (IM)	External Marks (EM)
Theory	2+1*	03	30	70
English Theory	1+1*	02	30	70
Life Science	2	02	30	70
Mandatory Learning Courses	03	00	00	00
Mini project/ Practical	03	1.5	25	50
Drawing	03	03	30	70
Skill Development Courses/Value Added Course	1+2*	0.5**	30	70
Comprehensive Viva (CV)	--	0.5	00	50
Extra Academic Activities	2	00	00	00
Seminar		0.5	50	00
Internship		1.0	00	Certificate from Internship Agency
Project Phase-I		1.0	25	00
Project Phase-II	--	06	25	100

*Tutorial

**[Skill Development / value Added Courses credits will not be considered for the award of division.

However, all these courses have to be cleared through internal evaluation by scoring minimum of 40% marks. The credits obtained in Skill development courses will be taken in to account for the award of degree.]

Note:- Mandatory Learning Courses /EAA will not carry any credits but attendance requirements of 75% should be fulfilled otherwise they have to reregister to fulfill academic requirements.

4.0 Distribution and Weightage of Marks

4.1 The performance of the student in each semester shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition, mini-project, Comprehensive Viva-Voce (CV) shall be evaluated for 50 marks each and the project work shall be evaluated for 150 marks.

4.2 For theory subjects, the distribution shall be 30 marks for Internal Evaluation (20 marks for internal test and 10 marks for assignment or field work/group task/Online test) and 70 marks for the End-Examination.

4.3 During the semester there shall be 2 tests for theory subjects. In each Internal test there shall be one compulsory (short answers) question and 3 descriptive questions are to be answered. The duration of internal test will be for 2hours. First test to be conducted in 3 units and second test to be conducted in the remaining 3 units of each subject. For awarding of 20 Internal marks the performance of the student in two Internal examinations conducted one in the middle of the semester and the other towards the end of the semester giving a weight age of 0.75 for the better score and 0.25 for the other score will be considered. There shall be two assignments in each subject (problem based/ field work/group task/Online test) for award of 10 marks so that internal component (marks) will be 30 marks (20 marks for internal test+10 marks for assignments / field work/group task).

Table 3: Units for Internal Tests

Semester	
3 Units	First Internal test
3 Units	Second Internal test

4.4 In the case of Skill Development Courses, two Internal examinations shall be conducted one in the middle of the semester and the other at the end of the semester for 30 marks and the

marks scored by the student in these exams with a weight age of 0.75 for better score and 0.25 for the other score will be awarded as Internal marks for 30. For the remaining 70 marks an end examination will be conducted along with other theory examinations. However skill development courses/Value added courses, end examination will be evaluated internally.

4.5 No makeup test for internal examination or assignments/group tasks will be conducted in any subject or practical. The student, who is absent for any test shall be deemed to have scored zero marks in that subject.

4.6 Open and Professional Electives will commence from 3rd year Second semester onwards. The open elective offered in 3-2 semester will be based on self-study/MOOCs. All the students have to opt for the MOOCs (Self Study) and should acquire the required credits. If the student fails to opt for MOOCs, (Under unavoidable circumstances) he/she has to write two internal tests besides the end examination conducted by the institute (Elective offered in place of MOOCs by the Dept.) like other subjects. However, he/she has to obtain the certificate from the organization in which he has registered. Any MOOCs course selected by the student should be of more than 45 hours duration /12 weeks course with minimum of 3 credits and also from the reputed organization. Attendance of the student who has opted for MOOCs will be taken from the remaining subjects and labs only in that semester while finalizing the attendance for fulfilling the minimum requirements of attendance for promotion to the next semester. Attendance will not be recorded for MOOCs.

{Massive open online Courses (MOOCs') B.Tech students can avail the facility of earning up to a maximum of 5% credits of their degree requirements through MOOCs. MOOC courses eligible for this purpose are the courses offered by NPTEL/ SWAYAM/EDX/Course by any other reputed organisation approved by the department only. The student shall obtain prior approval of the Head of the Department before registering for MOOC's. MOOC courses can be taken in lieu of Elective courses such as Open Electives & Professional Electives (pertaining to their branch only) and Employability Enhancement Courses. No Core, Lab or Project Course can be dropped in lieu of MOOC. The student shall submit course Title, institute which offered MOOC, Examination system and Credits of the Course, duration of course ¬After deciding on the MOOC and a course which is approved as its equivalent in the curriculum a student can enrol for it and clear it any time as per his/her convenience and obtain the assessment certificate.

If the assessment certificate is submitted

(i) Before the commencement of the semester in which the equivalent course is offered, the student will be exempted from attending the regular class work and internal assessment exams of the equivalent subject.

(ii) During the semester the student is permitted to withdraw from the remaining part of the course work and internal assessment tests.

(iii) After the semester is over but before the results of that semester are declared the student can request for considering his performance in the MOOC in lieu of its equivalent.

The student shall submit to the HOD the original certificate issued by MOOC authorities along with a photocopy of the same. The original will be returned after verification and verification shall be certified by the Head of the Department on the photocopy which shall be kept in records. An equivalent Grade corresponding to grade/marks awarded by MOOC agency shall be determined by a committee consisting of Principal, Controller of Examinations, Dean Student affairs and HoD concerned. This equivalent Grade shall be shown in the grade sheet and accounted in the SGPA and CGPA calculations.

4.7 Gap Year – Concept of student Entrepreneur in Residence shall be introduced and the outstanding students who wish to pursue entrepreneurship are allowed to take a break of one

year at any time after I/II/III year to pursue full time entrepreneurship. This period may be extended for another one year (two years in total) and this period would not be counted for the maximum duration for completion of graduation. An evaluation committee shall be constituted to evaluate the proposal submitted by the student and committee shall decide on permitting the student for having the Gap Year. The committee consists of Principal as Chairman and all HODs as members.

4.8 In the open electives offered from III year II Sem onwards Student has to select the subjects among the list of open elective subjects by the other departments (inter - department). Student has to clear the subject as per norms to get the required credits. At least minimum of 40 students should register for any open elective; otherwise that open elective will not be offered.

4.9 Out of the professional electives offered from III Year II Semester onwards again one Professional elective in IV Year I Sem will be a MOOCs (Self Study) and the student has to acquire the required credits to clear the subject as specified in 4.6.

4.10 The institute would like to offer **Honours** and **Minor** as optional feature of the B. Tech program aimed at providing additional learning opportunities for academically motivated and bright students. In order to earn Honours or Minor, student has to earn a minimum of 20 extra credits. For this in addition to the regular subjects, a student has to pursue (Self-study/MOOCs) five additional subjects from 3-1 semester onwards and acquire the required credits. The Minor is indicated by separate CGPA and is reflected in the degree certificate as for example, B.Tech. in ECE with Minor in Artificial Intelligence. Each department shall offer at least one Minor and also Honours. The student has to select the subjects which are not studied in their regular course and student should have cleared all the subjects up to and including 2-1 semester with above 8.5 CGPA (for SC/ST students 8.0 CGPA) to become eligible for registration for Honours/Minor. GPA and CGPA of 8.0 has to be maintained in the subsequent semesters without any backlog subjects in order to keep the Minor/Honours discipline registration active else Minor/Honours registration will be cancelled. The breakup of the credits are 5 subjects which carry 15 credits @3 credits per subject and project work carries 5 credits. The evaluation pattern of subjects and project work will be similar to methods followed in regular course evaluation. No attendance minimum will be considered for Honours/Minor. Not more than two subjects are allowed for registration in any semester for Honours/ Minor. The student is eligible to receive B.Tech with Honours if he acquires the required additional credits in the same discipline in which he is pursuing his B.Tech. degree. If the students acquire the additional credits from other disciplines then he is eligible to receive B.Tech along with Minor degree in the specified area. Minimum strength for offering Minor/Honours in a discipline is considered as One-Fifth (20% of the class) of the class size and Maximum size would size would be Four-Fifth of Class size (i.e 80% of the class).

4.11 Extra - Academic Activity (EAA)

Each of the following activities carries 0.5 credits and every student is required to register for **two** activities during second year of study (one in each semester) which is mandatory.

a) ***NSS/NCC***
b) ***Games and Sports***
c) ***Yoga/Meditation***
d) ***Extension Activities***
e) ***Literary/ Cultural Activities***

Any other which may be offered in future.

The activities shall be carried out in the allotted hours. The activities will be monitored by the respective faculty in charge, senior faculty member of the department and the Department HOD. Grades will be awarded on the basis of participation, attendance, performance and

behavior. Grades shall be entered in the marks statement as GOOD, SATISFACTORY and UNSATISFACTORY and shall not be counted towards CGPA calculation. If any student gets an Unsatisfactory Grade, he/she has to repeat the activity in the immediate subsequent year.

4.12 The student has an option of going for internship in IV year –II Sem in a reputed organization (The finalization of the internship organization will be as per college guidelines (HOD, two Senior faculty members of the department and same will be recommended to the Principal for approval). In case any student opted for intern ship he need not attend the classes however he has to write internal and external examination of subjects when ever conducted in that semester and acquire the required credits. The project work in the final semester may be carried out during the internship and same may be submitted for evaluation. Student has to acquire 01 credit by going for internship (minimum of Two weeks) / carrying out internal project work/ study project report on any industry/ attending work shop in reputed institutions for two weeks. Certificate from the organization has to be submitted to this effect attested by Head of the Department and Internship in charge to the academic section before the commencement of 3-2 semester. Student is expected to carry out the activities mentioned here during the summer break before the commencement of 3-1 semester.

4.13 The medium of instruction for all Course work, Examination, Seminar Presentations, Project Reports and all academic activities shall be English

5.0 Question Paper Pattern

5.1 Each Internal Test question paper shall contain 5 questions, of which the First question is compulsory and three questions are to be answered from the remaining four. Compulsory question carries 5 marks (It contains 5 questions of one marks - no choice in first question). The remaining 3 questions carry 5 marks each. Each question shall have a,b,c.... parts.

5.2 The End Examination question paper will have 7 questions and students have to answer5 questions. However, the first question is compulsory and it consists of 7 short answer questions, each carrying 2 marks. The next 4 questions are to be answered from the remaining 6 questions and each carries 14 marks. Each 14 marks question shall have a, b, c .. parts. Evaluation of answer scripts shall be done by either Internal or External examiners appointed by the Principal. A minimum of 50% of subjects will be evaluated by external examiners.

5.3 For practical subjects, there shall be a continuous evaluation during the semester for 25 internal marks and End Examination carries 50 marks. Of the 25 marks for Internal, 15 marks shall be awarded for day-to-day work, 5 marks to be awarded by conducting an internal laboratory test and 05 marks will be allotted for any creativity/ innovation/ additional learning in lab beyond prescribed set of experiments etc. The End Examination shall be conducted by the teacher concerned and an external Examiner from other institutions.

5.4 For the subject having design and/or drawing, (such as Engineering Graphics, Machine Drawing etc.) and estimation, the distribution shall be 30 marks for Internal evaluation (15marks for day-to-day work and 5 marks for Internal tests and 10 marks for assignments) and 70 marks for End Examination. There shall be two internal tests in a Semester and the better of the two shall be considered for the award of marks for internal tests.

5.5 The Engineering drawing, wherever offered is to be treated as a theory subject. Evaluation method adopted for theory subjects shall be followed here as well.

5.6 There shall be two Mini-Projects, in collaboration with an industry/EPICS (Engineering Projects In Community Services) (wherever is possible) of their specialization, to be taken up during the vacation (data collection, components etc.) after II year II and III Year II Semester examination and implementation/simulation shall be carried out in III year I semester and IV Year I Semester during lab classes. Implementation or fabrication/simulation of mini projects will be treated as laboratory. However, the mini project and its report shall be evaluated in III

year I Semester and IV Year I semester. The mini project shall be submitted in the report form and should be presented before the committee, which shall be evaluated for 50 marks. The committee consists of an external Examiner, Head of the Department and the supervisor of mini project. There shall be 25 internal marks for mini project which will be awarded based on the performance and involvement of the student during mini project period.

5.7 There shall be comprehensive Viva-Voce examination at the end of each semester.CV Examination shall be conducted by the committee consisting of Senior faculty (based on the recommendation of HOD), an external Examiner from other institutions and HOD and evaluated for 50 marks.

5.8 The project topic should be approved by Internal Department Committee (IDC). Out of total 150 marks for the project work, 50 marks shall be for Internal Evaluation (25 marks for Phase-I and 25 marks for Phase-II) and 100 marks for the End Semester Examination. The evaluation of project work phase-I shall be conducted at the end of the IV year I semester and Phase-II shall be conducted at the end of the IV year II semester. The project viva voce examination will be conducted by the committee consisting of an external Examiner from other institute, Head of the Department and the supervisor of the project. The Internal evaluation for 50 marks shall be on the basis of two seminars (25 marks for Phase-I and 25 marks for Phase-II) given by each student on the topic of the project. The Internal evaluation of the project work for 50 marks shall be conducted by the committee consisting of head of the Department or his nominee, senior faculty member and the supervisor of project.

5.9 For all practical /mini project/main project/CV etc. the HOD of the concerned dept. shall submit a panel of 4 external examiners from different institutes and one will be selected by the Chief Superintendent of the Examination for conducting of end examination.

5.10 Revaluation of End Examination Scripts: Revaluation of End Examination scripts is allowed for theory subjects only by paying requisite fee. Procedure for Revaluation: The script will be revaluated by an examiner appointed by the Principal. The maximum of revaluation and regular end examination grade will be awarded for that subject. Student can apply for revaluation in a subject only once.

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Table4: Distribution of weightages for examination and evaluation

Sl. No.	Nature of subject	Marks	Type of examination and mode of assessment		Scheme of Examination
1	Theory	70	End Examination. Both internal and external Evaluation(at least a minimum of 50% subjects will be sent for external evaluation)		End Examination in theory subjects will be for 70 marks.
		30	20	Internal Examinations (Internal evaluation)	These 20 marks are awarded to the students based on the performance in two (per semester) Internal examinations with a weightage of 0.75 for better score and 0.25 for the other score.
			10	Assignments/Field work/Group task/Online Test (Objective Type) (Internal evaluation)	Average of two assignments /Field work/group task in a semester each evaluated for 10 marks.
2	Practical	50	End lab examination (External evaluation)		This End Examination in practical subjects will be for a maximum of 50 marks.
		25	15	Internal evaluation	Day-to-day performance in lab experiments and record.
			05	Internal evaluation	Internal lab examination at the end of year/semester
			05	Internal evaluation	05 marks will be allotted for any creativity/ innovation/ additional learning in lab beyond prescribed set of experiments etc.
3	Mini Project	50	End Examination (External evaluation)		This End Examination in mini project will be for a maximum of 50 marks.
		25	Internal evaluation		Day-to-day performance in executing mini project.
4	Comprehensive Viva-Voce(CV)	50	External evaluation		This end viva voce examinations in all the subjects for 50 marks.
5	Project work	100	External evaluation		This end viva voce in project work for 100 marks
		50	Internal evaluation 25 marks for Phase-I 25 Marks for Phase-II		These 50 marks will be based on the performance of the student in the project reviews apart from attendance and regularity(25 marks for Phase-I and 25 marks for Phase-II)
6	Skill Development Courses/ Value Added Course/ Mock interviews and Group Discussion	30	Internal evaluation		These 30 marks are awarded to the students based on the performance of two Internal examinations with a weight age of 0.75 for better score and 0.25 for the other score.
		70	Internal Evaluation		Based on the performance in the end examination.
7	Internship/Internal Project/Study Report/Work shop	00	-----		Certificate form Internship Agency
8	Life Science	70	External Evaluation		End Examination in theory subjects will be for 70 marks.
		30	20	Internal Examinations (Internal evaluation)	These 20 marks are awarded to the students based on the performance in two (per semester) Internal examinations with a weightage of 0.75 for better score and 0.25 for the other score.
			10	Assignments/Field work/Group task/Online Test (Objective Type) (Internal evaluation)	Average of two assignments /Field work/group task in a semester each evaluated for 10 marks.
9	EAA	00	Internal evaluation		Based on performance and committee report.
10	Mandatory Learning Courses	00	Internal evaluation		No examinations. Attendance minimum is required

6.0 Attendance Requirements:

6.1 The student shall be eligible to appear for End examinations of the semester if he acquires a minimum of 75% of attendance in aggregate of all the subjects of that semester.

6.2 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in a semester may be granted by the College Academic Committee.

6.3 The student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester. They may seek re-admission for that semester when offered next.

6.4 Shortage of Attendance below 65% in aggregate shall in NO case be condoned.

6.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their End Examination of that class and their registration shall stand cancelled.

6.6 The stipulated fee shall be payable towards condonation of shortage of attendance.

7.0 Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No.6.0.

7.1 The student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical or design or CV or drawing subject or Skill Development Coursesor project if he secures not less than 35% of marks in the End Examination and he has to score minimum of 40% marks from internal and external exam marks put together to clear the subject.

7.2 The student shall be promoted from II to III year only if he fulfils the academic requirement of securing a minimum of 40.5 credits out of 81 credits from all the exams conducted up to and including II year II semester regular examinations irrespective of whether the candidate takes the examination or not.

7.3 The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing minimum of 61.5 credits out of 123 credits from all the exams conducted up to and including III year II semester regular examinations, whether the candidate takes the examinations or not.

Table 5: Promotion rules

Promotion from	Total credits to register	Minimum credits to obtain for promotion
II yr to III yr	81	40.5
III yr to IV yr	123	61.5

7.4 The student shall register and put up minimum attendance in all 160 credits and earn 160 credits. Grades obtained in 157 credits (excluding the credits obtained in Skill Development Courses/Value added courses) shall be considered for the calculation of CGPA.

7.5 Students who fail to earn 160 credits as indicated in the course structure in Table-1 within eight academic years from the year of their admission shall forfeit their seat in B.Tech. Course and their admission shall stand cancelled.

8.0 Course pattern:

8.1 The entire course of study is of four academic years. Each academic year consists of two semesters

8.2 The student is eligible to appear for the End Examination in a subject, but absent at it or has failed in the End Examination may appear for that subject at the supplementary examination.

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Table: 6: Course pattern

Year	Semester	No. of Subjects		No. of Skill Development Courses	Number of Labs		Total credits	
First Year	First	CE/ME/CSE 05 {ENG-I-HSMC M-I-BSC CP,ESC MEC-BSC E E Concepts-ESC	ECE/EEE 05 {ENG-1-HSMC M-I-BSC CP-ESC EP-BSC ED-ESC}	00	CE/ME/CSE EC lab-BSC CP lab-ESC ELCS-HSMC Comprehensive Viva	ECE/ EEE EP Lab-BSC CP lab-ESC EWS/ITWS-ESC Comprehensive Viva	4X3=12 1x2=02 3X1.5=4.5 1x0.5=0.5	19
	Second	05 {ENG-2-HSMC M-II-BSC DS-ESC AP/EP-BSC ED-ESC	05 {ENG -2-HSMC M-II-BSC DS-ESC MEC-BSC E E Concepts }	00	EP lab-BSC DS Lab-ESC EWS/ITWS-ESC CV	EC lab-BSC DS lab,-ESC ELCS-HSMC CV	4X3=12 1x2=02 3X1.5=4.5 1x0.5=0.5	19
Second Year	First	BSC Life Science Four Subjects	BSC Life Science Four Subjects	01	Subjects Life Science Labs Comprehensive Viva SDC/VAC EAA		5X3=15 1x2=2.0 3x1.5=4.5 1X0.5=0.5 1x0.5=0.5 NC	22.5
	Second	ML-I/ML-2/ML-3 Five Subjects SDC/VAC	ML-I/ML-2/ML-3 Five Subjects SDC/VAC	01	Subjects Labs Comprehensive Viva SDC/VAC Mandatory Learning Course-1/2/3 (ECE/CSE&EEE/CE&ME) (Indian Heritage, Culture Tradition)Mandatory Learning Course-3 (Constitution of India) EAA		5X3=15 3X1.5=4.5 1X0.5=0.5 1x0.5=0.5 NC NC	20.5
Third Year	First	Five Subjects SDC/VAC ML-I/ML-2/ML-3	Five Subjects SDC/VAC ML-I/ML-2/ML-3	01	Subjects(05S) Labs SDC/VAC Comprehensive Viva Mandatory Learning Course-1/2/3 (ECE/CSE&EEE/CE&ME) (Indian Heritage, Culture Tradition)		5X3=15 3X1.5=4.5 1x0.5=0.5 1X0.5=0.5 NC	20.5
	Second	03S + OE1(MOOCs) + PE1 ML-I/ML-2/ML-3	03S + OE1(MOOCs) + PE1 ML-I/ML-2/ML-3	01	Subjects(03S, OE1, PE1) Labs Mini Project-1(EPICS) SDC/VAC Comprehensive Viva Internship Mandatory Learning Course-1/2/3 (ECE/CSE&EEE/CE&ME) (Indian Heritage, Culture Tradition)Mandatory Learning Course-3 (Constitution of India)		5X3=15 2x1.5=3.0 1x1.5=1.5 1X.5=0.5 1X0.5=0.5 1x1.0=1.0 NC	21.5
Fourth Year	First	1S+OE2+OE3+PE2+PE3 (MOOCs)		01	Subjects(01S, OE2, OE3, PE2,PE3) Labs SDC/VAC Comprehensive Viva Project Phase 1 Mini project-2(EPICS)		5X3=15 2X1.5=03 1X0.5=0.5 1X0.5=0.5 1x1.0=1.0 1X1.5=1.5	21.5
	Second	PE4+PE5		01	Subjects (PE4, PE5) SDC/VAC Comprehensive Viva Seminar Project Phase-2/Internship		2X3=06 1X0.5=0.5 1X0.5=0.5 1x.5=0.5 1X8=08	15.5
GRAND TOTAL								160
ML1-(Environmental Studies), ML-2(Indian Heritage, Culture Tradition), ML-3(Constitution of India)								

9.0 Transitory Regulations:

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone this course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered subject to section 2.0 and they continue to be in the academic regulations in which they were readmitted.

10.0 With-holding of results:

If the candidate has any dues not paid to the Institute or if any case of indiscipline of malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

11.0 Award of Class:

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

Table 7: Award of Division

Class Awarded	% of marks to be secured	Division/ Class	CGPA	CGPA secured from 157 Credits (Excluding the credits obtained in Skill Development Courses)
First Class with Distinction	70% and above	First class With Distinction	≥ 7.5	
First Class	Below 70% but not less than 60%	First Class	≥ 6.5 and < 7.5	
Second Class	Below 60% but not less than 50%	Second Class	≥ 5.5 and < 6.5	
Pass Class	Below 50% but not less than 40%	Pass	≥ 4 and < 5.5	

12.0 **Grading*:***

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

Table 8: Conversion into Grades and Grade points assigned

Range in which the % of marks in the subject fall	Grade	Grade point Assigned	Performance
90 to 100	O	10	Outstanding
80 to 89.9	A^+	09	Excellent
70 to 79.9	A	08	Very Good
60 to 69.9	B^+	07	Good
50 to 59.9	B	06	Above Average
45 to 49.9	C	05	Average
40 to 44.9	P	04	Pass
<40	F	00	Fail
Ab	AB	00	Fail

12.1 Requirement for clearing any subject: The students have to obtain a minimum of 35% in End Examination and they have to score minimum of 40% marks from Internal and external exam marks put together to clear the subject. Otherwise they will be awarded fail grade.

12.2 F is considered as a fail grade indicating that the student has to reappear for the end supplementary examination in that subject and obtain a non-fail grade for clearing that subject.

12.3 In case of skill development/ value added course / soft skill subjects, as there is no end exam, all 100 marks are for internal assessment only. Student has to score 40% in these courses to complete the subject which will be evaluated internally. Marks obtained in these courses shall not be considered for award of Division.

12.4 To become eligible for the award of degree the student must obtain a minimum CGPA of 4.0

13.0 Supplementary Examinations:

Apart from the regular End Examinations, the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day. For eighth semester, special (Advance) supplementary examinations will be conducted in second week following the results publication date of regular examination of eighth semester only.

14.0 Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA)

The Grade Point Average (GPA) for each semester and Cumulative Grade Point Average (CGPA) up to any semester is calculated as follows:

i) Semester Grade Point Average will be computed as follows:

$$GPA = \frac{\sum_1^n C_j \times GP_j}{\sum_1^n C_j}$$

Where, n is the number of subjects in that semester. C_j is Credits for the subjects. GP_j is the grade point obtained for the subject and the summation is over all the subjects in that semester.

ii) A Cumulative Grade Point Average (CGPA) will be computed for every student at the end of each semester. The CGPA would give the cumulative performance of the student from the first semester up to the end of the semester to which it refers to and is calculated as follows:

$$CGPA = \frac{\sum_1^m GPA_j \times TC_j}{\sum_1^m TC_j}$$

Where 'm' is the number of semester under consideration. TC_j the total number of credits for a j^{th} semester and GPA_j is the Grade Point Average of the j^{th} semester. Both GPA and CGPA will be rounded off to the second digit after decimal and recorded as such.

While computing the GPA / CGPA, the subjects in which the student is awarded zero grade points will also be included.

For any academic/employment purpose the following formulae shall be used for conversion of CGPA to % of marks. % of marks = (CGPA –0.5) x 10.

15.0 Grade Sheet:

A grade sheet (Memorandum) will be issued to each student indicating his performance in all subjects of that semester in the form of grades and also indicating the GPA and CGPA.

16.0 Award of Degree

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

(i) The student joining with Intermediate qualification must have, after admission into the Regular B.Tech programme of the college, pursued a regular course of study for not less than four academic years and not more than eight academic years.

(ii) The student joining under lateral entry scheme with diploma qualification must have, after admission into III Semester B.Tech, pursued a regular course of study for not less than three academic years and not more than six academic years.

(iii) The student must have satisfied the minimum academic requirements in appropriate branch of engineering in each semester of the program, herein after prescribed.

(iv) Students must register for all the courses and earn the credits specified

(v) Students who fail to fulfil all the academic requirements for the award of degree within the specified period from the year of their admission shall forfeit their seat in B.Tech course and their admission stands cancelled.

(vi) The student shall successfully complete non-credit courses like EAA/MC/Internship.

(vii) The student has no dues to the institution, library, hostels etc.

(viii) The student has no disciplinary action pending against him/her.

The Degree will be conferred and awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu on recommendations by the Academic council of RGMCET (Autonomous) basing on the eligibility as in clause 6.0 and 7.0.

17.0 Transcripts:

After successful completion of prerequisite credits for the award of degree, a Transcript containing performance of all academic years will be issued as a final record. Duplicate transcripts will also be issued if required after the payment of requisite fee and also as per norms in vogue.

18.0 Rules of Discipline:

18.1 Any attempt by any student to influence the teachers, Examiners, faculty and staff of Examination section for undue favours in the exams, and bribing them either for marks or attendance will be treated as malpractice cases and the student can be debarred from the college.

18.2 When the student absents himself, he is treated as to have appeared and obtained zero marks in that subject(s) and grading is done accordingly.

18.3 When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he is awarded zero marks in that subject(s).

18.4 When the student's answer book is confiscated for any kind of attempted or suspected malpractice, the decision of the Chief Superintendent is final.

19.0 Minimum Instruction Days:

The minimum instruction days for each semester shall be 95 clear instruction days excluding the days allotted for tests/examinations and preparation holidays declared if any.

20.0 Amendment of Regulations:

The college may, from time to time, revise, amend or change the regulations, scheme of examinations and syllabi. However the academic regulations of any student will be same throughout the course of study in which the student has been admitted. However students will continue to be in the academic regulations in which they were readmitted.

21.0 Transfers

There shall be no branch transfers after the completion of admission process.

22.0 General:

22.1 The Academic Regulations should be read as a whole for the purpose of any interpretation.

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

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

22.4 Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

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AUTONOMOUS
DEPARTMENT OF CIVIL ENGINEERING

Academic Regulations for B.Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2020-2021 onwards)

1.0 The Students have to acquire a minimum of 122 credits out of 122 from II to IV year of B.Tech. Program (Regular) for the award of the degree.

2.0 Students, who fail to fulfil the requirement for the award of the degree in 6 consecutive academic years from the year of admission, shall forfeit their seat.

3.0 The same attendance regulations are to be adopted as that of B. Tech. (Regular).

4.0 **Promotion Rule:**
The student shall be promoted from third year to fourth year only if he fulfils the academic requirements of securing minimum of 42.5 credits out of 85 credits from all the exams conducted up to and including III year II semester regular examinations, whether the candidate takes the examinations or not.

5.0 **Award of Class:**
After the student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he shall be placed in one of the following four classes: The marks obtained in the best 119 credits will be considered for the calculation of percentage and award of class.

Table 1: Award of Division

Class Awarded	% of marks to be secured	Division/ Class	CGPA	CGPA secured from 119 Credits (Excluding the credits obtained in Skill Development Courses)
First Class with Distinction	70% and above	First class With Distinction	≥ 7.5	
First Class	Below 70% but not less than 60%	First Class	$6.5 and < 7.5$	
Second Class	Below 60% but not less than 50%	Second Class	$\geq 5.5 \ and \ < 6.5$	
Pass Class	Below 50% but not less than 40%	Pass	$\geq 4 \ and \ < 5.5$	

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

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I B.TECH, I-SEMESTER COURSE STRUCTURE

Category	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
HSMC	Communicative English - I	1	1	-	2	30	70	100
BSC	Linear Algebra and Calculus	2	1	-	3	30	70	100
BSC	Applied Chemistry	2	1	-	3	30	70	100
ESC	Engineering Mechanics	2	1	-	3	30	70	100
ESC	Programming for Problem Solving - I	2	1	-	3	30	70	100
PRACTICALS								
BSC	Engineering Chemistry Lab	-	-	3	1.5	25	50	75
ESC	Programming for Problem Solving – I Lab	-	-	3	1.5	25	50	75
HSMC	Digital English Language Lab	-	-	3	1.5	25	50	75
BSC	Comprehensive Viva - I	-	-	-	0.5	-	50	50
	Contact Periods / Week	9	5	9	19	225	550	775

I B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Theory	Tutorial	Lab		Internal	External	Total
THEORY								
HSMC	Communicative English - II	1	1	-	2	30	70	100
BSC	Ordinary, Partial Differential Equations and Vector Calculus	2	1	-	3	30	70	100
BSC	Engineering Physics	2	1	-	3	30	70	100
ESC	Engineering Drawing	2	1	-	3	30	70	100
ESC	Programming for Problem Solving - II	2	1	-	3	30	70	100
PRACTICALS								
BSC	Engineering Physics Lab	-	-	3	1.5	25	50	75
ESC	Programming for Problem Solving – II Lab	-	-	3	1.5	25	50	75
LC	Engineering and IT Workshops	-	-	3	1.5	25	50	75
BSC	Comprehensive Viva - II	-	-	-	0.5	-	50	50
	Contact Periods / Week	9	5	9	19	225	550	775

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II B.TECH, I-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Lecture/ Theory	Tutorial	Laboratory/ Practical		Internal	External	Total
THEORY								
	Numerical Methods & Probability Theory	2	1	-	3	30	70	100
	Strength of Materials-I	2	1	-	3	30	70	100
	Fluid Mechanics	2	1	-	3	30	70	100
	Basic Electrical & Electronics Engineering	2	1	-	3	30	70	100
	Python Programming	2	1	-	3	30	70	100
	Biology for Engineers (Life Science Course)	2	-	-	2	30	70	100
SKILL DEVELOPMENT COURSE								
	Aptitude Arithmetic Reasoning and Comprehension	1	2	-	0.5	30	70	100
PRACTICALS								
	Strength of Materials Laboratory	-	-	3	1.5	25	50	75
	Basic Electrical & Electronics Engineering Laboratory	-	-	3	1.5	25	50	75
	Python Programming Lab	-	-	3	1.5	25	50	75
	Comprehensive Viva - III	-	-	-	0.5	-	50	50
	Contact Periods / Week	13	7	9	22.5	285	690	975

II B.TECH, II-SEMESTER COURSE STRUCTURE

Subject Code	Name of the Subject	Hours/Week			Credits	Marks		
		Lecture/ Theory	Tutorial	Laboratory/ Practical		Internal	External	Total
THEORY								
	Surveying	2	1	-	3	30	70	100
	Building Technology	2	1	-	3	30	70	100
	Strength of Materials-II	2	1	-	3	30	70	100
	Hydraulics and Hydraulic Machines	2	1	-	3	30	70	100
	Structural Analysis	2	1	-	3	30	70	100
	Environmental Science (Mandatory Learning – I)	2	-	-	-	-	-	-
SKILL DEVELOPMENT COURSE								
	Design Thinking	1	2	-	0.5	30	70	100
PRACTICALS								
	Surveying Laboratory	-	-	3	1.5	25	50	75
	Fluid Mechanics, Hydraulics and Hydraulic Machines Laboratory	-	-	3	1.5	25	50	75
	Building Planning & Drawing Lab	-	-	3	1.5	25	50	75
	Comprehensive Viva - III	-	-	-	0.5	-	50	50
	Contact Periods / Week	13	7	9	20.5	255	620	875

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I B.Tech, I-Sem (CE) T C 1+1 2

COMMUNICATIVE ENGLISH- I

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- Communicative English-I is prescribed to make students communicate their thoughts, opinions and ideas freely and in real life situations. It has been framed with basics of English usage covering LSRW (Listening, Reading, Speaking and Writing Skills) with suitable practice versions. Further, this course is designed to update the learner in relevant English skills to face campus recruitments and other competitive exams.

COURSE OUTCOMES:

- Develop speaking, reading skills by prescribed lesson. Understand basic grammar principles.
- Write effective letters for job application and complaints, Enhance reading comprehension.
- Comprehend English speech sound system, stress and Intonation, Understand the usage of Vocabulary.
- Enhance reading comprehension, Vocabulary, Speaking, Grammar.
- Acquire knowledge in writing skills, learn Grammar usage and interpret the poem.

MAPPING WITH COs & POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	3	-	-	-	-	1
CO2	-	-	-	-	-	2	3	-	-	-	-	1
CO3	-	-	-	-	-	3	2	-	-	-	-	1
CO4	-	-	-	-	-	3	2	-	-	-	-	1
CO5	-	-	-	-	-	2	3	-	-	-	-	1

UNIT I

Speaking - Describing Home Towns - Hobbies - Reading - Essay - My Vision for India by APJ. Abdul Kalam, (http://www.studypage.in) Essay Writing Practice - Remedial Grammar - Practice - Standard Abbreviations & Acronyms

UNIT II

Writing - Principles of Punctuation - Prewriting Techniques - Letter formats - Formal letter - Writing - Practice - Techniques of Spelling - Reading Comprehension Skills - Practice

UNIT III

Listening & Speaking - Introduction to English Pronunciation - Minimal Pairs Practice - Words with complex pronunciation - Movie Analysis - Discussion - Grammar & Vocabulary - Concord - Idioms & Phrases - Practice

UNIT IV

Reading - Skimming and Scanning - What is a Drone: Main Features & Applications of Today's Drones by Jack Brown - Vocabulary - Computer Terminology - Phrasal Verbs - Speaking - Current Affairs - Discussions - Grammar & Usage - Articles & Prepositions - Practice.

UNIT V

Writing: Structure of Paragraph Writing - Cause and Effect - Compare and Contrast - Practice - Techniques - Report writing - Official Reports - Business Reports - Practice - Grammar & Usage - Conditional sentences - IF Poem by Rudyard Kipling.

UNIT VI

Listening & Speaking - Indian English Variants - Difference between British and American English - Listening comprehensions - Test - Remedial Grammar - Correction of Sentences - Sentence Completions - Movie Analysis - Debate

REFERENCE TEXT BOOKS:

1. English Language & Communication Skills for Engineers (AICTE Syllabus**)** by Sanjay Kumar & Pushpa Latha, Oxford University Press, 2018
2. Practical English Usage by Michael Swan, Oxford University Press.
3. The Definitive Guide to IELTS Academic Writing, Oxford University Press, 2019.

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I B.Tech, I-Sem (CE) T C 2+1 3

LINEAR ALGEBRA & CALCULUS

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- The essential tool of matrices and linear algebra in a comprehensive manner.
- The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
- To deal with functions of several variables that are essential in most branches of engineering.
- Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
- The mathematical tools needed in evaluating multiple integrals and their usage

COURSE OUTCOMES:

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

- Understand the use of matrices and linear system of equations in solving problems such as Network analysis, encoding and decoding in Cryptography and Quantum mechanics problems.
- Apply the concept of Gamma and Beta functions linear digital signal processing, discrete Fourier transform, digital filters and Oscillatory theory in engineering.
- Analyze differential and integral calculus to solve improper integrals and its applications in many engineering disciplines.
- Determine the process to evaluate double and triple integrals and understand its usage to find surface area and volumes of various bodies in engineering.
- Identify the applications of advanced calculus & Linear algebra in electro-magnetic theory and in telecommunication engineering.

MAPPING WITH COs & POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	-	-	-	-	-	-	-	-	-	-
CO2	3	1	-	2	-	-	-	-	-	-	-	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	3	-	-	-	-	-	-	-	-
CO5	1	3	-	-	-	-	-	-	-	-	-	-

UNIT I

Matrices: Elementary row transformations – Rank – Echelon form, Normal form – Solutions of Linear System of Homogenous and Non Homogeneous equations.

UNIT II

Eigen Values, Eigen vectors – Properties; Cayley – Hamilton Theorem (without proof) – Inverse and Power of a matrix by Cayley – Hamilton theorem.

UNIT III

Quadratic forms: Linear Transformation – Reduction of quadratic form to canonical form and their nature.

UNIT IV

Mean value theorems: Rolle's Theorem – Lagrange's Mean Value Theorem – (excluding proof). Taylor's and Maclaurin's Series for $e^x, \sin x, \cos x$ and $\log(1+x)$.
Functions of several variables – Jacobian – Maxima and Minima of functions of two variables - Lagrange's method of Multipliers with three variables only.

UNIT V

Special functions: Gamma function – Properties – Beta function – properties – Relation between Gamma and Beta functions – Evaluation of Integrals using Gamma & Beta functions.

UNIT VI

Multiple integrals: – Evaluation of Double integrals (Cartesian and Polar) – Change of Variables – Change of order of Integration – Evaluation of triple integrals.

TEXT BOOKS/REFERENCES:

1) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,
2002.
2) Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.
3) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5) T.K.V. Iyengar, B. Krishna Gandhi and Others, Mathematical Methods, S. Chand & Company.
6) T.K.V. Iyengar, B. Krishna Gandhi and Others, A Text Book of Engineering Mathematics, Vol – 1, S. Chand & Company.
7) S.R.K. Iyengar and R.K. Jain, Advanced Engineering Mathematics, Narosa publishing.

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I B.Tech, I-Sem (CE) T C
2+1 3

APPLIED CHEMISTRY
Common to (Mech and Civil)

COURSE OBJECTIVES:

- To familiarize applied chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

COURSE OUTCOMES:

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

- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **explain** the preparation, properties, and applications of thermoplastics &thermo settings& elastomers (L2)
- **explain** calorific values, octane and cetanenumber (L2)
- explain the setting and hardening of cement (L2)
- **summarize** the application of adsorption and nanomaterials (L2)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	-	-	1	-	-	-	1	1	-	-	1
2	-	1	2	1	-	1	1	-	-	-	-	-
3	1	-	-	2	-	-	1	1	-	-	-	-
4	1	3	-	1	2	1	-	1	-	-	-	1
5	1	1	-	1	2	-	-	1	1	-	-	1
Course	1	-	1	-	1	-	-	-	1	-	-	-

Unit 1: Water Technology: (12 hrs)

Introduction – Types of water, Soft and hard water, hardness of water, Estimation of hardness of water by EDTA Method and Numerical problems on hardness,Water Softening methods - zeolite and ion-exchange processes - desalination of brackish water - reverse osmosis (RO) - Boiler troubles **-** scale and sludge, Boiler Corrosion, Caustic Embrittlement, Priming and foaming – Analysis of water – Alkalinity, Dissolved oxygen by Winkler's method - specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards

Learning outcomes:

The student will be able to

- **list** the differences between hardness and hard water (L1)
- **list** the differences between temporary and permanent hardness of water (L1)
- **Explain** the principles of reverse osmosis.(L1)
- **Comparing** thequality ofdrinking water with BIS and WHO standards. (L2)
- **Illustrate**theproblems associated with hard water for production of steam(L2)
- **explain** the working principles of different softening methods (L2)
- **Understanding** the problems due to presence of alkalinity and dissolved oxygen (L3)

Unit 2: Electrochemistry and Applications: (10 hrs)

Types of Conductance – Conductance, Specific conductance, Equivalent Conductance and molar conductance. Determination of equivalent conductance by Wheatstone bridge method,concept of conductivity, conductivity cell, conductometric titrations (acid-base

titrations), Numerical Problems on conductance.Nernst equation, cell potential calculations, Electrodes – concepts, reference electrodes (Standard hydrogen electrode and Calomel electrode) photovoltaic cell – working and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Apply** Nernst equation for calculating electrode and cell potentials (L3)
- Applications of Conductometric titrations (L2)
- **Solve** problems based on conductance and cell potential (L3)
- **Learning** about the concept of electrodes (L2)

Unit 3: Corrosion: (12 hrs)

Definition - Severity of the Problem

Types of Corrosion: Direct chemical attack type of corrosion, electrochemical type of corrosion and their mechanism, other types of corrosion: Galvanic, pitting, concentration cell type corrosion and water line corrosion. Factors affecting the rate of the corrosion, Proper design and material selection, Cathodic protection against corrosion, Use of inhibitors, Metallic Coatings, Hot dipping method(Galvanization, Tinning).

Learning Outcomes:

At the end of this unit, the students will be able to

- Apply pilling Bed-worth rule for corrosion and corrosion prevention (L3)
- Understanding and analysing the severity problem of corrosion(L3)
- Demonstrates the corrosion prevention methods and factors affecting the corrosion(L2)
- Learning the principles of protection against corrosion methodologies (L2)

UNIT-4 Advanced Engineering Materials: (8 hrs)

Refractories- Classification, Properties and its Applications, Reasons for failure of the refractory materials.

Lubricants- Classification, Functions of lubricants, Mechanism of lubrication (fluid-film lubrication), Properties of lubricating oils (viscosity, viscosity index, saponification number, oiliness, flash and fire points, emulsification, carbon residue, mechanical stability and aniline point).

Learning Outcomes:

At the end of this unit, the students will be able to

- Identify the factors affecting the refractory material(L3)
- Illustrate the functions and properties of lubricants (L2)
- identifying the constituents of Portland cement (L3)
- Enumerate the reactions at setting and hardening of cement.

Unit 5: Surface Chemistry and Applications:(9 hrs)

Introduction to surface chemistry, Adsorption- Types of adsorption, Adsorption of gases on solids and its applications, Adsorption isotherm-Langmuir adsorption isotherm theory and postulates, Nanomaterials: Introduction and applications of nanomaterials in catalysis, medicine, sensors.

Learning Outcomes:

At the end of this unit, the students will be able to

- **outline** the preparation of nanomaterials and metal oxides (L2)

- **Understanding** and analysing the concept of adsorption(L1)
- **identify** the application of nanomaterials in medicine, sensors and catalysis (L2)

Unit 6: Polymers and Fuel Chemistry:(12 hrs)

Polymers: Classification of polymers, functionality, chain growth and step growth polymerization, Copolymerization with specific examples and mechanisms of additional polymerization.

*Plastics***:**Thermoplastics: Preparation, properties and applications of PVC and Teflon.

Thermosets: Bakeliteand Urea-formaldehyde.

Fuels –Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal-Proximate and Ultimate analysis.

Liquid Fuels: Extraction of petroleum, knocking, Octane and Cetanenumber.

Flue gas: Analysis by Orsat's apparatus.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** different types of polymers and their applications (L2)
- **Solve the numerical problems based on Calorific value(L3)**
- **Significance** of flue gas analysis
- **explain** calorific value and its significance(L2)
- Octane and cetane ratings of fules

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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AUTONOMOUS

DEPARTMENT OF CIVIL ENGINEERING

I B.Tech, I-Sem (CE)

T	C
2+1	3

ENGINEERING MECHANICS

COURSE OBJECTIVES:

- To provide basic concepts of forces, resultants and their applications on regular bodies to the engineering students.

COURSE OUTCOMES:

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

- To provide the knowledge on different types of force systems and to find the resultant of the force system.
- To be able to analyse truss and find forces in all the members.
- Understand dry friction and apply to solve problems.
- Understand Centroid and area moment of inertia and find Centroid and moment of inertia of given body.
- To be able to solve problems relating to Kinematics and Kinetics.

MAPPING WITH COs & POs:

	Po1	Po2	Po3	Po4	Po5	Po6	Po7	Po8	Po9	Po10	Po11	Po12
Co1	3	2	1									
Co2	3	2	1									
Co3	3	2	1									
Co4	3	2	1									
Co5	3	2	1									

UNIT-I: INTRODUCTION (10h)

Laws of Mechanics, Derived laws, Units, Characteristics of a Force, System of Forces, Resultant of Coplanar Concurrent Force System, Coplanar Non-concurrent Force System, Concurrent Force System in Space, Equilibrium of Body subjected to Concurrent Force System, Non-concurrent Force System.

UNIT-II: ANALYSIS OF PERFECT FRAMES (10h)

Introduction, Perfect, Deficit and Redundant Trusses, Assumptions, Nature of Forces in Members, Methods of Analysis, Method of Joints, Method of Sections.

UNIT III: FRICTION (10h)

Introduction, Types of Friction, Static, Dynamic & Limiting Friction, Coefficient of Friction, Angle of Repose, Cone Friction, Equilibrium of body lying on inclined surface – problems. Screw jack and its application problems.

UNIT IV: CENTROID AND CENTER OF GRAVITY (10h)

Centroid, Centre of Gravity, Difference between Centroid & Centre of Gravity, Centroid of simple figures: Rectangle, Triangle, Semi & Quarter circle. Centroid of composite figures - T Section, I Section, Angle Section, Hollow Section. Centre of Gravity of Bodies: Cone, Solid Hemisphere. Centre of Gravity of Composite figures using Pappu's theorem. (Simple problems).

UNIT V: MOMENT OF INERTIA (10h)

Area Moment of Inertia : Definition of Moment of inertia, Parallel & Perpendicular axis Theorem, Polar moment of inertia, product of inertia, Moment of Inertia of simple and composite figures.

UNIT VI: DYNAMICS (10h)

Kinematics: Rectilinear and curvilinear motion – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion.

Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equation of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

TEXT BOOKS

1. Engineering Mechanics: Statics and Dynamics by Ferdinand Leon Singer. Harper and Row Publications.
2. Engineering Mechanics by S.S. Bhavikatti. New age International Publications.

REFERENCES

1. Engineering Mechanics by R. K. Bhansal, Lakshmi Publications.
2. A Text Book of Engineering Mechanics by R.S. Khurmi. S. Chand Publications.
3. Engineering Mechanics by Basudeb Bhattacharyya. Oxford Publications.

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DEPARTMENT OF CIVIL ENGINEERING

I B.Tech, I-Sem (CE) T C
2+1 3

PROGRAMMING FOR PROBLEM SOLVING-I

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- To make students aware about fundamentals of computer programming.
- To provide exposure on C programming language
- To provide exposure on various C programming concepts like arrays, functions, pointers, Structures etc.
- To develop solutions for various problems by using C programming language.

COURSE OUTCOMES:

At the end of this course, the student would be able to

- Design algorithms and flowcharts for real world applications
- Know the usage of various operators in Program development
- Design programs involving decision and iteration structures.
- Apply the concepts code reusability using Functions
- Analyse the concepts of Arrays and Strings for real world problems.
- Able to apply the pointers in programs

MAPPING WITH COs & POs:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	-	2	-	-	-	2	1	-	-
CO2	2	-	-	-	2	-	-	-	-	-	-	-
CO3	3	2	3	2	-	2	-	-	2	-	-	-
CO4	3	-	2	-	-	-	-	-	3	-	-	-
CO5	-	3	3	-	-	2	-	-	-	-	2	-
CO6	-	-	3	-	-	-	2	-	-	-	-	-

UNIT I

Problem Solving Using Computers: Introduction, Algorithms, Flowcharts and pseudo code.

Overview of C Language: Introduction, Salient Features of C Language, Structure of a “C” Program.

C Language Preliminaries: Keywords and Identifiers, Constants, Variables, Data Types, and Input Output Statements with suitable illustrative “C” Programs.

UNIT II

Operators: Assignment Operators, Relational and Logical Operators, Increment and Decrement Operators, Bitwise Operators, Ternary Operator, Type Conversion, Precedence and Associativity with suitable illustrative C Programs.

UNIT III

Statements in C:

Conditional/Decision Statements: if, if-else, Nested if-else, else-if ladder, Switch-Statement and goto statement with suitable illustrative C Programs.

Loop Control Statements: while, do-while and for with suitable illustrative “C” Programs, break, continue statements.

UNIT IV

Arrays: Definition, Importance of an array in C language, One-Dimensional Arrays, Two-Dimensional Arrays, Example programs on the topics mentioned above

Strings: Introduction to Strings, String I/O, String Operations with and without built-in functions

(strlen( ), strcmp( ), strcat( ),strcpy( ), and strrev( )) Example Programs on the topics mentioned above

UNIT V

Functions: Introduction to Functions, benefits of functions, types of functions, Function calls, return vs. exit( ), Parameter Passing mechanisms, Call-by-Value, Recursion, Storage Classes, preprocessor directives

UNIT VI

Pointers: Pointer variable and its importance, Pointer variable declaration, initialization of pointer variables, how to access a value from a memory location through it‘s pointer variable. Arithmetic operations on pointer variables, Scale factor length. Pointers and functions - pointers as function arguments (i.e., call-by-reference), Pointers and Arrays, Pointers and Strings, Generic Pointers.

TEXT BOOKS:

1. B.A.Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016
2. Pradip Dey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.

REFERENCE BOOKS:

1. Byron Gottfried, “Programming with C “, Schaum’s Outlines, 2nd Edition, TATA McGraw-Hill.
2. M.T.Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press
4. Rajaraman V., "The Fundamentals of Computers", 4th Edition,Prentice Hall of India, 2006.
5. R S Bichker, "Programming in C", University Press, 2012.

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ENGINEERING CHEMISTRY LAB
For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVE:

- Verify the fundamental concepts with experiments

COURSE OUTCOMES:

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

- Learning the analytical skills while doing the experiments (L3)
- Learning the quality of water and its significance (L2)
- Importance of the Conductometric titrations while determine the strength of weak acids an coloured solutions (L3)
- Analyse the IR and UV-Visible Spectra of some organic compounds (L3)

Mapping with Cos & POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	1	-	1	-	-	-	-	1	-	-	1
2	-	2	1	-	2	1	1	1	-	-	1	-
3	-	1	-	-	1	-	1	-	1	-	-	1
4	1	3	2	1	2	-	1	-	-	-	1	1
Course	1	2	1	-	2	1	-	-	1	1		1

LIST OF EXPERIMENTS:

1. Preparation of standard $K_2Cr_2O_7$ solution
2. Estimation of Hardness of Water by using Standard EDTA solution
3. Estimation of Copper by using Standard EDTA solution
4. Estimation of Magnesium by using Standard EDTA solution
5. Estimation of dissolved oxygen by Winkler's method
6. Determination of Strength of given Hydrochloric Acid against standard sodium hydroxide solution by Conductometric titrations
7. Determination of Strength of given Acetic Acid against standard sodium hydroxide solution by Conductometric titrations
8. Determination of strength of mixture of acids against standard sodium hydroxide solution by conductometric method.
9. Verification of Beer-Lambert's law
10. Determine the strength of Cu(II) ion by colorimeter
11. Determination of total alkalinity of water
12. Preparation of a simple polymer
13. Thin layer chromatography
14. Identification of simple organic compounds by IR and UV-Visible Spectroscopy
15. HPLC method in separation of liquid mixtures

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PROGRAMMING FOR PROBLEM SOLVING LAB - I

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OUTCOMES:

- To learn about different types of operators
- To learn how decision making is done during programming
- To learn about various simple constructs used for programming
- To learn to define functions and call them with appropriate parameters
- To understand the usage of string libraries to do common string operations
- To understand pointer referencing and pointer dereferencing

COURSE OUTCOMES:

At the end of this course, the student would be able to

- Apply the specification of syntax rules for numerical constants and variables, data types
- Know the Usage of various operators and other C constructs
- Design programs on decision and control constructs
- Develop programs on code reusability using functions
- Implement various concepts of arrays and strings

MAPPING WITH Cos & POs:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	2	-	-	-	-	-	-	-
CO2	2	-	-	-	3	-	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-
CO4	3	-	2	-	-	-	-	-	-	1	2	-
CO5	-	2	-	-	2	-	2	-	-	-	-	1

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

- Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise 1

Write a C program to demonstrate the various operators used in C language.

Exercise 2

a) Write a C program to find the roots of a quadratic equation.
b) Write a C program to find both the largest and smallest number in a list of integers.

Exercise 2

a) Write a C program, which takes two integer operands and one operator from the user, performs the specified operation and then prints the result. (Consider the operators +,- ,*, /, % and use Switch Statement)
b) Write a C Program to find the reverse of a given number.

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer.
b) Write a C program to generate the first ‘n‘ terms of the Fibonacci sequence.
[**Note:** A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.]
c) Write a C program to generate all the prime numbers between 1 and n, where ‘n‘ value is given by the user.

[**Note:** Develop each of the above programs by using different loop constructs supported by C language. (i.e., while, do while and for Loops)]

Exercise 4

a) Write a C Program to mask the most significant digit of the given number.
b) Write a program which Prints the following pattern

```
0
111
22222
3333333
444444444
```

Exercise 5

a) Write a C program to find all the even numbers in the given one dimensional array.
b) Write a C program to print the elements of an array in reverse order.
c) Write a C program to construct a pyramid of numbers.

Exercise 6

Write a C program to perform the following operations:

a) Addition of Two Matrices
b) Multiplication of Two Matrices
[Note: Use functions to implement the above specified operations]

Exercise 7

Write C programs that use both recursive and non-recursive functions

a) To find the factorial of a given integer.
b) To find the GCD (greatest common divisor) of two given integers.

Exercise 8

a) Write a C Program to solve the Towers of Hanoi problem by using recursive function.
b) Write a C Program to demonstrate the various storage classes, which are supported by the C language. [i.e., automatic, external, static and register]

Exercise 9

a) Write a C Program to demonstrate that, how to pass an entire array as an argument to a function with a suitable example.
b) Write a C Program to perform various operations on given two strings using string handling functions.

Exercise 10

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
   i) Call-by-value
   ii) Call-by-reference

Exercise 11

a) Write a C program that uses functions to perform the following operations:
   i). To insert a sub-string in to a given main string from the specified position.
   ii). To delete '**n**' Characters from a given position in a given string.
b) Write a C program to determine if the given string is a palindrome or not.

Exercise 12

a) Write a C program that displays the position or index in the string 'S' where the string 'T' begins, or – 1 if 'S' doesn't contain 'T'.
b) Write a C program to count the lines, words and characters in a given text.

REFERENCE BOOKS

1. Programming in C, Pradeep Dey, Manas Ghosh, Oxford Heigher Education
2. The Spirit of C, an introduction to modern programming, M.Cooper, Jaico Publishing House.
3. Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.
4. Computer Basics and C Programming, V. Raja Raman, PHI Publications.

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DIGITAL ENGLISH LANGUAGE LAB

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

The Digital English Language Lab focuses on the production and practice of sounds of language and equips students with the use of English and vocabulary in everyday situations and contexts.

COURSE OBJECTIVES:

- To facilitate the students to use language effectively in everyday social conversations
- To expose the students to the blend of self-instructional and modes of language learning teacher assisted through digital lab
- To improve the fluency and intelligibility of student in spoken English and neutralize their mother tongue influences
- To help the students to participate in group discussions, to face interviews and shape the individual language learning.

COURSE OUTCOMES:

- Social interactions, greetings, self-introductions and group talk
- Improving standard pronunciation patterns and neutralize the mother tongue impact
- Developing communication through listening, reading, speaking and writing activities
- Enhancing vocabulary and grammar to develop professional language
- Improving life skills through GD and role plays practices

MAPPING WITH COs & POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	1	1	2	2	3	-	2
CO2	1	-	-	-	-	2	1	2	2	3	-	2
CO3	1	-	-	-	-	2	1	2	2	3	-	2
CO4	1	-	-	-	-	2	1	2	2	3	-	2
CO5	1	-	-	-	-	2	1	2	2	3	-	2

Digital English Language Lab consists of two parts:

- CALL (Lab): Computer Assisted Language Learning
- ICS (Lab): Interactivity Communication Skills

Exercise 1

Introduction to Phonetics - Speech Sounds - Vowels - Phonetic Transcription - CALL Lab - Ice Breaking Activity - Self Introductions (SWOT) - Social Interactions - Pair work - ICS Lab

Exercise 2

Diphthongs - Consonants - Phonetic Transcription - CALL Lab - Just A Minute (JAM) - ICS Lab

Exercise 3

Listening Comprehension (audio) - IELTS Testing Exercises - CALL Lab - Speaking Activity - Group talk - ICS Lab

Exercise 4

Vocabulary Building - Synonyms & Antonyms - Analogy - Testing Exercises - CALL Lab - Narration of a Story/Event/ Describing an Object - ICS Lab

Exercise 5

Situational Dialogues - CALL Lab - Role Play - ICS Lab

Exercise 6

Pronunciation Evaluation Testing Exercises through EPD - CALL Lab - Group Discussion - ICS Lab - Any student based activities

Course Outcomes:

Student will able to learn:

- Will understand the spoken skills from CALL and ICS
- Will know the variations in accent of native and non-native speakers of English and achieve accent neutralization
- Will develop the reading & listening comprehension skills

PRESCRIBED SOFTWARE:

- K-VAN Solutions (licensed software)
  - Advance Communication Skills Lab
  - English Language Communication Skills Lab
- Cambridge Advanced Learners' English Dictionary with CD
- IELTS Academic Preparation and Practice with CD

BOOKS SUGGESTED FOR DELL: (CENTRAL LIBRARY)

1) Skill Pro – A Course in Communication Skills and Soft Skills by Prof. K. Sumakiran et.al, EMESCO.
2) Skill Pro-I Foundation Course - 4 - by Dr. G. Gulam Tariq et.al, Maruthi Publications.
3) Strengthen Your Steps – A Multimodal Course in Communication skills by Dr. M. Hari
4) Prasad et.al
5) English Pronouncing Dictionary Daniel Jones Current Edition with CD
6) English Dictionary for Advanced Learners, (with CD) International edn. Macmillan 2009.

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1+1 2

COMMUNICATIVE ENGLISH- II

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- The course Communicative English - II is an extension of Communicative English - I. This will provide inputs in business vocabulary to introduce Communicative style in writing and speaking to expose students to professional scenario. This will led students to write letters in professional contexts. Communicative English -II enhances the students' communication skills in terms of LSRW Skills.

COURSE OUTCOMES:

- Develop communicative competence by enunciating words and learn Language games.
- Build the habit of reading skills and enhance styles of writing.
- Interpret different accents and modulations through active listening and improvisation of writing skills.
- Write clear and coherent passages.
- Improve the ability to speak effectively in English in real life situations and understanding of Team Dynamics.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	2	3	-	-	-	1	2
CO2	-	-	-	-	-	3	2	-	2	-	3	1
CO3	-	-	-	-	-	2	3	-	2	-	1	1
CO4	-	-	-	-	-	2	3	-	2	-	1	1
CO5	-	-	-	-	-	2	3	-	2	-	2	1

UNIT I

a) Speaking - News Paper Reading - Narrating a Story/ Event
b) Vocabulary Development: Root words-Homonyms-Homophones-Wordlists-Quizzes - Language Games – Puzzles

UNIT II

a) Reading Comprehension-Life is a Pizza by Richard Templar from Rules of Life - Vocabulary on Eateries, Food & Travel
b) Business Writing - Memorandums - Letters - Style & Formats - E-mail Writing - Practice

UNIT III

a) Listening & Speaking - TED Talks - Listening Comprehension- Practice – Tests
b) Writing - Proposals - Technical Paper Writing- Practice – Movie Analysis

UNIT IV

a) Writing - Gadget Reviews - Technical Jargon - Resume Writing - Practice
b) Précis Writing - Techniques of Writing the Précis- Sample Analysis-Practice.

UNIT V

a) Speaking - Seeking Information – Preferences - Likes & Dislikes - Cross - Cultural Communication

b) Satya Nadella: When empathy is good for business https://www.morningfuture.com - Team Dynamics Activity

UNIT VI

a) Listening & Writing **-** Movie/Short Film/Documentary Analysis
b) Info Graphics- Techniques – Practice from IELTS Videos

REFERENCE TEXT BOOKS:

1) Word Power Made Easy by Norman Lewis, Goyal Publications
2) Group Dynamics for Teams 3rd ed. By Levi, Daniel. Sage Publications India Pvt.Ltd. New Delhi, 2011.
3) Business English Essentials by Henderson, Greta Lafollette & Price R Voiles 7th Edition. Glencoe/McGraw Hill.
4) On Writing Well by William Zinsser, Harper Perennial Press, 2016

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ORDINARY, PARTIAL DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E.

COURSE OBJECTIVES:

- The effective mathematical tools for the solutions of differential equations that model physical processes.
- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To introduce the solution methodologies for second order Partial Differential Equations with applications in engineering
- To familiarize the concepts in vector calculus like gradient, divergent and curl, as well as, divergent theorems.

COURSE OUTCOMES:

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

- Obtain the knowledge of first and higher order differential equations and its use in solving Circuit analysis, heat transfer problems in engineering.
- Analyze solving higher order linear differential equations with variable coefficients and its applications.
- Understand about formation and solution of partial differential equations and importance in thermodynamics, continuum mechanics and fluid mechanics.
- Understand about vector differentiation and its applications in Electromagnetic theory.
- Apply the concept of vector integration to solve many problems in field theory, Electromagnetic theory and transmission lines.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	-	-	-	-	-	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-
CO3	1	2	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	3	-	-	-	-	-	-	-	-
CO5	1	3	2	-	-	-	-	-	-	-	-	-

UNIT I

Differential equations of first order and first degree - Formation of ODEs - Solution of ODEs - Exact, Non - Exact, Linear and Bernoulli's equations - Applications of ODEs to L - R & C - R circuits.

UNIT II

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type, e^{ax}, $\sin ax$, $\cos ax$, $\text{Polynomials in } x$, $e^{ax}\,V(x)$, $xV(x)$, Method of Variation of parameters.

UNIT III

Higher Order linear Differential Equations with variable coefficients: Cauchy's and Legendre's linear Differential equations, simultaneous linear differential equations with constant coefficients.

UNIT IV

Partial Differential Equations of First order:

First order partial differential equations, Formation of partial differential equations, solutions of first order linear and non – linear Partial differential equations, Method of separation of variables.

UNIT V

Vector Differentiation: Introduction of Vector differentiation– Scalar and vector point functions – Gradient of scalar function– Directional derivatives – Divergence of a vector function – Curl of a vector function.

UNIT VI

Vector integration: Line integral - Potential function – Area, Surface and volume integrals. Vector integral theorems: Green's theorem (without proof) – Stoke's theorem (without proof) and Gauss Divergence Theorem (without proof); Verification of Green's, Stoke's and Gauss Theorems.

TEXT BOOKS/REFERENCES:

1) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2) Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2011.
3) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4) T.K.V. Iyengar, B. Krishna Gandhi and Others, Mathematical Methods, S. Chand & Company.
5) T.K.V. Iyengar, B. Krishna Gandhi and Others, A Text Book of Engineering Mathematics, Vol – 1, S. Chand & Company.
6) S.R.K. Iyengar and R.K. Jain, Advanced Engineering Mathematics, Narosa publishing.
7) Ian Sneddon, Elements of Partial Differential equations, McGraw Hill.

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2+1 3

ENGINEERING PHYSICS
For Branches: EEE, ECE & CSE

COURSE OBJECTIVES:

- To provide basic concepts of interaction of light with matter, nanomaterials, ultrasonics and quantum physics to the engineering students.

COURSE OUTCOMES:

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

- Apply the concept of light to test the material properties
- Construct a quantum mechanical model to explain the behavior of a system at the microscopic level.
- Apply the knowledge of nanomaterials in the development of nanotechnology.
- Detect the flaws present in the materials using ultrasonics
- Apply the functional materials for the benefit of mankind.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	1	1	-	-	-	-	-	-	1
CO2	3	-	1	1	2	-	-	-	-	-	-	-
CO3	3	-	2	2	2	-	1	-	-	-	-	1
CO4	1	3	2	1	1	-	-	-	-	-	-	-
CO5	1	3	2	-	2	-	-	-	-	-	-	1

UNIT-I: WAVE OPTICS (9 h)

Interference: Introduction – Division of amplitude – Newton's rings and its applications. **Diffraction:** Introduction – Fraunhofer diffraction at single slit – Diffraction Grating – Grating spectra – Determination of wavelength of light.

UNIT-II: QUANTUM MECHANICS (9 h)

Introduction to quantum physics – Wave-Particle duality – de Broglie hypothesis – Verification of wave character of Matter waves (Davison–Germer experiment) – Uncertainty principle – Thought experiment (Electron diffraction) – Wave function (ψ) – Schrodinger's one-dimensional time-independent wave equation – Particle in 1D-potential box.

UNIT III: THE CRYSTAL STRUCTURE OF SOLIDS (9 h)

Introduction – Space lattice – Basis – Unit cell (primitive and Non-primitive) – Crystal systems – Bravais lattices – Atomic radius, Nearest neighbouring distance, Coordination number and packing factor for SC, BCC, FCC lattices – Diamond structure – Crystal planes and directions – Miller Indices – calculation of interplanar distance.

UNIT-IV: ULTRASONICS (9 h)

Introduction – Production of ultrasonics by magnetostriction and piezoelectric method – Detection methods – Properties – Cavitation – Pulse-echo & Transmission mode of non-destructive testing (NDT) methods – General applications of ultrasonics.

UNIT-V: NANOMATERIALS (9 h)

Introduction – Properties of nanomaterials: Surface area to volume ratio and Quantum confinement – Synthesis of nanomaterials – Ball milling – Sol-gel – chemical vapour deposition (CVD) techniques – Carbon nanotubes (CNTs) – Applications.

UNIT-VI: FUNCTIONAL MATERIALS (9h)

Introduction – Fiber reinforced plastics (FRPs) – Piezoelectrics – Piezoresistors – Metallic glasses – Shape memory alloys (SMAs) – Properties and Applications.

TEXT BOOKS

1. M. N. Avadhanulu, P.G. Kshirsagar & TVS Arun Murthy" AText book of Engineering Physics"- S. Chand Publications, 11thEdition 2019.
2. R. K. Gaur and S.C. Gupta, "Engineering Physics", Dhanpat Rai Publications, New Delhi.

REFERENCES

1. "Concepts of Modern Physics", Arthus Beiser, Tata Mc Graw Hill Publications, New Delhi.
2. "Physics Volume – II", Resnick, Halliday and Krane, Wiley, New Delhi.
3. "Elements of Solid State Physics", J.P. Srivastava, PHI Learning, 4th eds. New Delhi.
4. "Introduction to Nanotechnology", Charles P. Poole and Frank J. Ownen, Wiley.
5. "Applied Physics", S.P.Basavaraju, Subhas Stores, Bangalore.
6. "Nanotechnology", M. Ratner & D. Ratner, Pearson Ed, New Delhi.

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ENGINEERING DRAWING

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- Increase ability to communicate with people
- Learn to take data and transform it into graphic drawings.
- Learn basic engineering drawing formats
- Prepare the student for future Engineering positions

COURSE OUTCOMES:

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

- Understand the theory of orthographic projection.
- Understand the conventions and the methods adopted in engineering drawing.
- Know the importance of sectioning and Developments of solids in actual applications.
- Improve their visualization skills so that they can apply these skills in developing new products.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	-	-	-	-	-	2	-
CO2	3	2	3	2	3	-	-	-	-	-	-	-
CO3	3	2	2	1	3	-	-	-	-	-	-	1
CO4	3	2	2	2	3	-	-	-	-	-	1	-

UNIT I

Polygons-Construction of Regular Polygons using given length of a side; Conic sections- Ellipse- Arcs of Circles and Oblong Methods, Construction of Parabola and Hyperbola by eccentricity method only.

UNIT II

Introduction to Orthographic Projections- Projections of Points-Projections of Straight Lines parallel to both planes; Projections of Straight Lines-Parallel to one and inclined to other plane, inclined to both planes, determination of true lengths, angle of inclinations.

UNIT III

Projections of Planes- Regular Planes Perpendicular / Parallel to one Reference, Plane and inclined to other Reference Plane.

UNIT IV

Projections of Solids-Prisms, pyramids, cones and Cylinders with the axis inclined to one Plane.

UNIT V

Section of solids: Sectioning of prism, pyramid, cone and cylinder– sectional view – true shape. Solids in simple position and cutting plane inclined to one reference plane only.

Development of surface of solids: Development of truncated prism, pyramid, cone and cylinder – frustum of cone and pyramid

UNIT VI

Conversion of Isometric Views to Orthographic Views/Projections-Conversion of Orthographic Views to Isometric Projection/ Views.

TEXT BOOK:

1. Engineering Drawing by N.D. Bhatt, Chariot Publications.
2. Engineering Drawing and Graphics, Venugopal/New age publications.

REFERENCE BOOKS:

1. Engineering Drawing. K.L Narayana, P. Kannaiah, Scitech Publications.
2. Engineering Drawing, B.V.R Gupta, J.K. Publishers.
3. Engineering Drawing by M.B. Shah and B.C. Rana, Pearson Publishers.
4. Engineering Drawing, Johle, Tata Mc Graw - Hill.
5. K.V. Natarajan, 'A text book of Engineering Graphics', Dhanalakshmi publishers, Chennai (2006).

R G M COLLEGE OF ENGINEERING AND TECHNOLOGY

AUTONOMOUS

DEPARTMENT OF CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

T	C
2+1	3

PROGRAMMING FOR PROBLEM SOLVING - II

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- To make students aware about structures and unions in C language.
- To provide exposure on various searching and sorting techniques.
- To provide exposure on various data structures like stacks, queues, circular queues and linked lists etc.,
- To develop solutions for various problems by using C Programming Language by students.

COURSE OUTCOMES:

At the end of this course, the student would be able to

- Develop programs with user defined data types.
- Apply various file handling techniques for better data management
- Apply stacks in various applications
- Apply queues in various applications and distinguish between stacks and queues.
- Analyze various dynamic data structures.
- Implement various searching and sorting techniques

MAPPING WITH Cos & POs:

CO\PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	3	-	2	-	-	-	2	-	-	2
CO2	3	-	3	-	-	2	-	-	-	-	2	-
CO3	3	2	-	-	-	-	3	-	-	-	-	-
CO4	-	3	-	-	-	-	2	-	-	-	-	-
CO5	3	3	2	-	-	2	3	-	-	-	-	-
CO6	3	-	-	2	3	3	-	-	-	-	-	-

UNIT I

STRUCTURE AND UNIONS IN C LANGUAGE: Structures – Introduction, Features of Structures. Declaration and Initialization of Structures, Accessing structure members, structure initialization. Nested Structures, Array of Structures, Arrays within structures and Pointers to Structures, Structures and Functions, Unions, typedef. Example Programs on the topics mentioned above.

UNIT II

Files : Input and Output – Concept of a file, streams, text files and binary files, Differences between text and binary files, State of a file, Opening and Closing files, file input / output functions(standard library input / output functions for files), file status functions (error handling),Positioning functions, command –line arguments, C program examples.

UNIT III

INTRODUCTION TO DATA STRUCTURES: Classification of data structures, dynamic memory allocation functions in C language. **Stacks:** Definition, Various representation methods, operations on stacks and their implementation in C language, applications of stacks.

UNIT IV

QUEUES: Definition, Various representation methods, operations on queues and their implementation in C language, applications of queues. Circular queues- operations on circular queues and their implementation in C language.

UNIT V

LINKED LISTS: Definition, Various representation methods, operations on linked lists and their implementation in C language.

UNIT VI

SEARCHING AND SORTING TECHNIQUES: Searching Techniques - Linear search and Binary Search Techniques. Sorting techniques - Bubble Sort, Selection Sort, Insertion Sort. Implementation of all the above mentioned techniques in C language and trace them by giving different test data.

TEXT BOOKS:

1. B.A.Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016
2. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.

REFERENCE BOOKS:

1. Byron Gottfried, “Programming with C”, Schaum’s Outlines, 2nd Edition, TATA McGraw-Hill.
2. M.T.Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press
4. Rajaraman V., "The Fundamentals of Computers", 4th Edition, Prentice Hall of India, 2006.
5. R S Bichker, "Programming in C", University Press, 2012.

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DEPARTMENT OF CIVIL ENGINEERING

I B.Tech, II-Sem (CE)

P	C
3	1.5

ENGINEERING PHYSICS LAB
For Branches: EEE, ECE & CSE

COURSE OBJECTIVES:

- The laboratory should help the student to develop a broad array of basic skills and tools of experimental physics and data analysis.
- The laboratory should help students to understand the role of direct observation in physics and to distinguish inferences based on theory and the outcomes of experiments.
- To learn about the optical experiments in establishing the fundamentals in Interference and Diffraction phenomena which will be visualized with the light and laser experiments mentioned in the syllabus.
- To learn about the basic electronic experiments such as energy band gap determination, Hall Effect to know the type of extrinsic semiconductors, Stewart-Gee's experiment in field intensity determination and Solar I-V characteristics.

COURSE OUTCOMES:

After completion of the course the students will be able to

- Operate optical instruments like microscope and spectrometer .
- Determine thickness of a hair/paper with the concept of interference.
- Estimate the wavelength of different colors using diffraction grating.
- Measure the resolving power of the given optical device.
- Study the variation of intensity of the magnetic field due to circular coil carrying current with distance.
- Evaluate the acceptance angle of an optical fiber and numerical aperture.
- Calculate the band gap of the given semiconductor using four probe method.
- Identify the type of semiconductor (i.e., n-type or p-type) using Hall Effect.

MAPPING WITH Cos & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	1	-	-	-	-	-	-	1
CO2	2	-	2	1	-	-	-	-	-	-	-	-
CO3	3	2	-	1	1	-	-	-	-	-	-	1
CO4	3	2	-	1	1	-	-	-	-	-	-	1

LIST OF EXPERIMENTS (ANY10 EXPERIMENTS)

1. Determination of wavelength of light – Newton's rings
2. Determination of thickness of a thin film
3. Spectrometer – Transmission grating
4. Determination of wavelength of a Sodium light – Normal Incidence
5. Dispersive power of a prism - spectrometer
6. Laser experiment: wavelength determination using grating
7. Laser experiment: particle size determination
8. Determination of numerical aperture of an optical fiber
9. Field along the axis of coil carrying current – Stewart Gee's method

10. Determination of rigidity modulus – Torsional Pendulum
11. Determination of Band gap of Si or Ge – Four probe method
12. Study of B – H Curve.
13. Determination of Charge density and Hall coefficient or magnetic flux density – Hall effect.
14. Study of I-V characteristics of Solar Cell.
15. Measurement of Dielectric constant

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I B.Tech, II-Sem (CE)

P C
3 1.5

PROGRAMMING FOR PROBLEM SOLVING LAB - II

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- To understand how to use structures and unions as a compound data types
- To understand various basic file operations
- To understand various stack and queue operations
- To understand various linked list operations
- To understand basic searching and sorting techniques

COURSE OUTCOMES:

At the end of this course, the student would be able to

- Develop applications on user defined data types
- Apply dynamic memory allocation through pointers
- Use different data structures for create/update basic data files
- Implement linear data structures through stacks and queues
- Implement various searching and sorting techniques, Linked lists.

MAPPING WITH Cos & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	3	2	-	3	-	-	2	-	-	-
CO2	-	-	-	-	3	-	2	-	-	-	1	-
CO3	-	2	-	-	3	2	-	-	-	-	-	2
CO4	3	-	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	2	-	3	-	-	-	2	-	-

RECOMMENDED SYSTEMS /SOFTWARE REQUREMENTS:

- Intel based desktop PC with ANSI C Compiler and Supporting Editors

Exercise 1

a) Write a C Program to copy the contents of one structure variable to another structure variable.
b) Write a C program to implement nested structure to store and display the student information. The structure student contains the field‘s S.no, name, and date. Date is the nested structure and it contains the fields day, month and year.

Exercise 2

a) Write a C program to add two distances which is in feet and inches
b) Write a C program to illustrate passing the whole structure as argument to a function.

Exercise 3

Write a C program that uses functions to perform the following operations:

a) Reading a complex number
b) Writing a complex number
c) Addition of two complex numbers
d) Multiplication of two complex numbers (Note: represent complex number using a structure.)

Exercise 4

a) Write a C program to implement Union Concept.
b) Write a C program which copies last ‘n‘ characters from one file to another.

Exercise 5

a) Write a C program to reverse the first ‘n‘ characters in a file.
b) Write a C program to merge two files into a third file.

Exercise 6

Write a C program to implement the following operations on Stack using array representation

a) Push
b) Pop
c) Display

Exercise 7

Write a C program to implement the following operations on Queue using array representation

a) Insert
b) Delete
c) Display

Exercise 8

Write a C program to implement the following operations on Singly Linked list using linked representation

a) Insert
b) Delete
c) Display
d) Search

Exercise 9

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order.

a) Bubble sort
b) Selection sort
c) Insertion sort

Exercise 10

Write C program to implement the following searching methods to search an element in a given list of integers

a) Linear Search
b) Binary Search

REFERENCE BOOKS:

1) Programming in C, Pradeep Dey, Manas Ghosh, Oxford Heigher Education
2) Computer programming and Data Structures, E.Balaguruswamy, Tata Mc Graw Hill. 2009 revised edition.
3) Mastering C, K.R. Venugopal and S.R. Prasad, TMH Publications.

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I B.Tech, II-Sem (CE)

P	C
3	1.5

IT WORKSHOP

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- The modules include training on PC Hardware, and Productivity tools including text processor, spread sheet, presentation tools. It enables the students to understand and fix the common hardware, software issues & makes the students to install either Windows or UNIX based Operating system in the machines.
- Enable students to understand how computers work, different types of computers, functions of applications, input and data storage devices, different operating systems,
- It makes the students to understand and use the common office suite tools like word, excel etc. effectively in their daily usage.

COURSE OUTCOMES:

By the end of module students will be expected to demonstrate

- PC Hardware- introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer. The students should work on working PC to disassemble and assemble to working condition.
- To do installation of system software like MS Widows and Linux and the required device drivers.
- Productivity tools- module would enable the students in crafting professional word documents; excel spread sheets and power point presentations using the Microsoft suite of office tools.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	2	-	-	-	-	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	3	-	-
CO4	2	2	-	2	3	-	-	-	-	-	-	-

PC HARDWARE

Exercise 1 - Identify the peripherals of a computer, components in a CPU and its functions.

Exercise 2 - Every student should disassemble and assemble the PC back to working condition.

Exercise 3 - Every student should individually install MS windows on the personal computer and also install Linux as dual boot with both Windows and

OFFICE TOOLS

Exercise 4 - Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office equivalent tool word: Importance of LaTeX and MS office tool Word as word Processors, Details of the four tasks and features that would be covered in each. Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 1-Task III: Using Word Processor to create project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using

Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

SPREAD SHEET

Exercise 5 – Spread Sheet Orientation: The mentor needs to tell the importance of MS office 2007, 2010/ equivalent tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1-Task III: Features to be covered: - Gridlines, Format Cells, Summation, auto fill, Formatting Text, Formulas, Functions

PRESENTATION

Exercise 6 - Students will be working on basic presentation utilities and tools which help them create basic power point presentation. Topic covered during this Exercise includes :- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint. Students will be given model power point presentation which needs to be replicated (exactly how it's asked).

REFERENCES:

1) Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
2) LaTeX Companion – Leslie Lamport, PHI/Pearson.
3) Introduction to Computers, Peter Norton, 6/e Mc Graw Hill
4) Upgrading and Repairing, PC's 18th e, Scott Muller QUE, Pearson Education
5) Comdex Information Technology course tool kit, Vikas Gupta, WILEY Dreamtech
6) IT Essentials PC Hardware and Software Companion Guide, Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.

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ENGINEERING WORKSHOP

For Branches: C.E., E.E.E., M.E., E.C.E., C.S.E

COURSE OBJECTIVES:

- To familiarize with the basic manufacturing processes and to study the various tools and equipment used, hands-on training is given in different sections. Essentially student should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work.

COURSE OUTCOMES:

At the end of the Engineering Work Shop:

- A student should know the basic knowledge of various tools and their use in different sections of manufacturing such as fitting, carpentry, tin smithy, welding etc. and basic engineering practices such as plumbing, electrical wiring, electronic circuits, machine shop practice.
- Ability to design and model various basic prototypes in the trade of fitting such as Straight fit, V- fit.
- Ability to make various basic prototypes in the trade of Tin smithy such as rectangular tray, and open Cylinder.
- Ability to perform various basic House Wiring techniques such as connecting one lamp with one switch, connecting two lamps with one switch, connecting a fluorescent tube, Series wiring, Go down wiring.

MAPPING WITH COs & POs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	1	2	2	1	-	-	-	2	-	2	1	1	-	-	1
CO2	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-	1
CO3	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-	1
CO4	-	-	-	-	2	1	-	-	2	2	2	-	2	-	-	1

Note: At least two exercises to be done from each trade.

1. TRADES FOR EXERCISES:

A] Carpentry

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tennon Joint

B] Fitting

1. Vee Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

C] House Wiring

1. Parallel / Series Connection of two/three bulbs
2. Stair Case wiring
3. Tube Light Wiring
4. Measurement of Earth Resistance/Go down Wiring

D] Tin Smithy

1. Rectangular Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

E] Welding

1. Single V butt joint
2. Lap joint
3. Double V butt joint
4. T fillet joint.

F] Soldering

1. 1.Soldering & Desoldering Practice
2. Series Circuit
3. Parallel Circuit

2. TRADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop
c) Bosch Power Tools

REFERENCE BOOKS:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.

Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House

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2+1* 3

NUMERICAL METHODS AND PROBALITY THEORY

For Branches: C E & M E

Course Objectives:

- i) To familiarize the students with the foundations of probability and Numerical methods.
- ii) To impart probability concepts and Numerical methods in various applications in Engineering.

Course Outcomes:

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

- Understand various Numerical methods to solve transcendental equations and rate of convergence. Analyze the concept of Interpolation its applications in digital image processing, computer graphics and in many engineering disciplines.
- Understand the concept of Numerical differentiation and integration and its importance in mechanics.
- Identify various numerical methods to solve linear and non-linear ordinary differential equations and its applications in non-linear analysis.
- To know the importance of probability, random variables and distributions in solving various mechanical and civil engineering problems.

Mapping of COs & POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	3	2	-	-	-	-	-	-	-
CO2	3	3	2	2	3	-	-	-	-	-	-	-
CO3	2	3	2	3	2	-	-	-	-	-	-	-
CO4	3	2	3	2	3	-	-	-	-	-	-	-
CO5	2	3	2	3	3	-	-	-	-	-	-	-

UNIT – I

Solution of Algebraic and Transcendental Equations: Introduction – The Bisection Method – The Method of False Position – The Iteration Method – Newton-Raphson Method.

UNIT – II

Interpolation: Introduction – Finite differences – Forward Differences – backward Differences –Newton's forward and backward difference formulae for interpolation – Gauss forward and backward difference formulae for interpolation - Lagrange's Interpolation formula.

UNIT –III

Numerical Differentiation – Numerical Integration – Newton-cote's integration formula – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations – Euler's Method – Runge – Kutta Method.

UNIT – IV

Curve fitting: Fitting a straight line – Second degree curve – Exponential curve-Power curve by method of least squares.

UNIT – V

Basic concept of probability – Random variables – Expectation – Discrete and continuous distributions.

UNIT – VI

Distribution functions: Binomial Distribution – Poison Distribution and Normal Distribution – Related properties.

TEXTBOOKS:

1) Iyengar T.K.V., Krishna Gandhi B., Rangantham S., and Prasad M.V.S.S.N., (2006), "Mathematical Methods", S. Chand & Company, India.
2) Iyengar T.K.V., Krishna Gandhi B., Rangantham S., and Prasad M.V.S.S.N., (2015), "Probability and Statistics", S. Chand & Company, India.

REFERENCES:

1) Erwin kreyszig., (2011), "Advanced Engineering Mathematics", 10th Edition, John Wiley & Sons, United States
2) Ramana B.V., (2010), "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, India
3) Kandasamy P., Thilagavathy K., and Gunavathi K., (2012), 2nd Edition, Numerical Methods, S. Chand & Company, Reprint India
4) Sastry S.S., (2005), 4th Edition, "Introductory methods of numerical analysis"., PHI.
5) Grewal B.S., (2010), 35th Edition, "Higher Engineering Mathematics"., Khanna Publishers, India

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II B.Tech, I-Sem (CE) T C

2+1* 3

STRENGTH OF MATERIALS-I

Course Objectives:

- To understand the material strength with various forces acting on it.
- To provide basic knowledge in mechanics of materials so that the students can solve real engineering problems and design engineering systems.

Course Outcomes:

At the end of the course student is able to

- Describe the concepts and principles, understand the theory of elasticity including strain/displacement and Hooke's law relationships; and perform calculations, relative to the strength and stability of structures and mechanical components.
- Define the characteristics and calculate the magnitude of combined stresses in individual members and complete structures; analyze solid mechanics problems using classical methods and energy methods.
- Analyse various situations involving structural members subjected to combined stresses by application of Mohr's circle of stress.
- Calculate the deflection at any point on a beam subjected to a combination of loads. Solve for stresses and deflections of beams under unsymmetrical loading.

Mapping of COs & POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	3											3	2	1
CO2	2	3											3	2	1
CO3	3	3											3	2	1
CO4	2	3											3	2	1
Avg.	2	3											3	2	1

UNIT-I

Simple Stresses and Strains- Concept of stress and strain, St. Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains, Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain (dilatancy) – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT-II

Introduction to analysis of stress and strain – State of stress at a point – 2D system, stress at a point on a plane, principal stresses, principal planes and maximum shear stresses, Mohr circle of plane stress, - Principal stresses for a general state of stress. 2D stress-strain system, principal strains and principal axis of strain, Mohr Circle for plane strains.

UNIT-III

Shear Force (SF) and Bending Moment (BM) diagrams for cantilevers, simply supported beams with and without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of couples. Relationship between loads, SF and BM.

UNIT-IV

Flexural Stresses-Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R - Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of Beams for bending stresses.

Shear Stresses- Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

UNIT-V

Slope and deflection- Differential equation of the deflection curve, Relationship between moment, slope and deflection, Double integration method, Moment area method, Macaulay's method, Conjugate beam method.

UNIT-VI

Torsion- Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion., Transmission of power by circular shafts.

TEXT BOOKS:

1) Punmia B.C., and Jain A.K., (2017), "Mechanics of Materials", Lakshmi Publishers, India
2) Srinath L.S., (2000), "Strength of Materials", Macmillan Publishers, India

TEXT/REFERENCE BOOKS:

1) Jindal U.C., (2012), "Strength of Materials", Pearson publishers, New Delhi.
2) Gere J.M., and Goodno B.J., (2013), "Mechanics of Materials", Eighth edition, Cengage Learning, USA.
3) Popov E.P., (2012), "Engineering Mechanics of Solids", Second edition, PHI Learning Private Limited, New Delhi.
4) Hibbeler, R. C., (2004), "Mechanics of Materials", Sixth edition, East Rutherford, NJ: Pearson Prentice Hall, USA.
5) Gere J.M., and Timoshenko S., (2004), "Mechanics of Materials", Second edition, CBS Publishers, New Delhi.

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II B.Tech, I-Sem (CE) T C

2+1* 3

FLUID MECHANICS

Course Objectives:

- The student shall learn the basics related to fluid i.e. properties of fluid, fluid statics, fluid kinematics, fluid dynamics, pipe flow, types of flow and flow measurement.

Course Outcomes:

At the end of the course student is able to

- Understand the different types and properties of fluid. Apply the concept of Pascal's law and hydrostatic law.
- Evaluate hydrostatic forces.
- Study the properties of fluid in motion and analyze forces on fluid through the continuity equation.
- Analyze laminar and turbulent flows.
- Compute friction losses and minor losses in pipes.
- Determine discharge through pipes, tanks and channels using Venturi meter / Orifice meter, orifice/mouthpiece and notches
- Understand how the fluids in motion are affected by the forces acting on them.

Mapping of COs & POs:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3											2	1	1
CO2	3	3					2						2	1	1
CO3	3	3											2	1	1
CO4	3	3	1										2	1	1
CO5	3	3	1	1			2						2	1	1
CO6	3	3	1	1			2						2	1	1
CO7	3	3	1				2						2	1	1

UNIT – I

Properties of Fluids: Dimensions and units – Physical properties of fluids- specific gravity, viscosity, surface tension, Capillarity, vapor pressure and their influences on fluid motion.

Fluid Statics: Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure-measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers. Hydrostatic forces on submerged plane surfaces (Horizontal and Vertical)-total pressure and center of pressure.

UNIT – II

Fluid Kinematics: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two, three dimensional flows – stream and velocity potential functions, flow net.

UNIT – III

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Momentum equation and its application – forces on pipe bend. Kinetic energy correction factor and momentum correction factor.

UNIT - IV

Measurement of Fluid Flow: Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular, trapezoidal and stepped notches - –Broad crested weirs.

UNIT – V

Flow Through Pipes: Laws of Fluid friction – Darcy's equation, Minor losses (types), equation for head loss due to sudden expansion – pipes in series – pipes in parallel – Total

energy line and hydraulic gradient line, Hydraulic transmission through pipe, siphon, Water Hammer.

UNIT VI

Laminar Flow

Reynold's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe (Hagen Poiseuille equation).

Turbulent Flow

Characteristics of turbulent flow, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for flow in pipe, Variation of friction factor with Reynold's number –Moody's chart.

TEXT BOOKS:

1. Modi P.N., and Seth S.M., (2019), "Hydraulics and Fluid Mechanics Including Hydraulics Machines", 22nd Edition, Standard Book House, New Delhi.
2. Frank. M. White., (2015), "Fluid Mechanics", 8th Edition, Tata Mc. Grawhill Pvt. Ltd., USA.

REFERENCES:

1. Bansal R.K., (2018), "Fluid Mechanics and Hydraulic Machines", 10th Edition, Laxmi Publications (P) Ltd., New Delhi.
2. Douglas, J.F., Gaserek, J.M. and Swaffirld, J.A. (Longman), (2005), "Fluid Mechanics (4th edition)", by Delhi Pearson Education, India.
3. Mohanty A.K., (1994,) "Fluid Mechanics", Prentice Hall of India Pvt. Ltd., New Delhi.
4. Som S.K., and Biswas. G., (2010), "Introduction to Fluid Machines", Tata Mc.Grawhill publishers Pvt. Ltd., USA.
5. Edward J. Shaughnessy, Jr, Ira M. Katz and James P., (2005), "Schaffer Introduction to Fluid Machines", Oxford University Press, New Delhi.

WEB RESOURCES:

1. Fluid Mechanics, http://nptel.ac.in/courses/105101082/
2. Fluid Mechanics, http://www.nptel.ac.in/courses/112104118/ui/TOC.htm

R G M COLLEGE OF ENGINEERING AND TECHNOLOGY

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DEPARTMENT OF CIVIL ENGINEERING

II B.Tech, I-Sem (CE) T C

2+1* 3

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to ME& CE)

Course Objectives:

- This course introduces the basic concepts in electric circuits and networks
- This course also introduces the working principles of D.C Generator, DC motor.
- It also helps to study the operating principles of Transformers and their working.
- To understand the fundamental principles of basic electronic devices.
- To provide theoretical prerequisites necessary to do lab work on DC machines and Electronic Devices.

Course Outcomes:

At the end of the course student is able to

- To know the basic knowledge of conducting materials and electrical circuit parameters.
- Understand the principles of dc machines.
- Analyze the working operation of Transformer.
- Determine the efficiency of machines, half wave and full wave rectifiers.
- Able to observe the different tests and calculations of all machines.
- Applications of dc machines, transformers and rectifiers.

Mapping of COs & POs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	-	-	-	-	2	-	1	2
CO2	3	3	1	2	-	-	-	-	2	-	1	2
CO3	3	1	2	3	-	-	-	-	1	-	2	1
CO4	3	3	2	2	-	-	-	-	2	-	2	2
CO5	3	3	1	2	-	-	-	-	1	-	2	2
CO6	3	1	3	2	-	-	-	-	2	-	1	1
Avg.	3	3	2	2	-	-	-	-	2	-	2	2

UNIT – I

Electrical DC Circuits: Basic definitions (electrical conductor, insulator, semiconductor, electrical circuit, electric current, electric potential, EMF and electric potential difference) - Types of elements(active and passive elements)- Ohm's Law and its limitations- electric power-electrical energy- Kirchhoff's Laws- Resistances in series- Resistances in parallel- Star to delta and delta to star transformations- simple problems.

UNIT – II

DC-Generator: CONSTRUCTION AND OPERATION: D.C Generators-Working Principle – construction of DC Generator - Action of commutator, types of armature windings, induced emf equation, – Classification of DC Generators-separately excited, self-excited- series, shunt, short & long shunt compound generator-simple problems regarding EMF.

UNIT – III

DC Motor: DC motors-principle of operation -back emf –voltage and power equation of dc motor, condition for maximum power -types of DC Motors- series, shunt, short & long shunt compound motor, torque & speed equation –speed control of DC Shunt Motor – armature control method, field control method-losses in DC machines- efficiency calculation –simple problems.

UNIT – IV

Transformers: Necessity of transformer-classification of transformers-Principle of operation of single-phase transformers- Theory of an Ideal Transformer –Constructional features – core type & shell type transformers, induced emf equation, transformation ratio's-losses in a transformer- efficiency of transformer-transformer on no-load & R-load –simple problems.

UNIT – V

Diode and its Characteristics: Formation of n- type and p-type semiconductor – Construction of P-n junction diode, symbol - V-I Characteristics- Diode Applications- Rectifiers – Half wave-Full wave-mid-point only-simple Problems.

UNIT - VI

Transistors and CRO: Formation of PNP and NPN transistors – CE configuration of NPN and PNP transistors- applications -Transistor as an amplifier- construction and Principle of CRO(operation only)-Applications.

TEXT BOOKS:

1. Kothari D.P and Nagrath I.J., (2019),"Basic Electrical Engineering", 4th edition. McGraw-Hill Education., India
2. Naidu M.S and Kamakshaiah S., (1995),"Introduction to Electrical Engineering", McGraw-Hill Education (India) Pvt Limited., India

REFERENCES:

1. Mehata V.K and Rohit Mehata., (2005), "Principles of power systems", Revised edition, S. Chand, India
2. Mehta V.K and Mehta Rohit., (2008) , "Principles of Electronics", S. Chand & Co., India
3. Salivahanan S and Suresh Kumar N., (2011),"Electronics and Devises", 2nd edition, Tata Mcgraw Hill., India

WEB RESOURCES

1. https://nptel.ac.in/courses/108/101/108101091/
2. https://nptel.ac.in/courses/108/108/108108076/

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DEPARTMENT OF CIVIL ENGINEERING

II B.Tech. I-Sem (CSE) T C
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PYTHON PROGRAMMING

Course Objectives:

- Learn Syntax and Semantics of various Operators used in Python.
- Understand about Various Input, Output and Control flow statements of Python.
- Handle Strings and Files in Python.
- Understand Lists, Tuples in Python.
- Understand Sets, Dictionaries in Python.
- Understand Functions, Modules and Regular Expressions in Python.

Course Outcomes:

At the end of the course student is able to

- Examine Python syntax and semantics and be fluent in the use of various Operators of Python.
- Make use of flow control statements and Input / Output functions of Python.
- Demonstrate proficiency in handling Strings and File Systems.
- Create, run and manipulate Python Programs using core data structures like Lists and Tuples.
- Apply the core data structures like Sets and Dictionaries in Python Programming.
- Demonstrate the use of functions, modules and Regular Expressions in Python.

Mapping of COs & POs

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3								1				1	1	1
CO2	2	3							1				1	1	1
CO3	1		2						1				1	1	1
CO4	2		2						1				1	1	1
CO5	2		2						1				1	1	1
CO6	2		2						1				1	1	1

UNIT – I

Introduction: History of Python, Need of Python Programming, Applications Basics of Python Programming Using the REPL(Shell), Running Python Scripts, Variables, Assignment, Keywords, Input-Output, Indentation. Overview on data types: Numbers, Strings, Lists, Set, Tuple and Dictionaries.

Operators in Python: Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Shift Operators, Ternary operator, Membership Operators, Identity Operators, Expressions and order of evaluations. Illustrative examples on all the above operators.

UNIT – II

Input and Output statements: input() function, reading multiple values from the keyboard in a single line, print() function, 'sep' and 'end' attributes, Printing formatted string, replacement operator ({}). Illustrative examples on all the above topics.

Control flow statements: Conditional statements – if, if-else and if-elif-else statements. Iterative statements – for, while. Transfer statements – break, continue and pass. Illustrative examples on all the above topics.

UNIT – III

Strings: Introduction to strings, Defining and Accessing strings, Operations on string - String slicing, Mathematical Operators for String, Membership operators on string, Removing spaces from the string, Finding Substrings, Counting substring in the given String, Replacing a string with another string, Splitting of Strings, Joining of Strings, Changing case of a String, Checking starting and ending part of the string, checking type of characters present in a string. Illustrative examples on all the above topics.

Files: Opening files, Text files and lines, Reading files, Searching through a file, Using try, except and open, Writing files, debugging.

UNIT – IV

Lists: Creation of list objects, Accessing and traversing the elements of list. **Important functions of list** – len(), count(), index(), append(), insert(), extend(), remove(), pop(), reverse() and sort(). **Basic Operations on list:** Aliasing and Cloning of List objects, Mathematical Operators for list objects, Comparing list objects, Membership operators on list, Nested Lists, List Comprehensions. Illustrative examples on all the above topics.

Tuples: Creation of Tuple objects, Accessing elements of tuple, Mathematical operators for tuple, Important functions of Tuple – len(),count(),index(), sorted(), min(), max(), cmp().Tuple Packing and Unpacking. Illustrative examples on all the above topics.

UNIT – V

Sets: Creation of set objects, Accessing the elements of set. Important functions of set – add(), update(), copy(), pop(),remove(),discard(),clear(). Basic Operations on set - Mathematical Operators for set objects, Membership operators on list, Set Comprehensions. Illustrative examples on all the above topics.

Dictionaries: Creation of Dictionary objects, Accessing elements of dictionary, Basic operations on Dictionary - Updating the Dictionary, Deleting the elements from Dictionary. Important functions of Dictionary – dict(), len(), clear(), get(), pop(), popitem(), keys(), values(), items(), copy(), setdefault(). Illustrative examples on all the above topics.

UNIT – VI

Functions - Defining Functions, Calling Functions, Types of Arguments - Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Recursive functions, Illustrative examples on all the above topics.

Modules: Creating modules, **import** statement, from Import statement.

Regular Expressions: Character matching in regular expressions, Extracting data using regular expressions, Combining searching and extracting, Escape character.

TEXT BOOKS

1. Python for Everybody: “Exploring Data Using Python 3”., (2017), Charles R., Severance.

REFERENCE BOOKS

1. Allen Doweny., (2017), “Think Python”., 2nd Edition. Green Tea Press.,
2. Chun W., (2016), “ Core Python Programming” Pearson.
3. Kenneth A., and Lambert., (2015) ,”Introduction to Python”., Cengages.

WEB RESOURCES

4. https://www.w3schools.com/python/python_reference.asp
5. https://www.python.org/doc/

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DEPARTMENT OF CIVIL ENGINEERING

2 2

Biology for Engineers

Common to all branches

Course Objectives:

- To introduce the basic principles of Cell Structures and Functions
- To obtain a general knowledge about the human physiological system
- To train the concepts of molecular structures of Biomolecules
- To familiarize about biological components and their applications
- To apply the concepts in the development of biosensors for mankind.

Course Outcomes:

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

- Explain concept and function of cell and cell organelles
- Develop knowledge about various physiological processes in biological systems
- Explain about biomolecules, their structure and function and their role in living organisms. How biomolecules are useful in industry.
- Understanding about Biomaterials
- Identify and describe the functions of the skeletal system

Mapping of COs & POs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
1	3	-	-	-	-	-	-	-	-	-	-	1	-	-	-
2	2	-	2	-	-	-	2	-	-	-	-	1	-	-	-
3	2	-	2	-	-	-	-	1	-	-	1	1	-	-	-
4	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-
5	2	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Course	1	-	1	-	1	-	-	-	1	-	-	-	-	-	-

Unit-I:

Cell Structure and Function - Cell theory, Ultra structure of eukaryotic cell (Cell wall, Cell membrane, Golgi Complex, Endoplasmic Reticulum, Peroxisome, Lysosomes), Semi-autonomous cell Organelles (Mitochondria & Chloroplast) (5 periods)

Learning outcomes:

1. Understand the structure and importance of the cell.
2. Explain the importance of eukaryotic cell.
3. Explain the functions of cell organelles.

Unit-II

Human Physiology – Nutrition (Functions of micro & macro nutrients and their role), Respiration (Definition, Types, Respiration in humans), Digestion (Process and digestive organs in humans), Excretion (Definition, Urinary system in humans). (6Periods)

Learning outcomes:

1. Understand the metabolism in living organism.
2. Explain about the importance of human physiological process.

3. Identify the nutritional values in human body.

Unit-III

Biomolecules - Proteins (Denaturation of proteins), Nucleic acids (Mechanism of Replication & Transcription), Vitamins (Classification & functions of vitamins in bio-systems).

(5 Periods)

Learning outcomes:

1. Describe the denaturation of proteins.
2. Illustrate replication of nucleic acids.
3. Identify the importance of Vitamins in human body.

Unit-IV

Biomaterials - Definition of biomaterials, Requirements of biomaterials, Classification of biomaterials, Physical and Mechanical properties of bio-materials, Comparison of properties of some common biomaterials. (5Periods)

Learning outcomes

1. Understand the role of biomaterials for humans.
2. Understand the properties of biomaterials for organ substitution.

Unit-V

Skeletal System-Types of bones, Structure and composition of bone, artificial bone replacements with soft engineering materials. (6 periods)

Learning outcomes

1. Understand bone structure and composition
2. Able to develop knowledge about bone replacement.

Unit-VI

Applications of Biology- Stem Cells (Sources, Types and its Uses) Cancer Therapy, Basics of bio-sensors and bio-chips for bio-engineering (5 Periods)

Learning outcomes

1. Understand the role of stem cells in biology.
2. Develop new type of biosensors, biochips etc.

TEXT BOOKS

1. Nelson D. L., Cox M.M., and Lehninger., (2008), "Principles of Biochemistry"., 5th Edition, W.H.Freeman and Company, N.Y., USA.
2. Ross and Wilson., Anatomy and Physiology., (2014), Churchill Livigstone publications .

REFERENCE BOOKS

1. Voet D., and Voet J.G., (2004), " Biochemistry"., 3rd Edition, John Wiley & Sons, Inc, USA.
2. Karp G., (2010), "Cell and Molecular Biology Concepts and Experiments.", 6th Edition, John Wiley & Sons. Inc,Usa
3. De Robertis E. D. P. , and De Robertis R. E., (2009), "Cell and Molecular Biology"., 8th edition. Lippincott Williams and Wilkins, Philadelphia.

4. Cooper G. M., and Hausman R. E., (2009), "The Cell: A Molecular Approach"., 5th edition. ASM Press and Sunderland, Washington D. C., Sinnauer , Academic Press.
5. Hench L and Ethridge E.C., (1982), "Biomaterials – An Interfacial approach"., Academic Press,

II B.Tech. I-Sem (CSE) T C
1+2 0.5

APTITUDE, ARITHMETIC REASONING AND COMPREHENSION

Course Objectives:

- To familiarize the students about the concepts of aptitude, arithmetic and reasoning.
- To cope up the students to improve their employable skills.

Course Outcomes:

- After completion of the course the student will be able to:
- Understand number system which helps to become well trained for recruitment drives.
- Analyze permutations and combinations concept
- Obtain the knowledge of coding and decoding concept.
- Understand the topics related to clock and probability.
- Identify the topics related to Venn diagrams, reasoning and Non-verbal reasoning.

Mapping of COs & POs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

UNIT-I

Numbers, Number Systems Simple Equations, Ratio, Proportion, Variation Quadratic Equations, Progressions Percentages.

UNIT-II

Profit, Loss, Partnerships Averages, Mixtures & Allegations, Simple Interest, Compound Interest, Time and Work-Pipes, indices, surds, inequalities ,Cisterns Time and Distance Geometry and Menstruation.

UNIT-III

Permutations & Combinations and Probability Data Interpretation & Data Sufficiency.

UNIT-IV

Number & Letter Series, Analogies, Coding Decoding, Odd Man Out Blood Relations.

UNIT-V

Direction Sense, Symbols and Notations Deductions & Connectives Clocks, Calendars Analytical

UNIT-VI

Reasoning (Verbal and Non-Verbal) , Venn Diagrams, Analytical Puzzles and Octal number system.

Textbooks:

1. Agarwal R.S., (1997), "Quantitative Techniques"., Chand S Series, India

2. Shankuntala Devi., (1998), "Techniques of Reasoning"., Chand S Series, India

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3 1.5

STRENGTH OF MATERIALS LAB

Prerequisites: Strength of materials

Course Objectives:

- The course objective of this subject consists. Shear, tension, bending test, hardness, spring, impact, torsion, Maxwell's reciprocal theorem on beam

Course Outcomes:

At the end of the course student is able to

- Conduct tension test on steel, aluminum, copper and brass
- Conduct compression tests on spring, wood and concrete
- Conduct flexural and torsion test to determine elastic constants
- Determine hardness of metals

Mapping of COs & POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	3	-	-	-	-	-	-	2	1	-	-	1	1	3
CO2	3	3	-	-	-	-	-	-	2	1	-	-	1	1	3
CO3	3	3	-	-	-	-	-	-	2	1	-	-	2	1	3
CO4	3	3	-	-	-	-	-	-	2	1	-	-	2	1	3
Avg.	3	3							2	1			2	1	3

EXPERIMENTS

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam or simply supported beam
3. Torsion test
4. Hardness test
5. Spring test
6. Compression test on wood or concrete
7. Split tensile test on concrete
8. Impact test
9. Verification of Maxwell's Reciprocal theorem on beams.
10. Continuous beam – deflection test.

READING:

1. Timoshenko and Gere, (1996), "Mechanics of Materials", CBS Publishers, New Delhi.

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3 1.5

BASIC ELECTRICAL & ELECTRONICS ENGINEERING LAB

(Common to ME & CE)

Course Objectives:

- To experiment and verify the basic electrical and electronic principles.
- To provide practical exposure to test the performance of DC machines.
- It helps to study the characteristics of basic electronics devices

Course Outcomes:

At the end of the course student is able to

- To know the basic knowledge of electrical circuit parameters and Kirchhoff's laws.
- Understand the principles of dc machines and transformers.
- Analyze the working operations of measuring instruments, electrical machines.
- Determine the efficiency of machines, half wave and full wave rectifiers.
- Able to observe the different tests and calculations of all machines.
- Applications of dc machines, instruments and rectifiers.

Mapping of COs & POs

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3		-	-	2	-	-	-	3	-	-	-
CO2	3	1	2	-	2	-	-	-	3	-	-	-
CO3	3	3	2	2	1	2	-	-	3	-	2	-
CO4	3	1	1	1	-	1	-	-	3	-	-	-
CO5	3	2	1	2	-	2	-	-	3	-	2	-
CO6	3	2	1	1	2	1	-	-	2	1	-	-
Avg.	3	2	2	2	2	2	-	-	3	1	2	-

Section – A

Electrical Engineering Lab: (Any five experiments)

1. Verification of Kirchhoff's laws
2. Resistors in Series & Parallel.
3. Verification of Ohm's law
4. Speed control of D.C. Shunt motor by Armature Voltage control
5. Speed control of D.C. Shunt motor by Field flux control method
6. Brake test on D.C Shunt Motor

Section – B

Electronics Engineering Lab: (Any five experiments)

1. PN-junction diode characteristics
2. Half wave Rectifier without filters
3. Full wave center tapped without filters
4. Transistor CE Characteristics (Input and Output)
5. CE Amplifiers
6. Study of CRO (Voltage and time measurements)

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PYTHON PROGRAMMING LAB

Course Objectives:

- To be able to introduce core programming basics and various Operators of Python programming language.
- To demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
- To understand about Functions, Modules and Regular Expressions in Python Programming.

Course Outcomes:

- Student should be able to understand the basic concepts of scripting and the contributions of scripting language.
- Ability to explore python data structures like Lists, Tuples, Sets and dictionaries.
- Ability to create practical and contemporary applications using Functions, Modules and Regular Expressions.

Mapping of COs & POs

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	1	2						1				1	1	1
CO2	3	3	2						1				1	1	1
CO3	3	1	2						1				1	1	1

1. Program to demonstrate basic data type in python
2. Program to demonstrate operators in python
3. A cashier has currency notes of denominations 10, 50, and 100.If the amount to be withdrawn is input through the keyboard using input() function in hundreds, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer
4. Program to demonstrate list and tuple in python
5. Write a program in Python, A library charges a fine for every book returned late. For first 5 days the fine is 50 paisa, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled. Write a program to accept the number of days the member is late to return the book and display the fine or the appropriate message
6. Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of Rs.12.00 per hour for every hour worked above 40 hours. Assume that employee do not work for fractional part of an hour.
7. Two numbers are entered through the keyboard; write a program to find the value of one number raised to the power of another.
8. Write a function that receives marks received by a student in 3 subjects and returns the average and percentage of these marks. Call this function from main() and print the result in main
9. Write a program to read a file and display its contents.
10. Write a program to demonstrate Regular Expressions in python.

TEXT BOOKS

1. Learning Python, Mark Lutz, Orielly, 3 Edition 2007.
2. Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 2017.

REFERENCE BOOKS

1) Think Python, 2 Edition, 2017 Allen Downey, Green Tea Press
2) Core Python Programming, 2016 W.Chun, Pearson.
3) Introduction to Python, 2015 Kenneth A. Lambert, Cengages
4) https://www.w3schools.com/python/python_reference.asp
5) https://www.python.org/doc/

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II B.Tech, II-Sem (CE) T C

2+1* 3

SURVEYING

Course Objectives:

- Provides knowledge of various surveying & geomatics instruments Chain, Tape, Compass, Auto level, Theodolite, Total Station, GPS, DGPS etc.
- Provides understanding and application of various concepts: Principles of surveying, Chain Surveying, Compass Surveying, Levelling & Contouring, Tachometric Surveying, Trigonometric and Trilateral Principles, Curve Setting techniques, Computation of Areas & Volumes, EDM.

Course Outcomes:

At the end of the course student is able to

- Understand the basics of surveying, geomatics and various surveying instruments chain, tape, compass, auto level, theodolite, total station, GPS, DGPS etc. and their utility and precision.
- Understand and apply the concepts of triangulation, trilateration, leveling & contouring, tachometric surveying, setting out of curves, computation of area & volumes.
- Understand and apply the concepts of modern surveying like EDM, GPS.
- Able to plan the survey work for given application.

Mapping of COs & POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	2	1										3	2	
CO2	3	2	1										3	2	
CO3	3	2	2		2								3	2	
CO4	1	2	3		1								3	2	
Avg.	3	2	2		2								3	1	

UNIT -I

Basics of Surveying: Definition, principles and classification of surveying - Principles of chain survey - Methods of measuring horizontal and slope distance - Ranging - Chaining past obstacles - Plotting of chain survey - Construction and working of prismatic compass - Types of bearing - Plotting of a traverse - Declination, dip, local attraction.

UNIT – II

Levelling: Principle of levelling - Methods of levelling - Booking of readings – Contouring - Trigonometric levelling and Axis signal corrections

UNIT – III

Computation of areas: Area Between a Traverse Line and an irregular Boundary-Methods-Mid ordinate, Average ordinate, Trapezoidal rule, Simpsons rule-Coordinates.

Computation of volumes: Area of cross sections-Single level section-Two level section

UNIT – IV

Triangulation & Trilateration: Theodolite traversing - Measurement of horizontal and vertical angles - Omitted Measurements - Triangulation network – Signals - Base line measurement - Inter-visibility of stations.

Tacheometric Surveying: Principle of tachometric surveying - Distance equation for horizontal and inclined line of sights -Tangential Tacheometry – Errors.

UNIT V

Curves: Types of curves – Terminology - Elements of simple circular curve - Setting out methods - Elements of compound curve - Transition curve – Types - Methods of determination of length - Characteristics and elements of transition curve - Vertical curve –

Types and length of vertical curves - Setting out of foundation trench of a building and culvert.

UNIT VI

Modern Field Survey Systems

EDM and Total Station: Measurement principle of EDM - EDM instrument characteristics - Accuracy in EDM - Total station – Introduction – Advantages - Types and applications of total station - Field procedure

Global Positioning System (GPS): Introduction - Working principle - GPS receivers - Applications of GPS.

TEXT BOOKS

1. B.C. Punmia B.C. and Jain A.K, (2005), Surveying Vol. I, II & III", Laxmi Publications (P) Ltd., New Delhi.
2. Venkatramaiah C., (2011), "Surveying", Universities Press, India

REFERENCE BOOKS

1. Arora K.R, (2015), "Surveying vol. I, II& III", standard book house, New Delhi.
2. Subramanyam R., (2012), "Surveying and Levelling", Oxford University Press, New Delhi.
3. Basak N.N., (1994), "Surveying and Levelling", Tata McGraw Hill Publishers, New Delhi.
4. Agor R., A (1980), "Surveying& Levelling", 12th Edition, Khanna Publishers, New Delhi.
5. Satheesh Gopi., Sathi Kumar R., and Madhu N., (2006), "Advanced Surveying", Pearson Education, Dorling Kindersley (India) Pvt. Ltd, New Delhi.

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DEPARTMENT OF CIVIL ENGINEERING

II B.Tech, II-Sem (CE) T C

2+1* 3

BUILDING TECHNOLOGY

Course Objectives:

- Principles & bye-laws in planning public and residential buildings.
- Properties & application of various building materials like stones, bricks etc.,
- Principles and methods of construction of building components.
- Building services required with respect to safety and other requirements.
- Concept of Green Building system.

Course Outcomes:

At the end of the course student is able to

- Classify and understand the applications of building materials.
- Explain the principles and methods of construction of building components.
- Understand the building services required with respect to safety and other requirements.
- Apply the principles & bye-laws in planning Public and Residential buildings.
- Understand the concept of Green Building system.

Mapping of COs & POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	2	1										3	1	
CO2	3	2	1										3	1	
CO3	3	2	1										3	1	
CO4	3	2	1										3	1	
CO5	3	2	1										3	1	
Avg.	3	2	1										3	1	

UNIT – I

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

Building Bye–laws and Regulations: Introduction – Objectives of building bye-laws – Principles underlying building bye-laws – Terminology – Floor area ratio (FAR), Floor space index (FSI) – Classification of buildings – Open space requirements – Built up area limitations – Height of the buildings – Wall thickness – Lighting and ventilation requirements.

Planning of Residential Buildings: Introduction – Minimum standards for various Components of building like Bed room, Kitchen etc.,

UNIT - II

Basic Building materials: Introduction: Importance – Objectives of study of building materials – Classification of construction materials – Properties of materials.

Stones: Properties of building stones– Relation to their structural requirements – Classification of stones– Dressing of stones – Natural bed – Testing of stones.

Bricks: Composition of good brick earth – Methods of manufacturing of bricks– comparison between clamp burning and kiln burning – Qualities of a good brick –Testing of bricks.

Lime: Technical terms – Constituents of lime stone – Classification of lime – Manufacturing of lime. Cement: Properties of cement – types of cements – Testing of cements.

Wood: Structure – Seasoning of timber – Defects in timber.

UNIT - III

Tiles: Characteristics of good tile - Manufacturing methods – Types of tiles - Testing of tiles.

Other Materials: Properties and uses of iron, glass, ceramics, plastics, steel, aluminum, fiber-reinforced plastics.

UNIT - IV

Building Construction: Foundations: Shallow foundations – Spread, combined, strap and mat footings. Masonry: Bonds in Stone & brick masonry - Cavity& Partition walls. Floors: Materials used – Different types of floors – concrete, mosaic, terrazzo, tiled floors. Roofs:

Pitched, flat & curved roofs – Lean-to-roof, couple roofs, trussed roofs – King and queen post trusses – RCC roofs. Stairs: Terminology – Types of stairs. Surface Finishes: Plastering – Pointing – White washing, distempering and Painting – Damp proofing. Form work and scaffolding.

UNIT - V

Building Services: Ventilation: Necessity – Functional requirements – Natural and mechanical ventilation. Lighting: Day and artificial lighting – Types of lighting in working places. Fire Protection: Causes – Fire load – General fire safety requirements – Fire resistant construction.

UNIT-VI

Green Building: Concept of Green building, Principles of green buildings, Eco-friendly materials, Certification systems – Green Rating for Integrated Habitat Assessment (GRIHA) and Leadership in Energy and Environmental Design (LEED).

TEXT BOOKS:

1) Kumara Swamy N., and KameswaraRao A., (2012), " Building Planning & Drawing", Charotar Publishers, India
2) Rangwala S.C., Rangwala K.S., and Rangwala P.S., (2012), "Engineering materials", Charotar Publishers, India

REFERENCE BOOKS:

1) Punmia B.C., (2008), "Building construction", Laxmi Publications (P) Ltd., New Delhi.
2) Duggal S.K., (2012), "Building materials", New Age international (P) Ltd., New Delhi.
3) Arora N.L., and Gupta B.L., (2014), "Building construction", Satya prakshan publications, New Delhi.
4) Bureau of Indian Standards, National Building Code of India, New Delhi, 2005.
5) Arora N.L., Gupta B.K., and V.K. Jain (2009), "Automation Systems in smart and Green Buildings", Khanna Publications, New Delhi.
6) Tom Woolley., Sam Kimmins., Paul Harrison and Rob Harrison, (2003), "Green Building – Handbook", Volume I, Spon Press., UK

WEB REFERENCES:

IGBC website- https://igbc.in/
GRIHA website: https://www.grihaindia.org/griha-rating

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DEPARTMENT OF CIVIL ENGINEERING

II B.Tech, II-Sem (CE) T C

2+1* 3

STRENGTH OF MATERIALS - II

Course Objectives:

- Students can learn how to analyze beams which are subjected to complex stresses; also learn different theories to be considered while designing any structures or material.
- Knowledge on fluid tubes subjected to pressure will be imparted. Also, knowledge on bending stresses in masonry structures, and can learn details about unsymmetrical sections.

Course Outcomes:

At the end of the course student is able to

- Can be able to analyze structures subjected complex stresses
- Can be able to design thin and thick cylinder & shells
- Can be able to analyze unsymmetrical sections
- Analyze columns and struts

Mapping of COs & POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	1	-	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO3	1	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO4	1	2	-	-	-	-	-	-	-	-	-	-	3	2	-
Avg.	2	2											3	2	

UNIT – I

Columns and Struts: Direct and bending stresses –Kernel of section – Slenderness ratio and effective length of column - Buckling and stability – Columns with pinned ends, other support conditions, Eccentric axial loads using differential equations

UNIT – II

Theories of Failures: Introduction – Various Theories of failures like Maximum Principal Stress theory – Maximum Principal Strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – III

Thin Cylinders: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

Thick Cylinders: Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

UNIT – IV

Direct and Bending Stresses: Determination of stresses in the case of chimneys, retaining walls and dams - conditions for stability – stresses due to direct loading and B.M. about both axes.

UNIT – V

Unsymmetrical Bending: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

Shear Centre: Concept of Shear Centre – Shear Centre of various cross sections – Shear flow–Shear lag.

UNIT – VI

Strain Energy: Introduction – principle of virtual work – unit load method for calculating displacement – reciprocal theorems – strain energy and complementary energy – strain energy methods – complementary energy methods

Springs: Introduction – Helical springs – closed coil helical springs – open coiled helical springs.

TEXT BOOKS:

1. Punmia B.C., Jain A.K., (2017), "Mechanics of Materials", Lakshmi Publishers, India.
2. Rajput R.K., (2015), "Strength of Materials", S Chand Publishers, India.

REFERENCE BOOKS:

1) Jindal U.C., (2012), "Strength of Materials", Pearson publishers, India.
2) Gere J.M., Goodno B.J., (2013), "Mechanics of Materials", Eighth edition, Cengage Learning, USA.
3) Popov E.P., (2012), "Engineering Mechanics of Solids", Second edition, PHI Learning Private Limited, New Delhi.
4) Hibbeler, R. C., (2004), "Mechanics of Materials", Sixth edition, East Rutherford, NJ: Pearson Prentice Hall, USA.
5) Gere J.M., and Timoshenko S., (2004), "Mechanics of Materials", Second edition, CBS Publishers, New Delhi.

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HYDRAULICS AND HYRAULIC MACHINERY

Course Objectives:

- The student shall learn the concept of boundary layer theory and fundamentals of flow through open channels, dimensional analysis; Hydraulic machines such as flow through turbines and pumps including their performance characteristics and design aspects.

Course Outcomes:

At the end of the course student is able

- To understand the concept of boundary layer theory.
- To know the different types of flows and channels.
- To understand the fundamentals of Uniform and Non-Uniform flow, GVF and RVF in open channels.
- To prepare models for prototypes of hydraulic structures.
- To determine the forces exerted by the jet of fluid on vanes.
- To evaluate the performance of turbines and pumps.

Mapping of COs & POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2									2			1
CO2	3											2			3
CO3	3	3	2									2	1	2	3
CO4	3	3	3									2	1	2	3
CO5	3	3			2							2	1	2	3
CO6	3	3	2		2							2	1	2	3

UNIT – I

Boundary Layer Theory: Boundary layer – concepts, Characteristics of boundary layer along a thin flat plate, Von Karman momentum integral equation (No derivation); Forces on Submerged bodies: Drag & Lift force (Concepts and problems), Magnus effect.

UNIT – II

Open Channel Flow:

Uniform Flow: Introduction, Classification of flows, Types of channels; Chezy, Manning's, Bazin, Kutter's Equations; Hydraulically efficient channel sections - Rectangular, Trapezoidal and Circular channels; Velocity distribution; Energy and momentum correction factors.

Non - Uniform Flow: Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope.

Gradually Varied Flow: Dynamic equation; surface profiles; Computation of surface profiles by single step method; Back water curves and Draw down curves.

Rapidly Varied Flow: Hydraulic jump; Elements and characteristics of hydraulic jump; Types of hydraulic jump; Location and applications of hydraulic jump; Energy loss in a hydraulic jump.

UNIT – III

Hydraulic Similitude: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – IV

Basics of Turbo Machinery: Hydrodynamic force of jets on stationary and moving flat inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency

UNIT - V

Hydraulic Turbines: Layout of a typical Hydropower installation – Heads and efficiencies-classification of turbines- Pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency - draft tube – theory and function efficiency. Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

UNIT – VI

Centrifugal-Pumps: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed- multistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-cavitation-Model testing – Performance characteristics.

Reciprocating Pumps: Main components – Working of a Reciprocating Pump – Types of reciprocating pumps – Work done by single acting and double acting pumps – Coefficient of discharge, slip, percentage slip – Negative slip.

TEXT BOOKS:

1. Modi P.N., and Seth SM., (2019), "Hydraulics and Fluid Mechanics Including Hydraulics Machines", 19thEdition, Standard Book House, New Delhi.
2. Dr. Bansal R.K., (2018), "Fluid mechanics and hydraulic machines", by - Laxmi Publications (P) ltd., New Delhi.

REFERENCES:

1. Ranga Raju., (2008), "Elements of Open channel flow", Tata McGraw Hill Publications, New Delhi.
2. Rajput Er., (2016), "Fluid Mechanics and Fluid Machines", S Chand & Co., India.
3. Banga and Sharma., (1995), "Hydraulic Machines", Khanna Publishers, India.
4. Subramanya K., (2015), "Open Channel Flow", Tata Mc. Grawhill Publishers, New Delhi.
5. Ramamrutham S., (2014), "Hydraulics, Fluid Mechanics and Fluid Machines", 9th Edition, Dhanapat Rai Publishing Company, India.

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STRUCTURAL ANALYSIS

Course Objectives:

- To learn analysis of fixed & continuous beams with differing loading and support settlements with theorem of three moments.
- To learn analysis of beams and portal frames with slope deflection method, moment distribution method and Kani's method, analysis of rolling loads, influences line diagrams.

Course Outcomes:

At the end of the course student is able to

- Understand fundamental concepts, theorems & derivations for analysis of structures.
- Analyses of beams and portal frames by using various conventional methods.
- Draw influence line diagrams for beams and indeterminate structures.
- Analyses of structures for moving loads.

Mapping of COs & POs

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO2	2	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	3	2	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	2	-
Avg.	3	3											3	2	

UNIT-I:

Fixed Beams- Introduction to statically indeterminate beams with U.D. load, central point load, eccentric point load, series of point loads, uniformly varying load, couple and combination of loads shear force and bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT-II:

Continous Beams- Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT-III:

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

UNIT-IV:

Moment Distribution Method: Introduction-Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports –portal frames with and without Sway.

UNIT-V:

Kani's Method: Basic concepts- Analysis of continuous beams – including settlement of supports - portal frames (single bay-single storey) with and without sway.

UNIT-VI:

Influence Lines & Moving Loads:

Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads

Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a section single point load, U.D.load longer than the span, U.D. load shorter than the span.

TEXT BOOKS:

1. Bhavikatti S.S., (2013), "Structural Analysis (Vol-1&II)" Vikas Publishing House, India.
2. Vaidyanathan R., and Perumal., (2016), "Structural Analysis (Vol-1&II)", Laxmi Publications (pvt) Limited, India.

REFERENCE BOOKS:

1. Negi L.S., Jangid R.S., (2004), "Structural Analysis", Tata Mcgraw Hill Publishing Co Ltd, New Delhi.
2. Hibbeler, R.C., (2006), "Structural Analysis", Pearson, India.
3. Wang C.K., (2010), "Intermediate Structural Analysis", Tata McGraw Hill Publishing Co Ltd, New Delhi.
4. Ramamrutham S., Narayan R., (2013), "Theory of structures", Dhanpat Rai Publishing Co Ltd, India.
5. Devdas Menon, (2018), "Structural Analysis", Narosa Publishing House, India.

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II B.Tech. I-Sem (CSE) P C
2 0

ENVIRONMENTAL SCIENCE

(Mandatory Learning – I)

Common to All Branches

Course Objectives:

- Creating the awareness about environmental problems among people.
- Imparting basic knowledge about the environment and its allied problems.
- Developing an attitude of concern for the environment.
- Motivating public to participate in environment protection and environment improvement.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.
- Striving to attain harmony with Nature.
- Environmental education should be compulsory, right from the primary up to the post graduate stage.
- Environmental education should have an interdisciplinary approach by including physical, chemical, biological as well as socio-cultural aspects of the environment. It should build a bridge between biology and technology.
- Environmental education should take into account the historical perspective, the current and the potential historical issues.
- Environmental education should emphasize the importance of sustainable development i.e., economic development without degrading the environment.
- Environmental education should emphasize the necessity of seeking international cooperation in environmental planning.

Course Outcomes:

At the end of the course student is able to

- Understand environmental problems arising due to developmental activities.
- Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
- Identify the natural resources and suitable methods for conservation and sustainable development.
- Identify the environmental pollutants and abatement devices.
- Adopt practices that help in promoting balance in nature by making judicious utilization of recourses.

Detailed syllabus:

UNIT I

Multidisciplinary nature of environmental science:

Environment -Definition, Scope and importance, Segments of Environment(Atmosphere, Lithosphere, Hydrosphere and Biosphere)-Importance, Productivity, Aesthetical & Optional values of nature, Need for public awareness. (8 periods)

UNIT II

RESOURCES AND UTILIZATION

Renewable and Non-renewable resources.

A) Natural Resources: Soil & Water sources (salinity intrusion –conflicts of over utilization of water Resources-water logging, Hydro power project-problems), forest & mineral resources – Utilization-problems.

B) Non-conventional resources of energy(Solar Energy, wind energy and their applications)

C) Chemical fertilizers and pesticides-problems. (8 periods)

UNIT III

a) CONCEPTS OF ECO-SYSTEM

Structure and functions of an ecosystem: Producers, Consumers and Decomposers-Interaction between biotic and abiotic factors in an ecosystem- Energy flow and its

importance- Trophic levels- Food chain- Food web –Ecological Pyramid, Ecological succession

b) **TYPES OF ECOSYSTEM**

Understanding the types of ecosystem: (i) Terrestrial (forest and grassland) (ii) Aquatic (fresh waterand salt water) with an example of each. (8 periods)

UNIT IV

BIODIVERSITY

Introduction – Definition - genetic, species and ecosystem diversity- Biogeographical classification of India- Value of biodiversity - Biodiversity at global, National and Local levels- India as a mega diversity nation - Hot-spots of biodiversity- Threats to biodiversity- IUCN Red data book. Conservation of bio diversity (IN-SITU andEX-SITU conservation) (8 periods)

UNIT V

ENVIRONMENTAL POLLUTION:

Introduction - Cause, effects and control measures of
a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards
Municipal Solid Waste Management: Sources and Disposable methods.
Disaster management: Floods, Earthquake, Cyclone.
(8 periods)

UNIT VI

HUMAN POPULATION:

a) Population and Environment:- Definition of species, community, population; Population growth rate curves, Sex ratio, From unsustainable to sustainable development,
b) Diseases- AIDS, Malaria, COVID, Cancer.
c) Human rights, Fundamental duties and Value education.
d) Women and Family welfare Programs. (8 periods)

SOCIAL ISSUES:

a) Climatic changes
b) Greenhouse effect and global warming.
c) Ozone layer depletion.
d) Acid rain.
e) Resettlement and rehabilitation of people.
f) Sustainability- water conservation methods- Rain water harvesting.

TEXT BOOKS:

1. Deswal S., and Deswal A., (2004), “A Basic Course in Environmental Studies”., Dhanpat Rai & Co, Delhi
2. Anubha Kousik and Kousik C.P., New age international publishers.

REFERENCES:

1. Garg, S.K ., and Garg R., (2006), “Ecological and Environmental Studies”., Khanna Publishers, Delhi.
2. Chauhan A.S., (2006), “Environmental Studies”., Jain Brothers, New Delhi

3. Agarwal K.C., (2001) “Environmental Biology”., Nidi Publ. Ltd. Bikaner.
4. Bharucha Erach., “The Biodiversity of India”., Mapin Publishing Pvt. Ltd., Ahmedabad –380 013, India, Email:mapin@icenet.net (R)
5. Brunner R.C., (1989), “Hazardous Waste Incineration”., McGraw Hill Inc. 480p
6. Clark R.S., “Marine Pollution.,” Clanderson Press Oxford (TB)
7. Cunningham W.P., Cooper T.H., Gorhani E., and Hepworth.,(2001), M.T. “Environmental
8. Encyclopedia”., Jaico Publ. House, Mumabai, 1196p
9. De A.K., “Environmental Chemistry”., Wiley Eastern Ltd.

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II B.Tech, II-Sem (CE) T C

1+2* 0.5

DESIGN THINKING

(Skill Development Course)

Common to all branches

Course Objectives:

- To create awareness of design among students of engineering
- To motivate students to think of design before implementing an engineering project
- To teach a systematic approach to identifying and defining a problem before brainstorming for a solution
- To instil a sense of significance towards applying creativity to product and service design

Course Outcomes:

Upon completion of this course, the student shall be

- Learn to identify design principles from an engineering perspective
- Cultivate sensitivity towards design aspects in objects made by engineers and non-engineers, which are typically used in daily life
- Understand and create visual design elements to communicate more effectively
- Construct clear problem statements, understand the importance of validation, and design services creatively
- Develop fundamental team skills: working in teams and managing teams, strategizing tasks, and streamlining activities pertaining to a project

Students' Responsibilities:

1. Students will form teams of 3–5 members each, while working collaboratively throughout the semester.
2. Students will present and report the tasks to the class and to the concerned faculty members and design experts, using their oral and written communication skills as well as creativity and team skills.
3. Students must proactively engage in observing the objects and processes which are part of their daily life and society from a design perspective and discuss with peers to learn collaboratively.

UNIT-I: Design Overview and Motivation

History and Context of birth of Design; Design thinking: Introduction and Motivation; Various definitions and interpretations of design, Design Vocabulary; Design in Indian Context; Art and Design: Art in Design, Design beyond Art; Design in Creative Industries

UNIT -II: Design Sensitization for Engineers

Design Engineering vs. Engineering Design, Examples of Engineering Design and Design Engineering in various engineering domains, Examples of design failures leading to bad products and services, Real-world examples of bad design that caused engineering and technological disasters, Domain-specific Engineering Design examples.

UNIT -III: Design Thinking Foundations

The Design Double Diamond: Discover-Define-Develop-Deliver, User-centric design approaches: Importance of user-centricity for design, Empathisation, Empathy Maps, Data

collection from users and for users, Data Validation, Responsible Innovation and Ethical Design: Ethics as foundation for design, Concern for environment and sustainability

UNIT -IV: Communication Skills for Design, Culture and Art

Communication Media to express an idea: Visuals, Text, Voice and Audio, Infographics
General guidelines for a good Presentation: Target audience, slideshow templates, appropriate visual elements, presentation styles, guidelines, General guidelines for a good Report: Documentation classification, standards, styles, and templates, Modes of communication: Reports and documents, Presentation, poster, graphic, blog or website.
Understanding Art in Design: Need for creativity, Elements of Visual Design, Design Aesthetics: Influences and impressions of Colours, Shapes, Layouts, Patterns, and Fonts as Design Elements.

UNIT -V: Applied Creativity and Design for Services

Methods to brainstorm solutions for user issues; Combining solutions to workable solution concepts; Identifying the user needs in a service-driven economy; Process Flows and Customer Experience considerations for designing and improving services; 5 Why"s; Service Delivery Pathways

UNIT -VI: Doing Design

Looking for a problem, Ideation and Rules of Ideation, Framing and stating the problem; Basic considerations of Prototyping/ Model Building, Basics of Testing and Validation, Incorporating feedback

TEXT BOOKS:

1) Daniel Ling., (2015), "Complete Design Thinking Guide for Successful Professionals", Create Space Independent Publishing, USA. (ISBN: 978-1514202739)
2) Tim Brown., (2012), "Change by Design", Harper Business, USA (ISBN: 978-0062337382)

REFERENCES:

1) Jimmy Jain., (2018), "Design Thinking for Startups: A Handbook for Readers and Workbook for Practitioners", Notion Press, India (ISBN: 978-1642495034)
2) Beverly Rudkin Ingle., (2013), "Design Thinking for Entrepreneurs and Small Businesses: Putting the Power of Design to Work", A Press, USA (ISBN: 978-1430261810)
3) Donald A. Norman., (2013), "The Design of Everyday Things", *MIT Press*, USA (ISBN: 978-0262525671)
4) Bruno Munari., (2009), "Design As Art", *Penguin UK*, (ISBN: 978-0141035819)
5) Tom Kelly and Jonathan Littman, (2002) "The Art of Innovation", HarperCollins Business, USA (ISBN: 978-0007102938)
6) Thomas Lockwood., (2009), "Design Thinking: Integrating Innovation, Customer Experience, and Brand Value", *Allworth Press*, New York (ISBN: 978-158115).

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SURVEYING LABORATORY

Course Objectives:

- Provide knowledge & skill in using various traditional and modern Surveying Instruments.
- Provides knowledge and application of concepts in Chain Surveying, Compass Surveying, Leveling & Contouring, Tachometric Surveying, Trigonometric Surveying, and Curve Setting.

Course Outcomes:

At the end of the course student is able to

- Acquire skill in using various Surveying instruments Chain, Tape, Electronic Distance Meter, Compass, Auto level, Theodolite, Total Station, GPS, etc.,
- Acquire knowledge and skill in various areas of Surveying namely Chain Surveying, Compass Surveying, Leveling, Tachometric Surveying, Trigonometric Surveying, and Curve Setting.
- Able to plan, select the instruments and able to do Survey for a given work.

Mapping of COs & Pos:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	2	1	1		1	1			3	1			2	2	3
CO2	2	1	1		1	1			3	1			2	2	3
CO3	2	1	1		1	1			3	1			2	2	3
Avg.	2	1	1		1	1			3	1			2	2	3

LIST OF EXERCISES:

1) Surveying by chain (Obstacles, area) & Plotting
2) Compass Surveying.
3) An exercise of L.S and C.S and plotting using levelling instrument.
4) Measurement of horizontal angles and vertical angles by using theodolite.
5) Trigonometric Levelling - Heights and distance problem (Two Exercises)
6) Heights and distance using Principles of tacheometric surveying (Two Exercises)
7) Curve setting – different methods. (Two Exercises)
8) Setting out works for buildings & pipe lines.
9) Determine of area using total station
10) Traversing, contouring, stake out & finding remote height using total station
11) Distance, gradient, Difference in height between two inaccessible points using total stations
12) Learning the use of GPS
13) Learning the use of DGPS
14) Perform different built-in application programmes using Total Station.
15) Data collection using Total Station.
16) Demonstration of Advanced surveying instruments and E-Survey CAD

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DEPARTMENT OF CIVIL ENGINEERING

II B.Tech, II-Sem (CE) P C

3 1.5

FLUID MECHANICS, HYDRAULICS AND HYDRAULIC MACHINES LABORATORY

Course Objectives:

- Provides practical knowledge to understand fluid mechanics concepts
- Provides practical knowledge to understand fluid machines

Course Outcomes:

At the end of the course student is able to

- Calibrate flow measuring devices used in pipes, channels and tanks
- Determine fluid flow properties
- Characterize laminar and turbulent flows
- Determine the performance characteristics of various fluid machines like pumps, turbines etc.
- Establish the specific energy curve
- Determine Energy loss in Hydraulic jump

Mapping of COs & Pos:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	-	-		-	-	-	3	1		-	-	-	3
CO2	1	3	-	-		-	-	-	3	1		-	-	-	3
CO3	1	3	-	-		-	-	-	3	1		-	-	-	3
CO4	2	3	-	-		-	-	-	3	1		-	-	-	3
CO5	2	3	-	-	3	-	-	-	3	1	2	-	-	-	3
CO6	2	3	-	-	3	-	-	-	3	1	2	-	-	-	3

LIST OF EXPERIMENTS:

1) Determination of Coefficient of discharge for Venturi meter & Orifice meter
2) Determination of Coefficient of discharge for a small orifice by a constant head method.
3) Determination of Coefficient of discharge for an external mouth piece by variable head method.
4) Determination of Coefficient of discharge for contracted Rectangular Notch and /or Triangular Notch
5) Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6) Verification of Bernoulli's equation.
7) Impact of jet on vanes
8) Study of Hydraulic jump.
9) Performance test on Pelton wheel turbine
10) Performance test on Francis turbine.
11) Efficiency test on centrifugal pump.
12) Efficiency test on reciprocating pump.
13) Incipient motion of sand bed particles

READING:

1. Modi P.N., and Seth S.M., (2019), "Hydraulics and Fluid Mechanics Including Hydraulics Machines", Standard Book House, New Delhi.

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II B.Tech, II-Sem (CE) P C

3 1.5

BUILDING PLANNING & DRAWING LABORATORY

Course Objectives:

- To have knowledge of building bye-laws and the regulations as per National Building Code.
- To obtain skill in planning and drawing of different types of buildings (plan, elevation and sectional views).

Course Outcomes:

At the end of the course student is able to

- Apply the knowledge of National Building code and regulations.
- Plan the layout of the building satisfying the building bye-laws.
- Draw the line plan, dimensional plan, elevation and sectional elevation of the buildings as per the data given.
- Prepare building drawings identifying the functional requirements and building rules.

Mapping of COs & Pos:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PS03
CO1	3					2	2				2		3	2	2
CO2	3	2	3		3	2	2				2		3	2	2
CO3	3	2	3		3	2	2				2		3	2	2
CO4	3	2	3		3	2	2				2		3	2	2
Avg.															

Module 1

As per the building bye-laws, line plan and dimensional plan are drawn to scale as per the dimensions in AutoCAD for

1. Residential Building
2. Office building
3. Hospital building
4. School building

Module 2

For the dimensional plan, elevation and sectional elevation are drawn to scale as per the required dimensions in AutoCAD for

1. Residential Building
2. Office building
3. Hospital building
4. School building

Module 3

A problem statement including all the dimensions of building as per required is given. Line Plan, Dimensional plan, Elevation and Sectional elevation are to be drawn to scale in AutoCAD (for any category of building).

NOTE:

1. Students should sketch to dimension the above in a sketch book before doing the computer drawing.
2. Each module consists of 4 questions each. From total of 12, 8 lab drawings are to be compulsorily submitted by student at the end of semester.
3. Two full questions from module 2 and module 3 are to be answered by the students compulsorily.

READING:

1) Kumara Swamy N., and Kameswara Rao A., (2012), “Building Planning & Drawing”, Charotar Publishers, India.
2) Bureau of Indian Standards, National Building Code of India, New Delhi, 2005.

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