ACADEMIC REGULATIONS
COURSE STRUCTURE
AND
DETAILED SYLLABUS

CIVIL ENGINEERING

B.Tech Four Year Degree Course

(Applicable for the batches admitted from 2014-15)

GUDLAVALLERU ENGINEERING COLLEGE

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

Seshadri Rao Knowledge Village

GUDLAVALLERU - 521 356, Krishna District, Andhra Pradesh

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VISION & MISSION OF THE COLLEGE

Vision

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

Mission

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

VISION & MISSION OF THE DEPARTMENT

Vision

To provide quality education embedded with knowledge, ethics and advanced skills and preparing students globally competitive to enrich the civil engineering research and practice.

Mission:

- Aims at imparting integrated knowledge in basic and applied areas of civil engineering to cater the needs of industry, profession and the society at large.

- To develop faculty and infrastructure making the department a centre of excellence providing knowledge base with ethical values and transforming innovative and extension services to the community and nation.
- To make the department a collaborative hub with leading industries and organizations, promote research and development and combat the challenging problems in civil engineering which leads for sustenance of its excellence.

III. PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- Exhibit their competence in solving civil engineering problems in practice, employed in industries or undergo higher study.
- Adapt to changing technologies with societal relevance for sustainable development in the field of their profession.
- Develop multidisciplinary team work with ethical attitude &social responsibility and engage in life - long learning to promote research and development in the profession.

IV. PROGRAM OUTCOMES (POs)

- An ability to apply knowledge of mathematics, science and engineering principles to civil engineering problems.
- An ability to analyze design and conduct experiments and interpret the resulting data.
- An ability to design a system, component or process to meet desired goals in civil engineering applications.
- An ability to function on multi disciplinary teams.
- An ability to identify, formulate and solve challenging engineering problems.
- An understanding of professional and ethical responsibility.
- An ability to communicate effectively through verbal, written and drawing presentations.
- An ability to understand the impact of engineering solutions in a global, economical and social context with a commitment on environmental and safety issues.
- An ability to recognize the need of engaging in lifelong learning and acquiring further knowledge in specialized areas.
- Ability to excel in competitive examinations, advanced studies and become a successful engineer in construction industry.
- An ability to use the techniques, skills and modern engineering tools and software for engineering design and practices.
- The understanding of basic finance & management techniques and construction practices including work procurement and legal issues.

V. ACADEMIC REGULATIONS

Applicable for the students of B.Tech from the Academic Year 2014-15.

1. UG – B.Tech Programs

The following B.Tech Programs are offered at present

i. Civil Engineering (CE)
ii. Electrical and Electronics Engineering (EEE)
iii. Mechanical Engineering (ME)
iv. Electronics and Communication Engineering (ECE)
v. Computer Science and Engineering (CSE)
vi. Information Technology (IT)

2. Duration of the Program

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

3. Minimum Instruction Days

Each semester consists of a minimum of ninety instruction days.

4. Program Credits

i) Each discipline of the B.Tech program is designed to have a total of 180 credits and the student shall have to complete the four year course work and earn all the **180** credits for the award of B.Tech Degree.

ii) Students joining the B.Tech program into the third semester directly through Lateral Entry (LE) Scheme shall have to complete the three year course work and earn **132** credits for the award of B.Tech degree.

5. Attendance Regulations

5.1 A student shall be eligible to appear for End Semester Examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

5.2 Condoning of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester will be considered for genuine reasons such as medical grounds and participation in co-curricular and extra-curricular activities and shall be granted only after approval by a committee duly appointed by the college. The student should submit application for medical leave along with medical certificate from a registered medical practitioner within three days from reporting to the class work after the expiry of the Medical Leave. In case of participation

in co-curricular and extra-curricular activities, either in the college or other colleges, students must take prior written permission from HoD concerned and should also submit the certificate of participation from the organizer of the event within three days after the completion of the event. Only such cases will be considered for condoning attendance shortage.

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

5.4 A student will not be promoted to the next semester unless he satisfies the attendance requirement of the current semester. He may seek re-admission for that semester when offered next.

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

5.6 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.

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

5.8 A student is required to put up a minimum of 75% of attendance in the mandatory non-credit courses such as NSS and Games & Sports / Creative Arts despite satisfactory performance / participation in the activities organized under each event for getting the satisfactory grade.

6. Examinations and Scheme of Evaluation

6.1 Theory Courses (3 Credits):

Each theory course shall be evaluated for a total of 100 marks, consisting of 40 marks for internal assessment and 60 marks for semester end examination.

Internal Assessment:

i) Out of 40 marks for internal assessment, 20 marks are for continuous assessment in the form of class tests and 20 marks are based on two mid-term examinations. The first mid-term examination shall be from the first three units of syllabus and second mid-term from the last three units of syllabus, conducted during the semester.

ii) Four class tests, two tests before first mid-term examination and the other two before second mid-term examination, each for 10 marks, with 45 minutes duration, are conducted in a semester and the average marks of the three best scored tests are scaled up for 20 marks and taken as marks for the continuous evaluation process.

iii) Each mid-term examination is conducted for 40 marks with two hours duration. Each mid-term examination consists of four questions, each for 10 marks. All the questions need to be answered. First question shall have 5 short questions, each of two marks or 10 objective questions each of one mark and the remaining three questions are of descriptive type, one from each unit of syllabus.

iv) Sum of the 75% marks of best scored mid-term examination and 25% marks of least scored mid-term examination are scaled down for 20 marks.

v) For the subjects such as Engineering Graphics, Engineering Drawing, Machine Drawing, Design & Drawing of R.C. structures, Steel structures, Irrigation structures, Estimation Cost and Valuation, Building Planning and Drawing etc., the distribution of 40 marks for internal evaluation shall be 20 marks for day-to-day work and 20 marks for internal tests (average of 2 tests) and 60 marks for semester end examination.

External Assessment:

i) Semester End Examination will have questions under Part-A and Part-B with three hours duration. **Part-A** is compulsory and consists of six 2 marks questions. **Part-B** consists of six questions, one question from each unit, out of which four questions are to be answered. All questions carry equal marks of 12 each.

ii) For subjects like Engineering Drawing / Engineering Graphics, Machine Drawing, Building Planning & Drawing, etc., the pattern of semester end examination is given along with the syllabus of respective subject.

6.2 Theory Courses (2 Credits):

Each theory course shall be evaluated for a total of 75 marks, consisting of 25 marks for internal assessment and 50 marks for semester end examination.

Internal Assessment:

i) Out of 25 marks for internal, 5 marks for assignments and 20 marks are based on two mid-term examinations.

ii) Two assignments, each for 10 marks, are evaluated in a semester and the average marks of two assignments are scaled down for 5 marks.

iii) Each mid-term examination is conducted for 40 marks with two hours duration. Each mid-term examination consists of four questions, each for 10 marks. All the questions need to be answered.

iv) Sum of the 75% marks of the best scored mid-term examination and 25% marks of the least scored mid-term examination are scaled down for 20 marks.

External Assessment:

i) Semester End Examination will have questions under Part-A and Part-B with three hours duration. **Part-A** is compulsory and consists of five 2 marks questions. **Part-B** consists of six questions, covering uniformly the entire syllabus, out of which four questions are to be answered. All questions carry equal marks of 10 each.

Employability Skills:

The distribution of marks shall be 25 marks for Internal Evaluation and 50 marks for the semester end examination. There shall be continuous evaluation by the internal subject teacher during the semester for 25 internal marks, of which 15 marks shall be for day-to-day performance and 10 marks shall be evaluated by conducting an internal test towards the end of semester.

Semester end examination shall be conducted by the teacher concerned and external examiner for 50 marks. The distribution of marks in the semester end examination will be:

Questionnaire / data collection	: 10 marks,
Project Report	: 10 marks,
Presentation of the Project	: 15 marks and
Viva-voce	: 15 marks

MOOCs (Massive Open Online Courses):

The evaluation procedures and award of grades in different MOOCs and equivalent letter grading of the college shall be prescribed for each MOOCs along with the notification of MOOCs.

6.3 Laboratory Courses:

i) For practical subjects the distribution shall be 25 marks for Internal Evaluation and 50 marks for the semester end examinations. There shall be continuous evaluation by the internal subject teacher during the semester for 25 internal marks of which 15 marks shall be for day-to-day performance (10 marks for day-to-day evaluation and 5 marks for Record) and 10 marks shall be evaluated by conducting an internal laboratory test towards the end of semester.

ii) Semester end examination shall be conducted by the teacher concerned and external examiner for 50 marks.

6.4 Mandatory Non-Credit Courses:

A student is required to take up two Non-Credit courses, viz. NSS and Sports & Games / Creative Arts, one in II year and the other in III year, either in the first semester or second semester. Marks are awarded based on the day-to-day participation and performance in the activities organized under each event. A student is required to score 40 marks out

of 100 marks despite putting up a minimum of 75% attendance to be declared satisfactory in each mandatory non-credit course. The B.Tech degree shall only be awarded if a student gets satisfactory grade in each of the two mandatory non-credit courses and besides acquiring 180 credits of the B.Tech degree course.

A student whose shortage of attendance is condoned in the case of credit courses in that semester shall also be eligible for condoning shortage of attendance up to 10% in the case of mandatory non-credit courses also.

A student has to repeat the course if he does not get satisfactory grade in each non-credit course for getting the degree awarded.

NSS

There shall be internal valuation for 100 Marks, out of which 60 marks are for participation and involvement in day-to-day activities and 40 marks for participation and involvement in a three days NSS camp arranged during the semester.

Sports and Games / Creative Arts

There shall be two internal valuations, each for 50 marks, in the chosen activity, one in the middle of semester and the other towards the end of the semester. Sum of the two valuations shall be taken as the final marks for 100.

6.5 Industrial / Practical Training:

Industrial / Practical training shall be evaluated for a total of 100 marks, consisting of 25 marks for internal assessment of day-to-day work and 75 marks for the assessment of the training report and viva-voce examination, conducted by a panel of examiners appointed by the college.

6.6 Project work:

i) The final project work shall be carried out during the 8th semester and will be evaluated for 200 marks.

ii) Out of 200 marks, 80 marks shall be for Internal Evaluation and 120 marks for the assessment of project thesis and viva-voce examination.

iii) Each student needs to give two seminars on the topic of his project, and each seminar is evaluated for 40 marks by a committee consisting of the supervisor and a senior faculty of the department. The sum of the marks of two seminars is taken as internal marks for 80.

iv) The assessment of Project Thesis and Viva–Voce shall be conducted by the committee consisting of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the fourth year second semester.

7. Criteria for Passing a Course and Award of Grades:

7.1 Criteria for Passing a Course:

i) A candidate shall be declared to have passed in individual theory/ drawing/ design course if he secures a minimum of 40% aggregate marks (internal & semester end examination marks put together), subject to securing a minimum of 35% marks in the semester end examination.

ii) A candidate shall be declared to have passed in individual laboratory/ project course if he secures a minimum of 50% aggregate marks (internal & semester end examination marks put together), subject to securing a minimum of 40% marks in the semester end examination.

iii) The candidate shall be declared to have passed in Employability Skills / Industrial / Practical Training / Mini Project / Porject Work if he secures 50% marks.

iv) On passing a course of a program, the student shall earn the credits as asigned to that course.

7.2 Method of Awarding Letter Grade and Grade Points for a Course:

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

Theory / Drawing / Mandatory Course (%)	Laboratory / Employ-ability Skills / Industrial / Practical Training / Project Work (%)	Grade Points	Letter Grade
≥ 90	≥ 90	10	O (Outstanding
≥ 80 & < 90	≥ 80 & < 90	9	A+ (Excellent)
≥ 70 & < 80	≥ 70 & < 80	8	A (Very Good)
≥ 60 & < 70	≥ 60 & < 70	7	B+ (Good)
≥ 50 & < 60	≥ 50 & < 60	6	B (Above Average)
≥ 45 & < 50	–	5	C (Average)
≥ 40 & < 45	–	4	P (Pass)
< 40	< 50	0	F (Fail)

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

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

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

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

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

7.4 Eligibility for Award of B.Tech Degree:

A student will be declared eligible for the award of the B.Tech. Degree if he fulfills the following academic regulations.

i) 4 Year B.Tech Course:

(a) Pursued a course of study for not less than four academic years and not more than eight academic years.

(b) Registered for **180** credits and secured **180** credits.

(c) Students, who fail to complete their Four years Course of study within Eight years or fail to acquire the **180** Credits for the award of the degree within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

ii) 3 Year B.Tech Course under Lateral Entry:

(a) Pursued a course of study for not less than three academic years and not more than six academic years.

(b) Registered for **132** credits and secured **132** credits.

(c) Students, who fail to complete their Three years Course of study within Six years or fail to acquire the **132** Credits for the award of the degree within six academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

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

The CGPA is calculated as given below:

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

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

7.6 Award of Division:

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

CGPA	Class
≥ 7.5	First Class with Distinction
≥ 6.5 & < 7.5	First Class
≥ 5.5 & < 6.5	Second Class
< 5.5	Pass Class

7.7 Consolidated Grade Card

A consolidated grade card containing credits & grades obtained by the candidate will be issued after completion of the four year B.Tech program.

8. Supplementary Examinations

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

ii) Semester end supplementary examinations shall be conducted till next regulation comes into force for that semester, after the conduct of the last set of regular examinations under the present regulation.

iii) Thereafter, supplementary examinations will be conducted in the equivalent courses as decided by the Board of Studies concerned.

iv) **Advanced Supplementary Examinations:** Candidate(s), who failed in theory / seminar / project work courses in 4th B.Tech 2nd Semester can appear for advanced supplementary examination conducted within one month after declaration of the revaluation results. However, those candidates who fail in these advanced supplementary examinations shall appear for subsequent examination along with regular candidates in the examinations conducted at the end of the respective semester.

9. Conditions for Promotion

i) A student shall be eligible for promotion to next Semester of B.Tech program, if he satisfies the conditions as stipulated in Regulation 7.

ii) The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in Regulation 7 for promotion into III Year I semester and IV year I semester.

a) 4 Year B.Tech Program:

i) A student shall be promoted from II year to III year only if he acquires the academic requirement of a minimum of 50% credits up to second year second semester as shown below.

1.Two regular and two supplementary examinations of I year I semester,
2.Two regular and one supplementary examinations of I year II semester,
3.One regular and one supplementary examinations of II year I semester
4.One regular examination of II year II semester,
irrespective of whether the candidate takes the examination or not.

ii) A student shall be promoted from III year to IV year only if he acquires the academic requirement of a minimum of 50% of credits upto third year second semester as shown below.

1. Three Regular and three supplementary examinations of I year I sem.,
2. Three Regular and two supplementary examinations of I year II sem.,
3.Two Regular and two supplementary examinations of II year I semester,
4.Two Regular and one supplementary examinations of II Year II semester,
5.One Regular and one supplementary examinations of III Year I semester,
6.One regular examination of III Year II semester,
irrespective of whether the candidate takes the examination or not.

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

i) A student shall be promoted from III to IV year only if he acquires the academic requirement of a minimum of 50% credits up to third year second semester as shown below.

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

irrespective of whether the candidate takes the examination or not.

10. Revaluation

i) Students can submit the applications for revaluation, along with the prescribed fee receipt for revaluation of his answer script(s) of theory course(s) as per the notification issued by the Controller of Examinations.

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

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

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

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

11. Re-admission Criteria

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

ii) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated in regulation 9 by paying the required tuition fee and special fee in addition to paying an administrative fee of Rs. 1,000/-.

12. Break in Study :

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

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

13. Transitory Regulations:

A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such courses in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

a) Four Year B.Tech Regular course:

13.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

13.2 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

b) Three Year B.Tech program under Lateral Entry Scheme:

13.3 A student who is following JNTUK curriculum and detained due to

shortage of attendance at the end of the first semester of second year shall join the autonomous batch of second year first semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

13.4 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in place of them as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

c) Transfer candidates (from non-autonomous college affiliated to JNTUK):

13.5 A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto

previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

d) Transfer candidates (from an autonomous college affiliated to JNTUK):

13.6 A student who has secured the required credits upto previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college. A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

14. Withholding of Results

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

15. Malpractices :

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

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

DISCIPLINARY ACTION FOR MALPRACTICES/IMPROPER CONDUCT IN EXAMINATIONS

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

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

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

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

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

16. Other Matters

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

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

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

17. General

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

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

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

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

VI. CURRICULAR COMPONENTS

Sl.No.	Course Work - Subject Areas	Credits %
1.	Humanities and Social Sciences (HSS)	10
2.	Baisc Sciences (BS)	12
3.	Engineering Sciences (ES)	04
4.	Professional Subjects Core (PSC)	52
5.	Professional Subjects Electives (PSE)	10
6.	Open Subjects Electives (OSE)	05
7.	Project / Seminar / Industry	07
8.	Non-Credit Courses	03

COURSE STRUCTURE

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SYLLABUS

COURSE STRUCTURE

I Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Professional Communication – I	3+1*	-	3
2	Mathematics – I	3+1*	-	3
3	Engineering Physics	3+1*	-	3
4	Environmental Studies	3+1*	-	3
5	Engineering Mechanics	3+1*	-	3
6	Engineering Drawing	1	3	3
7	Professional Communication Lab – I	-	3	2
8	Engineering Physics Lab	-	3	2
9	Engineering Workshop	-	3	2
	Total	**21**	**12**	**24**

I Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Professional Communication – II	3+1*	-	3
2	Mathematics – II	3+1*	-	3
3	Mathematical Methods	3+1*	-	3
4	Engineering Chemistry	3+1*	-	3
5	Problem Solving Using C	3+1*	-	3
6	Building Materials & Construction	3+1*	-	3
7	Professional Communication Lab – II	-	3	2
8	Engineering Chemistry Lab	-	3	2
9	Programming Lab	-	3	2
	Total	**24**	**9**	**24**

* **Tutorial**

II Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Probability & Statistics	3+1*	-	3
2	Mechanics of Solids - I	3+1*	-	3
3	Fluid Mechanics	3+1*	-	3
4	Surveying	3+1*	-	3
5	Engineering Geology and GIS Applications	3+1*	-	3
6	Building Planning & Drawing	1	3	3
7	Professional Ethics & Patents	2	-	2
8	Surveying Field Work	-	3	2
9	Engineering Geology Lab	-	3	2
	Total	**23**	**9**	**24**
10	NSS (Mandatory Non-Credit Course)	-	2	-

II Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Mechanics of Solids – II	3+1*	-	3
2	Hydraulics and Hydraulic Machines	3+1*	-	3
3	Structural Analysis – I	3+1*	-	3
4	Geotechnical Engineering – I	3+1*	-	3
5	Water Resources Engineering – I	3+1*	-	3
6	Concrete Technology	3+1*	-	3
7	Employability Skills	1	2	2
8	Strength of Materials Lab	-	3	2
9	Advanced Surveying & GIS Lab	-	3	2
	Total	**25**	**8**	**24**

* **Tutorial**

III Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Structural Analysis - II	3+1*	-	3
2	Geotechnical Engineering - II	3+1*	-	3
3	Water Resources Engineering - II	3+1*	-	3
4	Design & Drawing of R.C Structures	3+1*	-	3
5	**Open Elective - I** (see the list of Open Electives)	3+1*	-	3
6	Concrete Technology Lab	-	3	2
7	Geotechnical Engineering Lab	-	3	2
8	Fluid Mechanics & Hydraulic Machines Lab	-	3	2
	Total	**20**	**9**	**21**
9	Sports & Games / Creative Arts (Mandatory Non-Credit Course)	-	2	-

III Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Environmental Engineering	3+1*	-	3
2	Transportation Engineering	3+1*	-	3
3	Design & Drawing of Steel Structures	3+1*	-	3
4	**Elective – I** i) Prestressed Concrete ii) Structural Dynamics iii) Project Management iv) Ground Improvement Techniques	3+1*	-	3
5	**Open Elective – II** (see the list of Open Electives)	3+1*	-	3
6	Environmental Engineering Lab	-	3	2
7	Computer Aided Drawing (CAD) Practice Lab	-	3	2
8	Mini Project / Survey Camp	-	2	2
	Total	**20**	**8**	**21**

* **Tutorial**

IV Year - I Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	Managerial Economics and Financial Analysis	3+1*	-	3
2	Estimating, Costing and Valuation	3+1*	-	3
3	**Elective – II** i) Finite Element Method ii) Advanced Structural Analysis iii) Advanced Environmental Engineering iv) Design & Drawing of Irrigation Structures	3+1*	-	3
4	**Elective – III** i) Design of Industrial Structures ii) Air Pollution & Its Control iii) Earthquake Resistant Design iv) Architecture & Town Planning	3+1*	-	3
5	**Open Elective – III** (see the list of Open Electives)	3+1*	-	3
6	Structural Engineering Lab	-	3	2
7	Transportation Engieering Lab	-	3	2
8	Computer Applications in Civil Engineering Lab	-	3	2
	Total	**20**	**9**	**21**

IV Year - II Semester

Sl. No.	Name of the Course / Laboratory	No.of Periods per week		No.of Credits
		L	P	
1	**Elective – IV** i) Advanced Concrete Structures ii) Environmental Impact, Assessment & Management iii) Soil Dynamics & Machine Foundations iv) Docks & Harbour Engineering	3+1*	-	3
2	**Elective – V** i) Pavement Analysis & Design ii) Induastrial Waste Management iii) Ground Water Development & Management iv) Repair and Rehabilitation of Structures	3+1*	-	3
3	**Self Study Course** (see the list of Self Study Courses)	-	-	2
4	Industrial / Practical Training	-	-	4
5	Project Work	-	9	9
	Total	**8**	**9**	**21**

* **Tutorial**

Open Elective - I

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Remote Sensing and GIS Techniques	CE	3+1*	-	3
2	Elements of Civil Engineering (other than CE)	CE	3+1*	-	3
3	Modeling and Simulation of Engineering Systems	EEE	3+1*	-	3
4	Renewable Energy Sources	ME	3+1*	-	3
5	Elements of Mechanical Engineering(other than ME)	ME	3+1*	-	3
6	Computer Networks (other than CSE & IT)	CSE	3+1*	-	3
7	Object Oriented Programming (other than CSE & IT)	CSE	3+1*	-	3
8	Data Structures Using C (other than EEE,ECE,CSE&IT)	CSE	3+1*	-	3
9	Cyber Laws	CSE	3+1*	-	3
10	Open Source Software	IT	3+1*	-	3
11	Fundamentals of Data Base Management Systems (other than CSE & IT)	IT	3+1*	-	3
12	Fuzzy Mathematics	Maths	3+1*	-	3

Open Elective - II

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Disaster Management	CE	3+1*	-	3
2	Solid Waste Management (other than CE)	CE	3+1*	-	3
3	Energy Audit, Conservation and Management	EEE	3+1*	-	3
4	Material Science (other than ME)	ME	3+1*	-	3
5	Automotive Electronics	ECE	3+1*	-	3
6	Introduction to MP&MC (other than EEE, ECE, CSE & IT)	ECE	3+1*	-	3
7	Cloud Computing (other than CSE & IT)	CSE	3+1*	-	3
8	Web Technologies(other than CSE & IT)	CSE	3+1*	-	3
9	Virtual Reality	CSE	3+1*	-	3
10	Scripting Languages	IT	3+1*	-	3
11	Big Data (other than CSE & IT)	IT	3+1*	-	3
12	Multi-variate analysis and Special Functions	Maths	3+1*	-	3

Open Elective - III

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Periods per week		No.of Credits
			L	P	
1	Building Services	CE	3+1*	-	3
2	Modern Optimization Techniques	EEE	3+1*	-	3
3	Electrical Power Utilization (other than EEE)	EEE	3+1*	-	3
4	Robotics (other than ME)	ME	3+1*	-	3
5	Assistive Technologies	ECE	3+1*	-	3
6	Introduction to Embedded Systems (other than ECE, CSE & IT)	ECE	3+1*	-	3
7	Social Networks	CSE	3+1*	-	3
8	Mobile Application Development (other than CSE & IT)	CSE	3+1*	-	3
9	Real-Time Systems	CSE	3+1*	-	3
10	Network Management Systems	IT	3+1*	-	3
11	Fundamentals of E-Commerce (other than CSE & IT)	IT	3+1*	-	3
12	Statistical Methods using R Software	Maths	3+1*	-	3

Self Study Courses

Sl. No.	Title of the Subject	Department Offering the Subject	No.of Credits
1	Global Positioning Systems	CE	2
2	Interior Design	CE	2
3	Electrical Safety Management	EEE	2
4	Green Engineering	ME	2
5	Managing Innovation & Entrepreneurship	ME	2
6	Internet of Things	ECE	2
7	Consumer Electronics	ECE	2
8	e-Waste Management	CSE	2
9	Management Information Systems	CSE	2
10	Information & Communication Technology	IT	2
11	Organizational Behaviour	MBA	2
12	MOOCs	–	2

SYLLABUS

PROFESSIONAL COMMUNICATIONICS – I
(Common to All Branches)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To equip students for their present and future academic pursuits: to understand classroom lectures, read textbooks, do reference reading, participate in classroom discussions, and write assignments and examination answers.
- To develop in them the communication skills and social graces necessary for functioning effectively in the social and other situations in which they may be called upon to use English.

Learning Outcomes:

Students will be able to

- produce and process language for academic, professional and social life.
- produce coherent spoken and written discourse of various kinds with attention to appropriate strategies and conventions of speaking and writing.

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – I:

- To transfer textual information to a table
- To introduce yourself
- To make polite conversations
- To comprehend subject-verb agreement

UNIT – II:

- To communicate well with your peers
- To express your views on a topic
- The present simple and present continuous tenses
- To write a text that has unity

UNIT – III:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- A Tale of Two Cities by Charles Dickens
- Treasure Island by R.L.Stevenson

Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – IV:

- To interact with your faculty members
- To express futurity
- To write a text that has cohesion
- To make your writing clutter-free

UNIT – V:

- To represent information in a diagram
- To make notes
- To offer your advice/suggestions
- To understand and use auxiliary verbs
- To write a letter to a company

UNIT – VI:

Extensive Reading

Simplified Classics from the series *Great Stories in Easy English*

- *Tales from Shakespeare by Charles and Mary Lamb*

Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Text Books:

1. Samson, T. (2010). Innovate with English. Hyderabad : Foundation **Great Stories in Easy English Published by S.Chand & Company Limited:**
2. Treasure Island by R.L. Stevenson
3. Tales From Shakespeare by Charles and Mary Lamb.
4. A Tale of Two Cities by Charles Dickens.
5. Vocabulary Builder: English in Contexts for students of Engineering and Technology

Reference Books:

1. Comfort, J. and others (2012). *Speaking Effectively.* U.K: Cambridge University Press.
2. Murphy, Raymond. *Intermediate English Grammar.* Cambridge University Press.
3. Lewis, N.(2005).*Word Power Made Easy.U.K: Bloomsbury.*
4. McCarthy and O'Dell. F (2008).*Test Your English Vocabulary in Use:* Upper – Intermediate U.K: Cambridge University Press.
5. O'Dell. F and McCarthy (2010).*English Collocations in Advanced Use.* New Delhi :Cambridge University Press.
6. Cambridge IELTS Examination Papers. New Delhi :Cambridge University Press.
7. TOEFL Examination Papers.
8. BEC Examination Papers.

Hornby.A.S. (2010). *Oxford Advanced Learner's Dictionary*. New Delhi: Oxford University Press.

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MATHEMATICS – I
(Common to All Branches)
I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To find the solutions of 1st and 2nd order Differential equations.
- To find the solutions of multiple integral problems using calculus and vector concepts.

Learning Outcomes:

Students will be able to

- apply 1st and 2nd order differential equations to various Engineering Problems.
- apply the techniques of partial differentiation to find maxima and minima of two variables.
- evaluate single and double integrals using various types of curves.
- apply the concepts of vector differentiation and integration to the surface and volume integrals.

UNIT – I: Linear Differential Equations of first order

Differential equations of first order – Exact – Equations reducible to Exact, Linear and Bernoulli.

Applications: Newton's law of cooling, law of natural growth and decay.

UNIT – II: Linear Differential Equations of Second and higher order

Linear differential equations of second and higher order with constant coefficients-Complete solution, Operator D, Rules for finding complementary function, Inverse operator for D, Rules for finding particular integral with Right hand side term of the type e^{ax}, Sin ax, cos ax, polynomials in x, e^{ax} V(x), x.V(x). Applications: LCR circuits.

UNIT – III: Partial Differentiation

Introduction - Total derivative - Chain rule - Functional dependence – Jacobian. Application: Maxima and Minima of functions of two / three variables with or without constraints

UNIT – IV: Multiple Integrals

Introduction to Curve Tracing [Cartesian and Polar Curves]. Change of order of integration, Areas by double integrals, Volumes by triple integrals.

UNIT – V: Vector Differentiation

Vector Differentiation: Gradient- Divergence- Curl - Laplacian operator

UNIT – VI: Vector Integration

Line, surface and volume integrals. Integral theorems: Greens - Stokes - Gauss Divergence Theorems (Without proof) and related problems. Applications: Work done, flux across the surface.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition, Khanna Publishers,2012, New Delhi.
2. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Engineering Mathematics, Volume-I : 11th edition, S. Chand Publishers, 2012, New Delhi.

Reference Books:

1. B.V.Ramana, Engineering Mathematics: 4th Edition, Tata McGraw Hill, 2009, New Delhi.
2. U.M.Swamy, A Text Book of Engineering Mathematics – I & II: 2nd Edition, Excel Books, 2011, New Delhi.
3. Erwin Kreyszig, Advanced Engineering Mathematics : 8th edition, Maitrey Printech Pvt. Ltd, 2009, Noida.

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ENGINEERING PHYSICS
(Common to CE, EEE & ME)
I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand principles of solid state materials for use in the engineering applications.

Learning Outcomes:

Students will be able to

- apply the principles of light for optical communication.
- Identify the appropriate solid state materials for engineering applications.
- apply Quantum mechanics to study the behavior of a particle.

UNIT – I: Wave Optics

Interference:

Introduction – Interference in thin films by reflection –Newton's rings.

Diffraction:

Introduction – Fraunhofer diffraction - Fraunhofer diffraction at single slit– Diffraction grating – Resolving power of a grating

Polarization: Introduction – Types of Polarization – Double refraction – Quarter wave plate and Half Wave plate.

UNIT – II: Lasers & Fiber Optics

Lasers:

Introduction – coherent sources – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients– Population inversion – Helium Neon laser – Co_2 laser – semi conductor lasers.

Fiber Optics :

Introduction, Principle of Optical Fiber - Total Internal Reflection, Conditions for Light to Propagate - Numerical Aperture and Acceptance Angle, Optical Fiber Construction, Types of Optical Fibers - Step Index Fibers and Graded Index Fibers, Advantages of Optical Fibers in Communications.

UNIT – III: Introductory Solid State Physics

Crystal Structure

Introduction, Basic Terms - Lattice, Basis, Crystal Structure,CoordinationNumber, Atomic Radius, Packing Fraction, Free Volume, LatticeParameters, Unit Cell and Primitive Cell, Crystal Systems and Bravais Lattices, Structure and Packing Fractions of Simple Cubic, Body Centered Cubic and Face Centered Cubic Crystal Structures.

X-Ray Diffraction

Crystal Planes, Directions and Miller Indices, Distance of Separation between successive hkl Planes - Inter Planar Spacing, Diffraction of X-Rays by Crystal Planes - Bragg's Law

UNIT – IV: Essentials Of Materials Science

Magnetic Properties: Magnetic permeability – Magnetization – Orgin or magnetic moment – Classification of Magnetic materials – Dir, para, Ferro, Hysteresis curve.

Dielectric Properties: Introduction – Dielectric constant – Electronic, ionic and orientational polarization – internal fields – Clausius –Mossotti equation

Superconductivity: General properties – Meissner effect – Type I and Type II superconductors – BCS Theory – Penetration depth – DC and AC Josephson effects (Qualitative). Applications of Super conductors.

UNIT – V: Semiconductor

Introduction – Intrinsic semiconductor and carrier concentration – Equation for conductivity – Extrinsic semiconductor and carrier concentration – Drift and diffusion – Einstein s equation – Hall Effect – direct & indirect band gap semiconductors

UNIT – VI: Preliminary Quantum Mechanics & Solid State Physics

Preliminary Quantum Mechanics:

Introduction to matter waves – Schrodinger Time Independent and Time Dependent wave equations – Particle in a box.

Free Electron Theory and Band Theory (Solid State Physics):

Classical free electron theory – electrical conductivity – Fermi energy (Qualitative) -Quantum free electron theory – Bloch theorem (qualitative) – Kronig – Penney model.

Text Books:

1. Engineering Physics by Mani Naidu, Pearson Publications Chennai.
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G.Kshirasagar (S. Chand publications).
3. Engineering Physics by Gaur and Gupta.
4. Optics – 5th Edition – Ghatak (TMH Publications)

Reference Books:

1. Solid state Physics by A.J. Dekker (Mc Millan India Ltd).
2. Engineering Physics b;y M.R. Srinivasan (New Age international publishers)
3. Fundamental of Physics by Resnick, Halliday and Walker.

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ENVIRONMENTAL STUDIES
(Common to CE , EEE & ME)

I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To know the multidisciplinary nature of Environment.
- To understand various measures of improvement & protection of Environment.

Learning Outcomes:

Students will be able to

- apply various mitigation measures to minimize environmental pollution.
- know the principles of Ecosystem.
- understand the various stages of Environmental Impact Assessment (EIA).

UNIT - I: Ecology & Environment

Multidisciplinary Nature of Environmental Studies:

Definition, Scope, Importance and public awareness of Environmental Studies - Concept of an Ecosystem – Components of an Ecosystem – Food Chain, Food Web, Ecological Pyramids – Energy flow – Bio-Geochemical Cycles – Ecological Succession – Major Types of Ecosystems – Forest, Grassland, Desert Land & aquatic Ecosystem.

UNIT - II: Natural Resource: **Classification and status**

Water Resources: Used and over utilization of surface & ground water – Conflicts over water – Big dams, Benefits and problems.

Land Resource: Land as a resource, Soil Erosion, Sources of Land degradation, Soil conservation practices – case studies.

Forest Resources:Use and over – Exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people – Case Studies related to deforestation.

Food & Fodder Resources: World food problems, changes caused by agriculture and overgrazing – effects of modern agriculture – fertilizer, pesticide related problems, water logging, Eutrophication, super pest, salinity, organic farming – Case studies.

Mineral Resources: Use and exploitation problems, environmental effects of extracting and using mineral resources – Case studies.

Energy Resources

UNIT - III: Biodiversity and its conservation

Introduction, Definition – genetic and ecosystem diversity – Biogeographical classification of India – value of biodiversity: consumptive use, productive use,

social, ethical, Aesthetic, option values and ecosystem service values – India as a mega diversity nation – Threats to biodiversity: habitat loss, poaching of wild life – man, wild life conflicts – Endangered and endemic species of India – conservation of biodiversity: In – situ and Ex-situ conservation of biodiversity.

UNIT – IV: Environmental pollution

Definition, cause, effects and control measures of

a) Air pollution b) Water pollution
c) Noise pollution d) Soil pollution
e) Environmental Impact Assessment (EIA) – Definition, Significance & Classification.

UNIT – V: Waste Management

Industrial solid waste – Municipal solid waste – Industrial waste waters – Solid waste – Biomedical waste – hazardous waste – e-waste – Green building – Green Development Mechanism – Carbon Credits – Carbon Trading.

UNIT – VI: Social Issues and Environment

Climate change: Global warming, Acid rains, Ozone layer depletion – case studies. Sustainable development and unsustainability–Rain water harvesting, watershed management, water conservation–Environmental Ethics–environmental Law (Air, Water, Wild life, forest, Environmental protection act)

Text Books:

1. Environmental studies: Anubha Kaushik,C.P.Kaushik:New Age International Publishers.
2. Society and Environment: Dr.Suresh K.Dhameja:S.K.Kataria and Sons.
3. Environmental Studies: Benny Joseph:Tata Mc Graw-Hill Publishing Company Limited.

Reference Books:

1. A text of Environmental Studies: Shashi chawala:Tata Mc graw Hill Education Private Limited.
2. Environmental Science & Engineering: P.Anandan, R.Kumaravelan, Scitech Publications (India) Pvt. Ltd.
3. Environmental Studies by R. Rajagopalan 2nd Edition 2011, Oxford University Press.
4. Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.

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ENGINEERING MECHANICS
(Common to CE & ME)
I Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To impart the basic concepts of Engineering Mechanics and the principles of various force systems under static and dynamic conditions.

Learning Outcomes:

Students will be able to

- determine the resultant of the given force systems.
- analyze force systems using equations of equilibrium.
- determine centroid, center of gravity and moment of inertia of areas and bodies.
- apply virtual work principle to simple beams and trusses.
- distinguish between kinematics and kinetics.
- apply the work energy and impulse momentum methods of various engineering problems.

UNIT – I: Introduction to Engineering Mechanics

Basic Concepts.

Systems of Forces:

Coplanar, Concurrent and parallel forces – Resultant – Composition and resolution of forces, method of projections – Moment of Force systems in plane and its Application – Couples.

Equilibrium of Systems of Forces:

Free Body Diagrams, Equations of Equilibrium of Coplanar Systems. Lami's Theorem - Equilibrium of Coplanar forces in plane and space – condition of equilibrium.

UNIT – II: Friction

Introduction, limiting friction and impending motion - Coefficient of friction, cone of static friction, applications of friction- Impending motion of connected bodies, ladder friction and wedges - Principle of screw jack & Belt friction.

UNIT – III: Centroid

Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity:

Centre of gravity of simple bodies (from basic principles), centre of gravity of composite bodies, pappu's theorems.

Area moments of Inertia:
Definition, Moment of Inertia of standard figures – Polar Moment of Inertia, Transfer Theorem, Moment of Inertia of composite figures.

UNIT – IV: Mass Moment of Inertia
Transfer Formula for Mass moment of Inertia, Mass moment of Inertia of standard bodies.

Virtual work:
Principle – Equilibrium of ideal systems – Virtual displacement – Applications to connected systems, simple beams, ladders and trusses.

UNIT – V: Kinematics
Rectilinear and Curve linear motions – Time, Displacement, Velocity and Acceleration & their relations – Linear & Angular.

Kinetics:
Analysis as a Particle, Newton's Laws of motion, D' Alembert's Principle– Simple applications - Analysis as a Rigid Body in Translation – Fixed Axis Rotation – Simple Applications.

UNIT – VI: Work – Energy & Impulse - Momentum Method
Equations for Translation, Work-Energy Applications to Particle Motion and Connected Systems - Impulse momentum method – Simple applications.

Text Books:

1. Engineering Mechanics, Timoshenko & Young, Tata Mc Graw – Hill education (India) Pvt. Ltd.
2. Engineering Mechanics, R.K.Bansal, Laxmi publications Pvt. Ltd.

Reference Books:

1. Singer's Engineering Mechanics Statics and Dynamics, K.Vijay Kumar Reddy and J.Suresh Kumar, B.S publications, Hyderabad.
2. Engineering Mechanics statics and dynamics, Nelson e.w, Tata Mc Graw – Hill publishing company limited, New Delhi.
3. Engineering. Mechanics, S.S.Bhavikatti and K.G.Rajashekarappa, New age International Pvt. Ltd., Publishers.
4. Engineering Mechanics A.K.Tayal, Umesh Publications.

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ENGINEERING DRAWING
(Common to CE, EEE & ECE)

I Year – I Semester

Lecture	: 1 + 3	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To highlight the significance of universal language of engineers.
- To visualize and represent the 3-D objects in 2-D planes and pictorial views. with proper dimensioning and scaling.

Learning Outcomes:

Student will be able to

- apply principles of drawing in representing dimensions of an object.
- construct polygons, scales and curves.
- draw projections of points, lines and planes.
- draw projections of solids in different positions.
- convert orthographic views into isometric views and vice-versa.

UNIT – I: Introduction

Geometrical Construction,

Conic Sections: Ellipse, parabola, hyperbola – general method.

Scales: Plane, Vernier and Diagonal Scales.

UNIT – II: Orthographic Projections

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.

UNIT – III: Projections of Straight Lines

Projections of Straight Lines inclined to both planes, determination of true lengths, angle of inclinations and traces.

UNIT – IV: Projections of Planes

Regular Planes Perpendicular / Parallel to one Reference Plane and inclined to other Reference Plane; inclined to both the Reference Planes.

UNIT – V: Projections of Solids

Prisms, Cylinders, Pyramids and Cones with the axis inclined to one Plane.

UNIT – VI: Transfermation of Projections

Conversion of Isometric Views to Orthographic Views and Orthographic to Isometric Views.

Semester End Examination Pattern:

Semester end examination paper consists of eight questions out of which five questions are to be answered. All questions carry equal marks.

Text Books:

1. Engineering Drawing by N.D. Bhatt, Chariot Publications.
2. Engineering Drawing by K. Venugopal, V. Prabhu Raja, G. Sreekanjana, New Age International Publishers.

Reference Books:

1. Engineering Drawing by M.B. Shah and B.C. Rana, Pearson Publishers.
2. Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill Publishers.
3. Engineering Graphics for Degree by K.C. John, PHI Publishers.

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PROFESSIONAL COMMUNICATION LAB - I
(Common to All Branches)

I Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To strengthen the oral communication skills of the learners for communicative functions;
- To hone their pronunciation;
- To build confidence in them to communicate effectively in English.

Learning Outcomes:

Students will be able to

- enhance their basic communication skills to interact with people around them;
- shed their inhibition and take part in different speaking activities;
- respond in several contexts using the expressions they will have learned;
- speak English with reasonably good pronunciation.

UNIT – I:

- Greeting others
- Taking leave
- Introducing
- Identifying and pronouncing vowel sounds

UNIT – II:

- Asking for information
- Giving information
- Identifying and pronouncing diphthongs

UNIT – III:

- Inviting
- Accepting and declining invitations
- Identifying and pronouncing consonants

UNIT – IV:

- Giving commands or instructions
- Requesting
- Using accent on the appropriate syllable
- Speak rhythmically

UNIT – V:

- Giving suggestions
- Expressing opinions
- Using different tones in connected speech

Text Books:

1. Strengthen your communications skills by Maruthi Publications

Reference Books:

1. Strengthen your steps by Maruthi Publications
2. Speak well by Orient Blackswan.
3. Jones, D. English Pronunciation Dictionary.

ENGINEERING PHYSICS LAB
(Common to CE , EEE & ME)

I Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand Active and Passive Electronic Components.
- To measure magnetic field along the axis of circular coil.
- To learn waves and oscillations.
- To explore the nature of light.

Learning Outcomes:

Students will be able to

- calculate the time constant of RC circuit & Predict resonance frequency of LCR circuit.
- verify magnetic field along the axis of a circular coil.
- observe the regulatory nature of Zener diode & Identify energy gap of semiconductor.
- estimate rigidity modulus of a given wire.
- determine radius of curvature of a given Plano convex lens.

S.N.	Name of the experiment- Aim
	Electromagnetism and Electronics
1	Study the variation of Magnetic field along the axis of a Solenoid coil using Stewart-Gee's Apparatus.
2	Draw the frequency response curves of LCR Series and Parallel circuits
3	Determine the time constant for a CR Circuit
4	Determine the Band Gap of a semiconductor using a PN junction diode.
5	Study of characteristic curves (I/V) of a Zener diode to determine its breakdown voltage.
6	Determine the rigidity modulus of given wire
7	Determine the radius of curvature of given planoconvex lens
8	Determine the thickness of thin objects by optical wedge method
9	Determine the velocity of sound in air by using volume resonator
10	Determine the wave length of Y1 and Y2 lines by diffraction grating normal incidence

Reference Books:

(lab manuals, equipment user manuals, text books, data books, code books, etc.)

1. College lab manuals
2. Practical Physics for engineering students by Vijay Kumar & T. Radha Krishna.
3. Lab manual of Engineering Physics by Dr. Y.Aparna and Dr. K.Venkateswara Rao (VGS Books links, Vijayawada)

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ENGINEERING WORKSHOP
(Common to CE & ME)

I Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart hands-on training on basic engineering trades.

Learning Outcomes:

Student will be able to

- use various tools to prepare basic carpentry and fitting joints.
- prepare jobs of various shapes using black smithy.
- make basic house wire connections.
- fabricate simple components using tin smithy.

List of Trades:

Carpentry :

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

Fitting :

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

Black Smithy :

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

House Wiring :

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

Tin Smithy:

1. Taper Tray
2. Square Box without lid
3. L - Pipe
4. Funnel

Note: Practice any two experiments from each trade

Reference Books:

1. Engineering Drawing by M.B. Shah and B.C. Rana, PearsonPublishers.
2. Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill Publishers.
3. Engineering Graphics for Degree by K.C. John, PHI Publishers.

PROFESSIONAL COMMUNICATION - II
(Common to All Branches)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To equip students for their present and future academic pursuits: to understand classroom lectures, read textbooks, do reference reading, participate in classroom discussions, and write assignments and examination answers.
- To develop in them the communication skills and social graces necessary for functioning effectively in the social and other situations in which they may be called upon to use English.
- To prepare them to secure employment and to function successfully in their career.

Learning Outcomes:

Students will be able to

- produce and process language for academic, professional and social life.
- produce coherent spoken and written discourse of various kinds with attention to appropriate strategies and conventions of writing.
- to take part in job interviews with confidence and competence.

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – I:

- To make effective telephone conversations
- To use the modal auxiliaries *can* and *could*
- To write persuasive letters
- To write a winning resume

UNIT – II:

- To effectively participate in an informal meeting
- To use articles and other determiners
- To get some practice in composing professional emails
- To plan a professional presentation

UNIT – III:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- *Oliver Twist by Charles Dickens*
- *Robinson Crusoe by Daniel Defoe*

Vocabulary

'Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Speaking, Listening, Intensive Reading and Grammar Practice

UNIT – IV:

- To effectively participate in an informal meeting
- To use passive voice
- To identify the structure of reader-oriented technical reports

UNIT – V:

- To use prepositions
- To use visual aids in a presentation

UNIT – VI:

Extensive Reading

Simplified Classics from the series Great Stories in Easy English:

- *Round the World in Eighty Days by Jules Verne*

Vocabulary

'Vocabulary Builder: English in Contexts for students of Engineering and Technology'

- GRE words 75 words
- Idioms 25
- Words often confused 15
- Collocations 15
- One word substitutes 25
- Phrasal verbs 25

Text Books:

1. Samson, T. (2010). *Innovate with English*. Hyderabad : Foundation

Great Stories in Easy English Published by S.Chand & Company Limited:

1. *Oliver Twist* by Charles Dickens
2. *Robinson Crusoe* by Daniel Defoe
3. *Round the World in Eighty Days* by Jules Verne
4. *Vocabulary Builder : English in Contexts for Students of Engineering and Technology*

Reference Books:

1. Comfort, J. and others (2012). *Speaking Effectively.* U.K: Cambridge University Press.
2. Murphy, Raymond. *Intermediate English Grammar.* Cambridge University Press.
3. Lewis, N.(2005).*Word Power Made Easy.U.K: Bloomsbury.*
4. McCarthy and O'Dell. F (2008).*Test Your English Vocabulary in Use: Advanced* U.K: Cambridge University Press.
5. O'Dell. F and McCarthy (2010).*English Collocations in Advanced Use.* New Delhi: Cambridge University Press
6. Cambridge IELTS Examination Papers. New Delhi :Cambridge University Press.
7. TOEFL Examination Papers.
8. BEC Examination Papers.
9. Hornby.A.S. (2010). *Oxford Advanced Learner's Dictionary*. New Delhi: Oxford University Press.

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MATHEMATICS - II
(Common to All Branches)
I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To determine the eigenvalues and eigenvectors.
- To understand the concepts of Fourier Series and Fourier Transforms.
- To solve partial differential equations of 1st and 2nd order.

Learning Outcomes:

Students will be able to

- use the concepts of eigenvalues and eigenvectors in Engineering problems.
- apply to transform a function into Fourier Series and Fourier Integral form.
- apply 1st and 2nd order partial differential equations to Engineering Problems.

UNIT – I: Matrices

Rank of Matrix- Echelon form, Normal form – System of Linear equations – Consistency-Gauss elimination Method. Applications to electrical circuits [Finding the current in an electric circuit].

UNIT – II: Eigenvalues & Eigenvectors

Eigenvalues - Eigenvectors – Properties – Cayley Hamilton Theorem (without proof) - Inverse and powers of a matrix using Cayley Hamilton theorem, Quadratic forms- Reduction of quadratic form to canonical form by Orthogonal Transformation– Rank - index – signature.

Applications: Free vibration of a two mass system.

UNIT – III: Fourier Series

Fourier series: Determination of Fourier coefficients (without proof) – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.

UNIT – IV: Fourier Transforms

Fourier integral theorem (only statement) – Fourier transform – sine and cosine transforms – properties – inverse Fourier transforms – Finite Fourier transforms.

UNIT – V: 1st order Partial Differential equations

Formation of partial differential equations by eliminating arbitrary functions – solutions of quasi linear equations using Lagrange's method, solutions of non-linear equations by 4 strandard forms and Charpit's method.

UNIT – VI: 2nd order Partial Differential equations

Method of Separation of Variables. One dimensional Heat, Wave and Laplace equations.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition, Khanna Publishers,2012 , New Delhi.
2. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Engineering Mathematics – II : 6th edition, S.Chand Publications, 2012, New Delhi.

Reference Books:

1. B.V.Ramana, Mathematical Methods: 4th Edition, Tata McGraw Hill, 2009, New Delhi.
2. Ravindranath, V. and Vijayalaxmi, A. : 2nd edition, A Text Book on Mathematical Methods, Himalaya Publishing House,2012, Bombay.
3. Dean G. Duffy, Advanced engineering mathematics with MatLab, CRC Press
4. Erwin Kreyszig, Advanced Engineering Mathematics:8th edition,Maitrey Printech Pvt. Ltd, 2009, Noida.

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MATHEMATICAL METHODS
(Common to CE, EEE & ME)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the various numerical techniques .
- To gain the knowledge of Laplace, z-transforms and their inverse transforms.

Learning Outcomes:

Students will be able to

- apply numerical techniques for solutions of Algebraic, transcendental and ordinary differential equations.
- transform ordinary function into Analytical function using Milne-Thompson Method.
- apply Laplace transforms to find the solutions of ordinary differential equations.
- apply Z–transforms to find solutions of difference equations.

UNIT - I: Algebraic and Transcendental Equations

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

UNIT - II: Interpolation

Interpolation- Introduction – Finite differences- Forward Differences –Back ward differences –Central differences – Symbolic relations – Newton formulae for interpolation – Lagranges interpolation.

UNIT - III: Numerical Solutions Of Ordinary Differential Equations

Solution by Taylors series – Euler and Modified Euler method – Picard method - 4^{th} order Runge-Kutta methods - Predictor and corrector method.

UNIT - IV: Introduction To Complex Variables

Continuity – Differentiability – Analyticity – Properties- Cauchy Riemann Equations in Cartesian and Polar coordinates. Harmonic functions and conjugates : Milne Thomson method.

UNIT - V: Laplace Transforms and Inverse Laplace Transforms

Laplace transforms of standard functions – Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac Delta function.

Applications : Evaluation of Improper Integrals.

Inverse Laplace transforms – Convolution theorem.

Application: Solution of ordinary differential equations.

UNIT - VI: Z- Transforms

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems -Inverse z- transform using Partial fractions, Convolution theorem.

Application: Solution of Difference equations by Z-transforms.

Text Books:

1. B.S.Grewal, Higher Engineering Mathematics : 42nd edition, Khanna Publishers,2012, New Delhi
2. Ravindranath. V, and Vijayalaxmi. A. : 2nd edition, A Text Book on Mathematical Methods, Himalaya Publishing House, Bombay.

Reference Books:

1. Dr. T.K.V.Iyengar, Dr. B.Krishna Gandhi, S.Ranganatham and Dr.M.V.S.S.N.Prasad, Mathematical Methods :6th edition, S. Chand Publications, 2011, New Delhi.
2. B.V.Ramana, Engineering Mathematics : 4th Edition, Tata McGraw Hill, 2009, New Delhi.
3. Erwin Kreyszig, Advanced Engineering Mathematics : 8th edition, Maitrey Printech Pvt. Ltd, 2009, Noida.

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ENGINEERING CHEMISTRY
(Common to CE, EEE & ME)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To impart the knowledge of chemical and solar energy.
- To familiarize with various types of polymers, fuels and lubricants and their applications in engineering.

Learning Outcomes:

Students will be able to

- apply various methods of water treatment.
- understand the applications of chemical and solar energy in various engineering aspects.
- apply various chemical methods to prevent corrosion of metals.
- understand the process to prepare synthetic polymers used for various applications.
- know the characteristic features of lubricants and their applications.
- understand the need of green synthesis.

UNIT – I: Water and Its Treatment

Introduction, Hardness of water, types of hardness, Degree of hardness, Determination of hardness by EDTA Method, Numerical Problems on hardness of water by EDTA method. Softening of hard water by Permutit and Ion Exchange Processes, Treatment of brackish water by reverse osmosis, Potable Water, General Outline of municipal water treatment (Sedimentation, Filtration and chlorination).

UNIT – II: Energy Sources

Chemical Sources of Energy: Galvanic Cell - Single electrode potential – Electro chemical series-Problems on electrode potential using Nernst equation - Hydrogen and Calomel reference electrodes and measurement of pH by glass electrode – Leclanche cell, Lead **-** Acid accumulator, Hydrogen-Oxygen fuel cell and Methanol Fuel cell.

Solar Energy: Introduction–Harnessing of solar energy – Applications of solar energy - Photovoltaic cells-Solar reflectors (Parabolic trough, Solar dish and Solar tower) and Solar water heater.

UNIT – III: Corrosion and Its Prevention

Dry & wet corrosion – Mechanism – Pilling and Bedworth Rule - Factors influencing the rate of corrosion (Temperature, pH, Humidity of environment and position of

metal in Galvanic series) - Types of Corrosion (galvanic corrosion, concentration cell corrosion, pitting corrosion and stress corrosion) - Sacrificial Anodic method, Impressed voltage method – Metallic coatings (galvanization and tinning methods).

UNIT – IV: Polymers

Definitions of Polymer and Polymerization, Degree of polymerization and Functionality - Classification of polymers, Types of Polymerisation– Addition, Condensation and Co-polymerizations –Plastics – Thermoplastics – Thermosetting plastics, - Biodegradable polymers (PHBV & PHA). Preparation, properties and uses of poly styrene, PVC, PTFE, Bakelite, Buna-S rubber, Buna-N rubber, Thiokol rubber.

UNIT – V: Fuels & Lubricants

Fuels: Classification of fuels, calorific value, LCV & HCV and determination of calorific value of a solid fuel using Bomb calorimeter, Problems based on calorific values, Fischer-Tropsch Method and Bergius Method for preparation of Synthetic Petrol.

Lubricants: Definition and explanation of Lubrication-Types of Lubricants-Definition and significance of Viscosity, Flash and Fire Point, Pour and Cloud Point, Aniline point of a lubricant. - Engineering applications of lubricants.

UNIT – VI: Green Chemistry

Introduction- Principles of Green Chemistry, Methods of Green synthesis (aqueous phase, supercritical fluid extraction, green solvents and microwave induced methods), IWM (Integrated Waste Management), ZWT (Zero Waste Technology) Engineering Applications.

Text Books:

1. Text book of Engineering Chemistry by Jain & Jain. Dhanpat Rai Publishing Company.
2. Text book of Engineering Chemistry-II by Srinivasulu Doddaga, Ashima Srivastava, Roliverma. Parshva Publication.
3. Engineering Chemistry by Dr. Bharathi Kumari Yalamanchili,VGS Publication.

Reference Books:

1. A Text book of Engineering Chemistry by S.S.Dara. S.Chand&Company Ltd.
2. Engineering Chemistry by J.C.Kurisascose and J.Rajaram.Tata Mc Graw-Hill Publishing.
3. A Text book of Engineering Chemistry by Balaram Pani.Galgotia Publications.
4. A Text book of Engineering Chemistry by Shashi Chawla. Dhanpat Rai Publications.
5. Industrial Chemistry by O.P.Veeramani and A.K.Narula. Galgotia Publications.
6. Text book of Engineering Chemistry by Jain & Jain. Dhanpat Rai Publishing Company.

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PROBLEM SOLVING USING C
(Common to CE & ME)

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the steps of problem solving.
- To emphasize the role of logical flow charts and pseudo code in problem solving on computers.
- To impart skills for solving problems using C.

Learning Outcomes:

Students will be able to

- develop logical flow charts for solving problems.
- develop pseudo code for solving problems.
- solve simple to moderate problems on computer using C.
- self-learn advanced features of C.
- self-learn for solving complex problems on computers.

UNIT – I: Problem Solving Steps

Understanding problem, Formulating a mathematical model, Solving the mathematical model, Developing algorithm, Representing algorithm as pseudo code or logical flow chart, Coding, Testing and Debugging.

General form of a C program, C Tokens – Constants, Identifiers, Operators, Punctuation and Keywords.

Basic data types, Data modifiers, Variable declaration statement, Console I/O statements, Assignment statement and Order of evaluation.

Simple problems such as evaluating formulae.

UNIT – II: Control Statements

Selection Statements – if-else, nested if, switch, nested switch and ? Operator; Control Statements – For loop, while loop and do while loop; Jump Statements – return, goto, break, exit() and continue.

Problem Solving – Exchanging the values of two variables, Summation of a set of numbers, Factorial Computation, Sine function computation, Generation of Fibonacci sequence, reversing digits of an integer, Base conversion and Character to number conversion, LCM and GCD computation, Generating prime numbers, Computing prime factors of an integer, Raising a number to a large power, Computing the n^{th} Fibonacci number.

UNIT – III: Arrays

Declaring, initializing and accessing of one dimensional and two dimensional arrays and strings; and multidimensional arrays.

Problem Solving – Computing mean, range and variance of a set of numbers, Array order reversal, Histogramming, Removal of duplicates from an ordered array, Partitioning an array, Finding k^{th} smallest element and Longest monotone subsequence.

UNIT – IV: Pointers and Functions

Pointers – Variables, Operators, Expressions and Multiple indirection.

Functions – General form of functions, Passing parameters by value and Passing parameters by address, Dynamic memory allocation functions, Pointers and arrays, Pointers and functions, recursive functions and String handling functions, Problem solving using functions.

UNIT – V: Structures and Unions

Structures -Definition, declaration, initialization of structures, accessing structure members, nested structures, arrays of structures, array within structures, structures and functions.

Unions, Bit-Fields and enumerations; Problem solving using structures, unions, Bit-fields and enumerations.

UNIT – VI: Files

File Handling- Text and binary files, commonly used C file system functions, File Processing Operations – inserting, deleting, searching and updating a record and displaying file contents. Random access files.

Problem solving – Billing at Checkout counter of a supermarket, Preparing consolidated attendance / marks statements, and Performing banking operations.

Text Books:

1. R G Dromey, How to Solve it by Computer, Prentice-Hall of India, 1999.
2. Jeri R Hanly and Elliot B Koffman, Problem Solving and Program Design in C, Seventh Edition, Pearson, 2014.
3. Herbert Schildt, C: The Complete Reference, Tata McGraw-Hill, 2008.

Reference Books:

1. C Programming, E Balaguruswamy, 3rd edition, TMH.
2. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
3. Programming in C, Second Edition Pradip Dey and Manas Ghosh, OXFORD Higher Education.

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BUILDING MATERIALS & CONSTRUCTION

I Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Learn the nature, properties, classification and manufacturing process of building materials and familiarize with various methods of masonry construction.
- To Understand the knowledge of building components, finishings, green buildings and Geosynthetics.

Learning Outcomes:

Students will be able to

- explain the importance of building materials and their properties in construction industry.
- apply the knowledge of manufacturing process and composition of building materials and concrete.
- evaluate importance and role of alternate material to wood.
- enumerate various types of building components, finishings and water proofing methods.
- explain the importance of Geosynthetics as Building materials.
- illustrate the concept of “Green Building”.

UNIT – I: Stones, Bricks and Tiles

Properties of building stones, Relation to their structural requirements; Classification of stones, Stone quarrying, Precautions in blasting; Dressing of stone; Composition of good brick earth, various methods of manufacture of bricks; Comparison between clamp burning and kiln burning; Qualities of a good brick; Characteristics of good tile, Manufacturing methods, Types of tiles.

UNIT – II: Wood

Structure of wood, Properties - Seasoning of timber; Classification of various types of woods used in buildings, Defects in timber; Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, Steel, Aluminum, Glass, Gypsum.

Lime and Cement:

Various ingredients of lime, Constituents of lime stone ; Classification of lime ; Various methods of manufacture of lime ; Various types of cements, their properties and applications; Various field and laboratory tests for Cement.

UNIT – III: Aggregates

Classification of aggregate, Coarse and Fine aggregates; Particle shape and Texture, Bond and Strength of Aggregate; Specific gravity; Bulk density; Porosity and Absorption, Moisture content of Aggregate– Bulking of sand.

Masonry:

Types of Masonry, English Bond, Flemish Bond and Rat Trap Bond; Rubble and Ashlar masonry; Cavity walls and Partition walls.

UNIT – IV: Building Components

Lintels, Arches, Vaults-Stair cases – Types; Different types of floors, Concrete, Mosaic, Terrazzo floors. Pitched, Flat and curved Roofs, Lean-to-Roof ; Coupled roofs, Trussed roofs- King and Queen Post Trusses, RCC roofs, Madras Terrace/Shell roofs.

UNIT – V: Finishings

Damp proofing and Water proofing- materials used; Plastering, Pointing, White washing and Distempering; Painting – Constituents of paint – Types of paints; Painting of new/old Wood – Varnish – Form work and scaffolding.

UNIT – VI: Green Buildings

Introduction, Historical back ground, Concepts and Definitions, Design criteria and standards, Safety measures, Fire safety.

Geosynthetics:

Introduction; Functions and their Applications, Tests on geo-textiles; Geo-grids, Geo-membranes and Geo-composites.

Text books:

1. Building material by S K Duggal – New Age International Publishers; Second Edition.
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi

Reference Books:

1. Construction Technology R.Chudly– Volumes I and II 2nd Edition, Longman, UK, 1987.
2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
3. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.

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PROFESSIONAL COMMUNICATION LAB – II
(Common to All Branches)

I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To strengthen the oral communication skills of the learners for communicative functions at an advanced level;
- To train them in handling complex communication situation;
- To give them adequate practice for communication in professional situations like group discussions, presentations and interviews.

Learning Outcomes:

Students will be able to

- enhance their oral communication skills to perform communicative functions;
- speak confidently in public and handle complex communication situation;
- face job interviews with confidence and competence.

UNIT – I:

- Body Language
- Know how body language is used in communication
- Interpret non-verbal symbols

UNIT – II:

- Dialogues
- Starting a conversation
- Useful functions
- Telephone Etiquette
- Making a small talk

UNIT – III:

- Presentation Skills
- Present information with confidence, clarity and conviction
- Use the language of presentations
- Evaluate presentations

UNIT – IV:

- Group Discussion
- Participate in a group discussion
- Expressing ideas logically
- Using appropriate language in group discussions

UNIT – V:

- Become aware of various types of interviews
- Be able to participate in interviews confidently

UNIT – VI:

- Debates
- Able to argue for or against something
- Able to participate in debates

Text Books:

1. Strengthen your communications skills by Maruthi Publications

Reference Books:

1. Strengthen your steps by Maruthi Publications
2. Speak well by Orient Blackswan.
3. Patnaik., Group Discussion and Interview Skills. by Foundation.

ENGINEERING CHEMISTRY LAB
(Common to CE, EEE & ME)

I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To practice the titrations of chemical analysis for determining the quality of water.
- To know the preparation of Bakelite.

Learning Outcomes:

Students will be able to

- apply various titrations required for water quality analysis.
- understand the preparation of resin.

List of Experiments

Introduction to Chemistry Lab (the teachers are expected to teach fundamentals like Primary, Secondary Standard Solutions , Normality, Molarity, Molality etc and laboratory ware used, error ,accuracy, precision, Theory of indicators, use of volumetric titrations.

1. Practice experiment-Determination of the amount of HCl using standard Na_2CO_3.
2. Determination of alkalinity of water sample.
3. Determination of acidity of water sample.
4. Determination of Ferrous iron by permanganometric method.
5. Determination of Ferric Iron using standard $K_2Cr_2O_7$ solution.
6. Determination of Total hardness of the water sample by EDTA method.
7. pH metric titrations - Determination of concentration of HCl using glass electrode.
8. Determination of pH of the water sample by using pH meter.
9. Determination of conductivity of the water sample by using conductivity meter.
10. Conductometric titrations between strong acid and strong base
11. Determination of turbidity of the water sample by using turbidity meter.
12. Estimation of total dissolved salts in water sample.
13. Preparation of Phenol - Formaldehyde resin.

Lab Manual:

1. Engineering chemistry laboratory manual &record By Srinivasulu. D Parshva publications.
2. Engineering Chemistry Lab Manual by Dr. K.Anji Reddy. Tulip publication.
3. Engineering Chemistry Lab Manual by Dr. Jyotsna Cherukuri. V.G.S publication.
4. K.Mukkanti (2009) Practical Engineering Chemistry, B.S. Publication.

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PROGRAMMING LAB
(Common to CE & ME)
I Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with the discrete components of computers and networking components.
- To familiarize with usage of MS Office Tools.
- To provide the practice of solving problems on computer using C.

Learning Outcomes:

Students will be able to

- identify discrete components of computers and networking components and describe their functions.
- employ MS Office Tools for documentation and presentations and making computations.
- use computer for solving problems.

Part- A

Exercise - 1: IT Workshop

a) Identifying the discrete components of a computer and networking components
b) Demonstration of assembling a computer
c) Demonstrating installation of OS and applications

Exercise - 2: IT Workshop

a) Creating a document using MS Word
b) Creating a document using LaTeX

Exercise - 3: IT Workshop

a) Familiarizing with the usage and applications of MS Excel Using Excel.
b) Creating a presentation using MS Power point.

Exercise - 4: IT Workshop

Familiarizing with the Integrated Development Environment (IDE) for eveloping C programs

Part – B

Exercise - 5: Write a C program for the following

a) Calculate the area of triangle using the formula area = $(s\,(s-a)\,(s-b)(s-c))^{1/2}$ where $s= (a+b+c)/2$
b) Find the largest of three numbers using ternary operator.
c) Find the roots of a quadratic equation.

Exercise - 6: Develop a C program for the following

a) Read two integer operands and one operator form the user, perform the operation and then print the result. (Consider the operators +,-,*, /, % and use Switch Statement)
b) Check whether given number is Prime (or) not
c) Display first N natural numbers.
d) Calculate electricity bill for the consumed units – assume suitable constraints.
e) Find the sum of individual digits of a positive integer and find the reverse of the given number.

Exercise - 7: Design a C program for the following

a) Find the largest and smallest numbers in the array.
b) Search whether the given element is in the array.
c) Perform Addition, subtraction and multiplication of Matrices
d) Delete n Characters from a given position in a given string.
e) Illustrate at least five string handling functions.

Exercise - 8: Implement a C program for the following

a) Calculate mean, standard deviation and variance for a given set of values using functions
b) Sort a given set of numbers in ascending order using functions
c) Both recursive and non-recursive functions for the following
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To generate Fibonacci sequence.

Exercise - 9: Prepare a C program for the following

a) To implement a structure to read and display the Name, date of Birth and salary of ten Employees.
b) To display the Name, Marks in five subjects and total marks of given number of students. (Using array of structures).
c) Functions to perform the following operations using Structure:
   i) Reading a complex number
   ii) Writing a complex number
   iii) Addition of two complex numbers
   iv) Multiplication of two complex numbers

Exercise - 10: Develop C program for the following

a) Function to exchange (Swap) values of two integers using call by reference.
b) Illustrate the usage of dynamic memory management functions.
c) Develop a program to operations on a file.
d) To copy contents of one file to another.
e) To count the number of characters, words and lines in a file.

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PROBABILITY & STATISTICS

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Learn the nature, properties, classification and manufacturing process of building materials and familiarize with various methods of masonry construction.
- To understand the concepts of probability and statistics.
- To know sampling theory and principles of hypothesis testing.
- To appreciate Queuing theory and models.

Learning Outcomes:

Students will be able to

- use the probability in different problems.
- utilize where the certain probability distributions would be appropriate.
- calculate confidence intervals for estimating population parameters.
- apply a range of statistical tests appropriately.
- examine correlation between variables and find the relation between them.
- solve the different queuing models.

UNIT - I: Probability

Probability: Axioms of Probability – addition, conditional, multiplication and Baye's theorem. (Without Proof) Random variables: Discrete and Continuous Random Variable - Distribution functions - Evaluation of mean and variance.

UNIT - II: Standard Probability Distributions

Discrete distributions: Binomial distribution-probability-mean, variance - Poisson distribution-probability-mean, variance - fitting of Poisson distribution. Continuous distributions: normal distribution-properties – Problems.

UNIT - III: Sampling Distributions

Population and sample-types of sampling-Sampling distribution of mean - Sampling distribution of sums and differences. Point and interval estimation, Confidence Interval for mean and proportions.

UNIT - IV: Testing of Hypothesis (Large Samples)

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

UNIT – V: Testing of Hypothesis (Small Samples)

t-test, F-test and χ^2 test (independence of attributes and goodness of fit)

UNIT – VI: Correlation, Regression and Queuing Theory

Simple Correlation and regression. Queuing Theory M/M/1 model with finite and infinite Queue size and simple problems related to the evaluation of waiting time, length of the queue.

Text Books:

1. Probability and Statistics, Dr. T. K. V. Iyengar, Dr. B. Krishna Gandhi, S. Ranganatham and Dr. M.V. S. S. N. Prasad, S. Chand & Company Ltd.
2. Probability and Statistics for Engineers, Miller, John E. Freund, PHI.

Reference Books:

1. Fundamentals of Mathematical Statistics, S.C. Gupta & V.K. Kapoor,S.Chand & Company Ltd.Probability, Statistics and Queuing theory applications for Comp. Sciences, 2nd edition, Trivedy, John Wiley.

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MECHANICS OF SOLIDS - I

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of stress, strain and elastic constants and their relations for use in elastic design of prismatic bars.
- To familiarize with shear force, bending moment and torsion induced and shear stresses and bending stresses developed for different sections of beams and Shafts.
- To impart the knowledge on calculating forces in pin-jointed plane frames.

Learning Outcomes:

Students will be able to

- analyse and design the bars elastically by stress and strain relationship.
- aonstruct SF and BM diagrams for various beams carrying different types of loads.
- evaluate flexure and shear stresses for different beam sections.
- analyse and design shafts and springs using principle of torsion.
- determine the forces in frames by the method of joints and method of sections.

UNIT - I: Simple Stresses and Strains

Elasticity and plasticity – Type of stresses and strains – Hooke's Law – tress – Strain diagram for mild steel – Working stress – Factor of safety – Bars of varying cross sections - Composite bars – Thermal stresses – Lateral strain – Poission's ratio and volumetric strain – Elastic design of prismatic bars.

UNIT - II: Elastic Constants and Strain Energy

Bulk Modulus – Relation between Young's Modulus and bulk Modulus – Principle of complementary shear – Direct tensile or compressive stresses on diagonals – Relationship between Young's Modulus and shear Modulus – E,C,K relation. Resilience – Expression for strain energy – gradual and sudden loads, falling weights through some distance – strain energy stored in composite sections.

UNIT - III: Shear Force and Bending Moment

Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhang beams subjected to point loads, u.d.l s and combination of these loads – Relation between, B.M, S.F and rate of loading at a section. Point of contraflexure.

UNIT - IV: Flexure and Direct & Bending Stresses

Flexure 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, Circular (Solid and hollow), I, L, T and Channel sections – Elastic design of simple beams.

Direct and Bending stresses:

Stresses under the combined action of direct loading and bending moment – Kern of a section – Determination of stresses under eccentric loads – Conditions of stability- Application to retaining walls

UNIT - V: Shear and Torsion

Shear Stresses:

Shear stress at a section – Derivation for shear stress at a section – Shear stress distribution across various beam sections like rectangular, circular, T, I and channel sections.

Torsion:

Theory of pure torsion – Derivation of Torsion equation - Assumptions made in theory of pure torsion – Torsional moment of resistance – Polar section Modulus – Power transmitted by shafts. Types of springs – springs in series and parallel - Deflection of closely coiled helical springs under axial pull.

UNIT - VI: Analysis of Pin-Jointed Plane Frames

Determination of forces in the members of plane, pin – jointed and perfect trusses by method of joints and method of sections - Simply supported and cantilever type trusses.

Text Books:

1. "Strength of Materials by Ramamrutham, Dhanpat rai sons publications, New Delhi
2. A text Book of "Strength of Materials" by R.K.Bansal Laxmi Publications (P) Ltd., New Delhi.

Reference Books:

1. "Engineering Mechanics of solids" by EGOR.P.Popov, PHI publications, New Delhi.
2. "Strength of Materials by R.Subramanian, Oxford University press, New Delhi.
3. "Strength of Materials" by Dinesh. P.Mandal, Umesh publications.
4. "Mechanics of Materials" by B.C.Punmia, Laxmi publications, New Delhi.

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FLUID MECHANICS

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about the static and dynamic aspects of fluids.
- To understand laminar , turbulent flows and concepts of boundary layers theory
- To know the concepts of the discharge through canals and closed conduits.

Learning Outcomes:

Students will be able to

- determine the properties of fluids and obtain the intensity of pressure distribution.
- compute hydrostatic forces on surfaces immersed in liquid.
- determine the fluid flow using Bernoulli's and momentum equations.
- evaluate viscous flow under different boundary conditions.
- determine various losses in flow through pipes.
- measure flow in a canal and pipes using various flow measuring instruments.

UNIT – I: Introduction

Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: Differential, inverted Manometers. Hydrostatic forces on submerged plane, Horizontal, Vertical and inclined surfaces –Center of pressure, derivations and problems.

UNTI – II: Fluid Kinematics

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

UNIT – III: Fluid Dynamics

Surface and body forces Euler's equation of motion; Bernoulli's equation; Energy correction factor; Momentum principle; Applications of momentum equation- Force exerted on a pipe bend.

UNIT – IV: Boundary Layer Theory

Boundary layer (BL) – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL. Control of BL, flow around submerged objects-Drag and Lift.

UNIT – V: Closed Conduit Flow

Reynold's experiment – Characteristics of Laminar and Turbulent flows, flow between parallel plates, flow through long tubes, laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynolds's number.

UNIT – VI: Measurement of Flow

Pitot tube, Venturimeter and Orificemeter – classification of orifices, flow over rectangular, triangular and trapezoidal and stepped notches - –Broad crested weirs.

Text Books:

1. Fluid Mechanics by P.N. Modi and Seth, Standard book house.
2. Fluid mechanics and Hydraulic Machines by R.K Bansal, Laxmi publications, New Delhi

Reference Books:

1. Fluid Mechanics and Hydraulic machines, Rajput, S.Chand & Co.
2. Fluid Mechanics by J.F.Douglas, J.M. Gaserek and J.A.Swaffirld (Longman)
3. Fluid Mechanics by Frank.M. White (Tata Mc.GrawhillPvt. Ltd.)
4. Fluid Mehanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi.

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SURVEYING

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn principles of instruments and other equipment used to conduct field surveys.
- To enhance the nature of surveying data, including errors and the need for error control and calculation of elevation using trignometrical and triangulation survey principles.
- To familiarize with different types of curves and curve setting.

Learning Outcomes:

Students will be able to

- perform chain survey to locate the boundaries and calculate the areas.
- determine the included angles using compass, theodolite and total station.
- prepare different cross-sections of elevations and contour maps.
- handle total station for various surveys.
- design simple and compound curves for highways.

UNIT – I: Chain Surveying

Introduction, Classifications of surveying, principles of surveying, basic measurements Accuracy and precision, sources of errors, types of errors, Brief about linear measurements and instruments

Principles of chain surveying, basic definitions, well conditioned triangle, selection of survey stations and survey lines, recording measurements, offsets, cross staff survey, obstacles in chaining and ranging, chain traversing.

UNIT - II: Compass Surveying

Introduction, types of compass, prismatic compass, types of meridians, types of bearings, included angles, compass traverse, distance between two inaccessible points, magnetic declination, local attraction and corrections, Bowditch's rule for adjustment of a closed traverse, errors in compass surveying.

UNIT - III: Levelling and Contouring

Levelling principles, basic definitions- Parts of dumpy level, types of eye pieces, types of staves, temporary adjustments, methods of leveling: reciprocal levelling, theory of differential levelling, profile levelling, levelling problems, contouring, contour interval, characteristics of contours, direct and indirect methods of contouring, uses of contour maps.

UNIT – IV: Theodolite

Main parts of a theodolite, basic definitions, fundamental lines, temporary adjustments, vernier scales, horizontal angles, repetition and reiteration methods, vertical angles, direct angles, deflection angles, method of double sighting, errors, precautions.

Trigonometric leveling- Determination of height of an elevated object above the ground when the base is accessible and base is inaccessible.

UNIT – V: Tacheometry

Systems of tacheometric measurements: Stadia system-fixed hair method, movable hair method, Tangential System; Principle of stadia method, distance and elevation formulae for staff vertical and normal in both the systems.

Total Station

Features of Total station, functions of Total station and uses of Total station systems.

UNIT-VI: Curves

Basic definitions, designation of a curve, relationship between radius and degree of curve, elements of a simple circular curve, location of the tangent points, methods of setting out, tape methods, method of offsets from the chords produced, tape and theodolite method, two theodolite method, problems in setting out curves, compound curves, relationship between elements of a compound curve, reverse curves, elements of a reverse curve.

Text Books:

1. Surveying Vol. 1 & II by Dr. K. R. Arora; Standard Book House.
2. Surveying Vol-I&II by B.C. Punmia, Laxmi Publications.

Reference Books:

1. Plane Surveying by AM Chandra, New Age International (P) Ltd.
2. Fundamentals of Surveying by S K Roy, Prentice- Hall of India Private Ltd.
3. Surveying and Levelling T. P. Kanetkar, S. V. Kulkarni Vidyarthi Griha Prakashan,

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ENGINEERING GEOLOGY AND GIS APPLICATION

II Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To explain the formation of minerals and rocks
- To familiarize with folds, faults, unconformities and joints
- To understand the concept of GIS and its applications

Learning Outcomes:

Students will be able to

- identify the minerals according to classification.
- distinguish the igneous, metamorphic and sedimentary rocks based on their properties.
- identify the defects in rock mass and causes of earthquakes.
- apply GIS to various civil engineering applications.

UNIT – I:

Scope of Engineering Geology, Disciplines involved in Engineering Geology. Formation of minerals, Crystal Geometry, Crystal System, Physical Properties of Minerals, Classification of Minerals

UNIT – II:

Origin and occurrence of Igneous rocks, Texture, Structures and forms of Igneous rocks, origin of Sedimentary rock, mineralogical composition, Textures and Structures of Sedimentary and Metamorphic rocks.

UNIT – III:

Folds, faults, unconformities and joints, classification and field identification of Folds, faults, unconformities and joints

UNIT – IV:

Hydrological cycle, types of Aquifers, water table, Ground motion, seismic waves, classification of earthquakes, causes of earthquakes, morphology of landslides, causes of landslides, types of landslides.

UNIT – V:

Geographic Information system: Introduction, key components, Map projections. Data entry and preparation: spatial data input, Raster data model, Vector data model, Raster Vs Vector

UNIT – VI:

GIS data & Application: Introduction, overlay function, vector overlay operations, raster overlay operations.

Application: Geology, geomorphology, hydrology, flood zone delineation and mapping.

Text Books:

1. Engineering Geology by S K Duggal, H K Pandey and N Rawal – McGraw Hill Education (India) Private Limited.
2. Engineering Geology by Subinoy Gangopadhyay - Oxford University Press
3. Remote Sensing and GIS by Basudeb Bhatta - Oxford University Press

Reference Books:

1. Engineering Geology by N. Chennakesavulu, McMillan, India Ltd. 2005.
2. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992.
3. GIS by Kang – tsung chang, TMH Publications & Co.,
4. Remote Sensing and Geographical Information systems by M.Anji Reddy , B.S.Publications.

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BUILDING PLANNING & DRAWING

II Year – I Semester

Lecture	: 1+3	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the building byelaws and familiarize National Building Code
- To learn the concept of drawing various building components.
- To familiarize with different sign conventions and different views of a building
- To impart the scope of applying principles of planning for both residential and public buildings.

Learning Outcomes:

Students will be able to

- implement the byelaws and regulations of NBC in planning different types of buildings.
- represent the conventional signs in a master plan.
- identify and draw various building components.
- draw plan and various sectional views of simple residential and public buildings.

SECTION - A

UNIT – I: Building Rules and Bye-Laws

Zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, climatic zones, floor and carpet area; Floor space index, Floor area ratio, C.B.R.I Recommendations.

UNIT – II: Planning of Residential Buildings

Different types of Residential Buildings, Selection of site for residential buildings. Guidelines for planning and drawing of residential building

UNIT - III: Planning of Public Buildings

Norms, requirements and planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels and motels, buildings for recreation.

UNIT – IV: Sign Conventions

Sign conventions: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys, Lead, Zinc, tin, and white lead, Earth, Rock, Timber and Marble, Stretcher bond and Header bond, English bond and Flemish bond, odd and even courses for one, one and half and two brick walls in thickness at the junction of a corner.

SECTION-B

UNIT –V: Doors, Windows, Ventilators and Roofs

Paneled Door – paneled and glazed door, glazed windows – paneled windows – Swing ventilator – Fixed ventilator-Couple roof –Collar roof – King Post truss – Queen post truss.

Drawing plans, Elevations and Cross-sections of a given sloped roof buildings.

UNIT – VI:Planning and Design of Building

Given line diagram with specification, to draw, plan, section and elevation of residential or public buildings (School, Bank, and Hospital buildings)

Final Examination Pattern

The end examination paper should consist of Part A and Part B. Part A consists of five questions from section A out of which three questions are to be answered. Part B consist of two questions from Section B out of which one is to be answered on drawing sheet. Weightage for Part – A is 60% and Part- B is 40%.

Text Books:

1. Building Planning and Drawing by Dr.N.Kumaraswamy & A.Kameswara Rao-Charotar Publications
2. Building Planning and Drawing by S.S.Bhavikatti &M.V Chitawadagi-I.K International Publishing House.
3. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur

Reference Books:

1. Building by laws by state and Central Governments and Municipal corporations.
2. Planning, Designing and scheduling – Girescharan Singh & Jagadish Singh.
3. Y.N.Sane, Planning and designing, Allies Book Stall, Pune
4. Gurucharn Singh, Planning Designing & Sheduling, Standard Publishers Distributors, 5th edition.

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SURVEYING FIELD WORK

II Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To learn basic principles of surveying, various methods of measuring instruments.
- To familiarize with surveying equipments/ instruments, leveling instruments, theodolite and compass.
- To impart the knowledge of measurement of linear, angular and types of curves.

Learning Outcomes:

Students will be able to

- apply principle of surveying in carrying out field surveys.
- handle various survey instruments for obtaining better results.
- to prepare contour maps of various sites.

List of Field Practices:

1. Bisection of line, angle and cross staff survey.
2. Survey of an area by chain survey (closed traverse).
3. Chaining across obstacles.
4. Determination of distance between two inaccessible points with compass.
5. Surveying of a given area by prismatic compass (closed traverse).
6. Fly Leveling- Height of the instrument method.
7. Fly Leveling- Rise or fall method
8. Fly Leveling- Height of the instrument method and Rise or fall method (Inverted staff reading).
9. Reciprocal Leveling.
10. Profile Leveling.

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ENGINEERING GEOLOGY LAB

II Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To identify the formation of minerals.
- To understand the megascopic identification of rocks and minerals.
- To understand geological maps.

Learnaing Outcomes:

Students will be able to

- explain the megascopic identification of rocks.
- identify the rocks according to megascopic description.
- interpret geological maps.
- evaluate the types of subsurface formation.

List of Experments:

1. Megascopic identification of minerals - Hematite, Magnetite. Pyrolusite and galena.
2. Megascopic identification of minerals- Pyrite, Bauxite, Mica Muscovite and Quartz.
3. Megascopic identification minerals–Biotite, Talc, Calcite and Chlorite.
4. Megascopic identification minerals–Hornblede, Kyanite, Olivine and Graphite.
5. Identification of Igneous rocks–Green Granite, Compact Basalt, Pegmatite and Dolerite.
6. Identification of Sedimentary rocks–Red Sand Stone, Shale, Lime Stone and Laterite.
7. Identification of Metamorphic rocks–Gneiss, Marble, Slate and schist.
8. Structural Geology-Problem on strike, Dip.
9. Study and Observation of folds, faults and joints.
10. Structural Geology-Completion of out crops maps, order of superposition.
11. Subsurface Analysis -Resistivity sounding.
12. Subsurface Analysis-Seismic Survey.

Lab Examination Pattern:

1. Description and identification of FOUR minerals.
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Interpretation of a Geological map along with a geological section.
4. Problem on strike and Dip.

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PROFESSIONAL ETHICS AND PATENTS
(Common to CE, CSE & IT)

II Year – I Semester

Lecture	: 2	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the basic concepts of Ethics and Human values.
- To enable the students understand the role and importance of ethics in Engineering.
- To familiarize the rights and responsibilities of Engineers.
- To know the laws and protect author's rights.
- To understand the legal aspects present in intellectual property law.

Learning Outcomes:

Students will be able to

- comprehend different Moral Perspectives and enabling him to frame one's own Ethical standards.
- find solutions for issues related to growth with reference to absolute ethical tenets.
- resolve Professional/Moral Dilemmas and be able to guide productivity.
- analyze the likelihood of confusion in Trademark Claims.
- understand different forms of infringement of Intellectual Property Rights.
- recognize the relevant criteria for protecting Creativity.

UNIT – I: Human Values

Morals, Values and Ethics – Integrity – Work Ethics – Service Learning – Civic Virtue -Value time – Co-operation – Commitment – Empathy – Self-confidence – Character.

Ethics- Types of Inquiry – Kohlberg's Theory – Gilligan's Argument – Heinz's Dilemma.

UNIT – II: Engineers' Responsibilities and Rights

Safety and Risk – Types of Risks – Voluntary vs. Involuntary Risk- Short Term vs Long Term Consequences - Expected Probability - Reversible Effects - Threshold Levels for Risk - Delayed vs Immediate. Risk collegiality – Techniques for achieving Collegiality – Group / Team – Two Senses of Loyalty, Rights – Professional Responsibilities – Confidential and Proprietary information – Conflict of Interest – Conflict resolution – Self-interest.

UNIT – III: Patent Law, Trade Marks and Copyrights

Introduction – Rights and Limitations – Application process – Patent requirements – Ownership – Transfer – Infringement – Litigation – International Patent Law – Double Patenting – New development in Patent Law.

Trade Mark and Copyrights: Introduction – Registration Process – Transfer – Infringement – Dilution of Ownership – Imitation – Litigations.

UNIT – IV: Cyber Law

Introduction to Cyber Law – Cyber Crime and E-Commerce – Online Crime – Innovations and Inventions in Trade Related Intellectual Property Rights.

Text Books:

1. "Principia Ethica" by Goerge Edward Moore, Cambridge University Press, 11-Nov-1993, Cambridge.
2. "Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
3. Deborah E.Bouchoux: "Intellectual Property", Cengage Learning, New Delhi

Reference Books:

1. "Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
2. R.Radha Krishnan, S.Balasubramanian: "Intellectual Property Rights",Excel Books, New Delhi.
3. Prabhuddha Ganguli: "Intellectual Property Rights" Tata Mc-Graw- Hill, New Delhi.

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MACHANICS OF SOLIDS - II

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To impart the knowledge on the concept of principal stresses & principal strains, Various Energy methods and theories of failure.
- To familiarize with the deflection of simple determinate beams.
- To familiarize with stresses and strains induced in columns and in thin & thick cylinders.
- To understand the concept of unsymmetrical bending and beams curved in plan.

Learning Outcomes:

Students will be able to

- determine the principal stresses using analytical and graphical solutions.
- analyze the beams by using different energy methods and failure theories.
- analyze the different types of columns and struts for different end conditions.
- determine the slope and deflection for determinate beams using various methods.
- analyze and design the thin and thick cylinders elastically.
- analyze the beams for stresses due to unsymmetrical bending and curved in plan.

UNIT- I: Principal Stresses and Strains

Plane State of stress – Stresses on an inclined plane in a rectangular block under axial loading – compound stresses – Normal and tangential stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circles of stresses – Principal stresses and strains – Analytical and graphical solutions.

UNIT- II: Energy Methods and Theories of Failure

Energy methods:

Introduction – Strain Energy expression – Principle of virtual work - Maxwell's reciprocal theorem, Castigliano's first and second theorems – Application to determinate beams and pin-jointed simple trusses using Castigliano's theorem.

Theories of failure:

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 and Mohr's theory.

UNIT- III: Columns and Struts

Introduction – Types of columns – short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns

– Assumptions – Derivation of Euler's critical load formula – Various end conditions – Equivalent length of column – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine formula – Long columns subjected to eccentric loading – Laterally Loaded struts – Subjected to u.d.l and concentrated loads – Maximum B.M and stress due to transverse and lateral loading.

UNIT- IV: Deflection of Determinate Beams

Deflection and slope of a beam subjected to uniform Bending Moment – Relation between slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Determination of slope and deflection for cantilever, simply supported and over hanging beams subjected to point loads and u.d.ls– by Macaulay's and Moment Area methods.

UNIT- V: Thin and Thick Cylinders

Thin Cylinders:

Thin Seamless cylindrical shells – Derivation for equations of longitudinal and hoop stresses - Hoop, Longitudinal and Volumetric strains – changes in diameter and volume of thin cylinders – efficiency of a joint.

Thick Cylinders:

Stresses in thick cylinders and compound cylinders – Lame's theory of thick cylinders - Distribution of hoop and radial stresses across thickness of cylinder – Design of thick cylinders – Initial difference of radii for shrinkage.

UNIT- VI: Unsymmetrical Bending and Beams Curved in Plan

Unsymmetrical Bending:

Introduction – Centroidal principal axes of section – Moment of Inertia referred to any set of rectangular axes – Methods of determining the principal axes – Location of neutral axis – Stresses in beams subjected to unsymmetrical bending.

Beams Curved in Plan:

Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semi-circular beam, simply-supported on three equally spaced supports.

Text Books:

1. "Theory of Structures" by Ramamrutham, Dhanapatrai sons publications.
2. A text Book of "Strength of Materials" by R.K.Bansal Laxmi Publications (P) Ltd., New Delhi.

References:

1. "Fundamentals of Solid Mechanics" by M.L.Gambhir PHI Learning Private Limited, New Delhi.
2. Strength of Materials by R.Subramanian, Oxford University press, New Delhi.
3. "Strength of Materials" by Dinesh. P.Mandal, Umesh publications.
4. "Mechanics of Materials" by B.C.Punmia, Laxmi publications, New Delhi.
5. "Analysis of Structures Vol I & II" by V.N.Vazirani and M.M.Ratwani, Khanna publications, New Delhi.

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HYDRAULICS AND HYDRAULIC MACHINES

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the principles of Open channel flow.
- To introduce the concept of dimensional analysis.
- To understand the working principles of hydraulic machines.

Learning Outcomes:

Students will be able to

- design efficient channel sections.
- express the dimension of various terms in fluid mechanics.
- conduct model studies.
- select appropriate turbines according to working principles.
- choose appropriate hydraulic machine for specific use.

UNIT – I: Open Channel Flow

Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows. Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT – II: Hydraulic Similitude

Dimensional analysis-Rayleigh's method and Buckingham's ð theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities dimensionless numbers Reynold's, Froude, Euler, Mach and Weber numbers; Model laws, scale effect; Distorted models– model and prototype relations.

UNIT – III: Basics of Turbo Machines

Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle

UNIT – IV: Hydraulic Turbines – I

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, hydraulic design, draft tube – theory and function efficiency.

UNIT – V: Hydraulic Turbines – II

Governing of turbines-surge tanks-unit and specific turbines unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation. Selection of Turbines

UNIT – VI: Centrifugal Pumps

Introduction - Advantages of Centrifugal pumps over Reciprocating pumps, Components, Working of Centrifugal pumps, Types, Work done, Head, Losses and efficiencies, Minimum starting speed, Diameter impel and pipes, specific speed, Multi stage pumps, Pumps in parallel, Performance and Characteristic, NPSH, Cavitation.

Text Books:

1. Fluid Mechanics by P.N. Modi and Seth, Standard book house.
2. Open Channel flow by K. Subramanya, Tata McGraw Hill Publishers.

Reference Books:

1. Fluid Mechanics and Hydraulic machines, Rajput, S.Chand & Co.
2. Hydraulic Machines by Banga& Sharma Khanna Publishers.
3. Fluid Mechanics by A. K. Jain; Khanna Publishers, Delhi.
4. Fluid mechanics and Hydraulic Machines by R.K Bansal, Laxmi publications, New Delhi.

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STRUCTURAL ANALYSIS - I

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To analyze the propped cantilevers and fixed beams.
- To determine the deflections of determinate beams using energy methods.
- To draw the influence lines and moving loads for statically determinate beams.
- To analyze the statically indeterminate structures using energy methods.

Learning Outcomes:

Students will be able to:

- analyze the propped cantilever beams for different load conditions.
- calculate the bending moments for fixed beams.
- determine the deflections of statically determinate beams, using energy methods.
- obtain the influence lines for determinate beams.
- analyze the indeterminate structures up to two degrees of freedom.

UNIT- I: Propped Cantilevers & Fixed Beams

Degree of static & Kinematic indeterminacy-Analysis of propped cantilevers and fixed beams for concentrated loads and udl -Shear force and Bending moment diagrams—Deflection of propped cantilevers

UNIT- II: Continous Beams

Introduction-Application of Clayperon's Theorem to continuous beams with and without sinking of supports (moment of inertia is same and different for different spans.)

UNIT- III: Slope Deflection Method

Introduction , derivation of slope deflection equation and application to continuous beams with and without settlements of supports.

UNIT- IV: Strain Energy Method

Introduction—Strain energy in linear elastic system, Strain energy stored due to axial loading, bending, strain energy stored by a beam subjected to uniform bending moment, Castigliano's first theorem , Application to simple beams

UNIT- V: Moving Loads & Influence Lines

Introduction, maximum SF and BM at a given section and absolute maximum SF and BM due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two points loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length..

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

UNIT- VI: Indeterminate Structural Analysis

Indeterminate Trusses -Determination of static and kinematic indeterminacies-Solution of trusses with upto two degrees of internal and external indeterminacies-castigliano's theorem.

Text Books:

1. Analysis of structures by T.S. Thandavamoorthy,Oxford University press, New Delhi.
2. Theory of structures by S.Ramamrutham and R.Narayan,DhanpatRai Publishing Company.

Reference Books:

1. Theory of structures by Gupta, Pandit&Gupta;Tata McGraw Hill,New Delhi.
2. Structural analysis by R.C.Hibbler, Pearson ,Delhi.
3. Analysis of structures Vol-I & Vol-II by V.N.Vazirani & M.M.Ratwani, Khanna Publishers,NewDelhi.
4. Intermediate Structure Analysis by C.K.Wang
5. Structural Analysis vol I &II by S.S.Bhavakatti

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GEOTECHNICAL ENGINEERING - I

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand different classification of natural soils.
- To learn Consolidation settlement and compaction control.
- To study the shear strength parameters.

Learning Outcomes:

Students will be able to

- classify the natural soils as per different standards.
- calculate consolidation settlement for cohesion soils.
- apply methods of compaction in field.
- determine shear strength parameters of soils.
- explain the seepage analysis of soils.

UNIT – I: Introduction

Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass-volume relationship –Relative density. Grain size analysis – Sieve and Hydrometer methods – consistency limits–Various types of soil classification –I.S. soil Classification and Unified soil classification

UNIT–II: Permebility And Seepage Through Soils

Capillary rise – flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Total, neutral and effective stresses –quick sand condition – Seepage through soils.

UNIT – III: Stress Distribution in Soils

Geostatic stresses – stresses induced by applied loads –Boussinesq's and Westergaard's theories for point load, line load, circular load and rectangular loads – Newmark's influence chart.

UNIT – IV: Compaction

Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Methods of compaction used in field.

UNIT – V: Consolidation

Spring Analogy mechanism –Terzaghi's theory of one dimensional consolidation – Over consolidated and normally consolidated clay – Determination of void ratio at various load increments –Determination of coefficient of consolidation – pre consolidation pressure.

UNIT – VI: Shear Strength of Soils

Basic mechanism of shear strength –Mohr Coulomb Failure theories –Liquefaction-shear strength determination – various drainage conditions

Text Books:

1. Soil Mechanics and Foundation Engg.By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.
3. Geotechnical Engineering Principles and practices of soil mechanics and foundation engineering by VNS Murthy – CRC Press

Reference Books:

1. Geotechnical Engineering by C. Venkataramiah, ew age International Pvt .Ltd, (2002).
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
3. Basic and Applied Soil Mechanics by Gopal Ranjan& ASR Rao, New age International Pvt. Ltd, New Delhi.

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WATER RESOURCES ENGINEERING - I

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn the essential components and functions of the hydrologic cycle.
- To understand the concepts -rainfall-runoff, hydrograph analysis and unit hydrograph theory.
- To study the climate-crop relationship.

Learning Outcomes:

Students will be able to

- explain the role of precipitation and evapotranspiration with the hydrologic cycle.
- determine peak flows and develop flood hydrographs.
- formulate and solve hydrologic flood routing models.
- apply different irrigation methods.
- understand the basic aquifer parameters and groundwater resources for different hydro-geological boundary conditions.

UNIT – I: Introduction

Engineering hydrology and its applications, Hydrologic cycle. Precipitation: Types and forms of precipitation, rainfall measurement, types of rain gauges, rain gauge network, average rainfall over a basin, consistency of rainfall data, frequency of rainfall, intensity-duration-frequency curves, probable maximum precipitation.

UNIT- II: Abstractions

Evaporation, factors affecting evaporation, measurement of evaporation, evaporation reduction, evapotranspiration, factors affecting evapotranspiration, measurement of evapotranspiration - Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices.

UNIT- III: Runoff

Factors affecting runoff ,components of runoff, computation of runoff-rational and SCS methods, separation of base flow ,Unit Hydrograph, assumptions, derivation of Unit Hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of UH.

UNIT- IV: Floods

Causes and effects, flood frequency analysis-Gumbel's method, flood control methods, flood routing-hydrologic routing, hydraulic routing, channel and reservoir routing- Muskingum method of routing.

UNIT- V: Ground Water

Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well recuperation test.

UNIT- VI: Irrigation

Necessity and Importance of Irrigation, advantages and ill effects of Irrigation, types of Irrigation, methods of application of Irrigation water, water logging and drainage, standards of quality for Irrigation water, principal crops and crop seasons, crop rotation. Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture tension, Consumptive use, estimation of consumptive use, duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

Text Books:

1. Engineering Hydrology by K. Subramanyam, TATA McGraw-HILL Education Private Limited.
2. Engineering Hydrology P. Jayaram Reddy, Laxmi publications pvt. Ltd., New Delhi.
3. Irrigation and water power engineering by B.C. Punmia&Lal, Laxmi publications pvt. Ltd., New Delhi.

Reference Books:

1. Hand book of applied hydrology by VenTe Chow, Tata-McGraw Hill.
2. Hydrology by HM Raghunath, New Age International Publishers.
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
4. Irrigation and Hydraulic structures by SK Garg, Khanna Publishers.

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CONCRETE TECHNOLOGY

II Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the types, properties of cements and admixtures
- To know different types of aggregates.
- To understand setting and hardening characteristics of concretes.
- To understand the method of Mix Design.

Learnaing Outcomes:

Students will be able to

- understand the properties of ingredients of concrete.
- identify the suitability of different types of aggregates for their use.
- explain about Fresh concrete, Hardened Concrete and Special concretes.
- explain the role of elasticity, creep and shrinkage on concrete.
- design the mix for given grade of concrete.

UNIT - I: Cements & Admixtures

Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrated cement – Test for physical properties –Different grades of cements – physical and chemical requirements of OPC for different grades of cement, Uses of cement. Admixtures – Mineral and chemical admixtures – accelerators, retarders, plasticizers, super-plasticizers, fly ash and silica fume.

UNIT - II: Aggregates

Classification of aggregate – Particle shape & texture – Bond, strength &other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, absorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size.

UNIT - III: Fresh Concrete & Special Concretes

Fresh Concrete: Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding ,Steps in manufacture of concrete – Quality of mixing water, Tolerable concentrations of some impurities in mixing water, permissible limit for solids as per IS456-2000, use of sea water for

mixing concrete. Ready mixed concrete-Introduction, Advantages and Disadvantages

Special Concretes: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete– High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C, Polymer concrete – Types of Polymer concrete – Properties of polymer concrete, High performance concrete – Self consolidating concrete, Ferrocement: Casting techniques guniting, applications.

UNIT – IV: Hardened Concrete & Testing of Hardened Concrete

Hardened Concrete: Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength - Curing.

Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests –Splitting tests – Non-destructive testing methods

UNIT - V: Elasticity, Creep & Shrinkage

Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage. Factors contributing to cracks in concrete, sulphate attack and methods of controlling sulphate attack, chloride attack, corrosion of steel and its control.

UNIT - VI: Mix Design

Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by BIS method of mix design

Text Books:

1. Concrete Technology by M.S.Shetty. – S.Chand & Co
2. Properties of Concrete by A.M.Neville – PEARSON – 4th edition

Reference Books:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi.
2. Text Book of Concrete Technology, Mahaboob Bhasha, Anuradha publications.
3. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.
4. Mix design by N.Krishnam Raju.

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EMPLOYABILITY SKILLS
(Common to CE, CSE & IT)
II Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To equip the learners to gain employability skills and to have successful careers.
- To enable them to use English in different socio-cultural and professional contexts.
- To assist them to communicate their ideas relevantly and coherently in globalized contexts.

Learnaing Outcomes:

Students will be able to

- gain employment and function successfully in their careers.
- use English successfully in different socio-cultural and professional contexts
- communicate their ideas coherently in globalized situations.

Syllabus:

Listening:

- Listening Comprehension- 4 exercises
- Active Listening

Reading:

- Reading Comprehension – 4 Passages
- Book Review-Any Novel among the list prescribed by the Department
- Cloze Test

Speaking:

- Extempore
- One Act Plays
- Public Speaking
- Group Discussions
- Interpersonal skills
- Ad Making
- Poster presentation
- Mock Interviews
- Assertiveness

Writing:

- Information Transfer
- Report Writing
- Team building
- Paragraph Writing
- Project Work

Vocabulary:

- Business Vocabulary

Short Films:

- Creativity
- Leadership

Books Recommended:

1. Effective Technical Communication, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. Communication Skills by Leena Sen, Prentice-Hall of India, 2005.
3. Academic Writing- A Practical guide for students by Stephen Bailey, Rontledge Falmer, London & New York, 2004.
4. English Language Communication: A Reader cum Lab Manual Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai.
5. Body Language- Your Success Mantra by Dr. Shalini Verma, S. Chand, 2006.
6. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice, New Age International (P) Ltd., Publishers, New Delhi.
7. Books on TOEFL/GRE/GMAT/CAT by Barron's/cup.
8. IELTS series with CDs by Cambridge University Press.
9. Technical Report Writing Today by Daniel G. Riordan & Steven E. Pauley, Biztantra Publishers, 2005.
10. Communication Skills for Engineers by Sunita Mishra & C. Muralikrishna, Pearson Education, 2007.
11. Objective English by Edgar Thorpe & Showick Thorpe, 2nd edition, Pearson Education, 2007.
12. Cambridge Preparation for the TOEFL Test by Jolene Gear & Robert Gear, 4th Edition.

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STRENGTH OF MATERIALS LAB

II Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To introduce various strength and strain measuring equipments.
- To determine various physical, mechanical properties and strength of various engineering materials.
- To define constitutive model(stress- strain curve) of engineering material in the laboratory

Learning Outcomes:

Students will be able to

- gain knowledge on engineering properties of the materials in the laboratory.
- conduct laboratory tests to check suitability of the engineering materials for the given purpose.
- obtain the strength and quality of materials through laboratory tests.

List of Experiments:

1) To study the stress-strain characteristics of HYSD bars by UTM.
2) To find young's modulus of the given material (steel or wood) by bending test on simply supported beam
3) To find young's modulus of the given material (steel or wood) by conducting bending test on Cantilever beam .
4) To find modulus of rigidity by conducting torsion test on solid circular shaft.
5) To find the hardness of the given material by Brinnel's & Rockwell Hardness tester.
6) To determine the modulus of rigidity of the spring.
7) To determine Compressive Strength of wood or Brick.
8) To find impact resistance of the given material by conducting Charpy / Izod test on Impact testing machine.
9) To determine the ultimate shear strength of steel rod in single and double shear.
10) To Verify the Maxwell's Reciprocal theorem on beams.
11) To determine the deflection of Continuous beam.

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ADVANCED SURVEYING & GIS LAB

II Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart the knowledge of deriving field data of an area using theodolite and tacheometer.
- To demonstrate and make use of advanced surveying tool - Total station.
- To interpret satellite and vector data for developing thematic maps using Arc Map software.

Course Outcomes:

Students will be able to

- use theodolite for different field surveys.
- use total station for conduct of field surveys.
- use vector and raster data for developing maps.

List of Experiments:

1) Method of repetition & re-iteration for finding horizontal angles
2) Finding height of building using theodolite
   a) When the base is accessible
   b) When the base is inaccessible
3) Curve setting using theodolite
4) Finding tacheometer constants
5) Total station introduction and leveling and centering
6) Remote distance measurement & Remote elevation measurement
7) Finding area of the field using total station when the target points are commanded by total station
8) Finding the area of the field by total station by the method of traversing
9) Sending input/output data of the total station to computer
10) Digitization of map-using vector data
11) Digitization of map-using raster/satellite data
12) Creation of thematic maps
13) Study of future estimates
14) Study of longitudes and longitudes using GPS

NOTE: At least 12 of the above experiments are to be conducted

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STRUCTURAL ANALYSIS - II

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn the concept of analyzing the cables and arches.
- To familiarize with lateral load analysis using approximation methods.
- To impart the knowledge on analysis of indeterminate structures by various methods.

Learning Outcomes:

Students will be able to

- analyze the arches and cables.
- carry out lateral load analysis by approximation methods.
- analyze statically indeterminate beams by moment distribution method.
- calculate the bending moment values by using kani's method.
- apply the concept of matrix analysis for solving statically indeterminate beams.

UNIT - I: Arches

Introduction - Eddy's Theorem—Determination of horizontal thrust, bending moment, normal thrust and radial shear for Two & Three Hinged Parabolic Arches.- Temperature Effects.

UNIT - II: Lateral Load Analysis Using Approximation Methods

Application to building frames by Portal and Cantilever Methods.

UNIT - III: Cables and Suspension Bridges

Introduction to cables, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cables, temperature effects, analysis of simple suspension bridge, three and two hinged stiffening girders.

UNIT - IV: Moment Distribution Method

Stiffness and carry over factors-Distribution factors-Analysis of continuous beams with and without sinking of supports-Storey portal frames with single storey and single bay -Substitute frame analysis by two cycle.

UNIT - V: Kani's Method

Analysis of continuous beams-including settlement of supports and single bay portal frames with and without side sway

UNIT - VI: Matrix Methods

Introduction,application to continuous beams(maximum of two unknowns)including support settlements up to two degree USING Stiffness & Flexibility Methods.

Text Books:

1. Analysis of structures by T.S. Thandavamoorthy,Oxford University press,New Delhi.
2. Structural Analysis - A Matrix Approach by G.S.Pandit & S.P.Gupta.
3. Theory of structures by S.Ramamrutham and R.Narayan,DhanpatRai Publishing Company.

Reference Books:

1. Intermediate Structureal Analysis by C.K.Wang.
2. Theory of structures by Gupta, Pandit& Gupta;Tata McGraw Hill,New Delhi.
3. Structural analysis by R.C.Hibbler, Pearson ,Delhi.
4. Analysis of structures Vol-I &Vol-II by V.N.Vazirani&M.M.Ratwani, KhannaPublishers, New Delhi.

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GEOTECHNICAL ENGINEERING - II

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the slope stability.
- To impart the knowledge on lateral earth pressure and stability of retaining walls.
- To understand load carrying capacity of shallow and deep foundations.

Learnaing Outcomes:

Students will be able to

- carry out soil investigation and prepare the bore log data.
- analyze stability of slopes of an embankment.
- determine lateral earth pressure and check the stability of retaining walls.
- determine bearing capacity of soil.
- analyze the load carrying capacity of deep foundation.

UNIT - I: Soil Exploration

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

UNIT - II: Earth Slope Stability

Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, Bishop's Simplified method – Taylor's Stability Number.

UNIT - III: Earth Pressure Theories

Rankine's &Coulomb's theory of earth pressure, Rehbann's graphical method– Culmann's graphical method.

Retaining Walls

Types of retaining walls – Design approach of gravity, cantilever retaining walls.

UNIT - IV: Shallow Foundations and Settlement Criteria

Bearing capacity–criteria for determination of bearing capacity– factors influencing bearing capacity– analytical methods to determine bearing capacity– Terzaghi, Meyerhof and IS code methods. Safe bearing pressure based on N- value –safe

bearing capacity and settlement from plate load test – allowable settlements of structures - Settlement Analysis

UNIT - V: Pile Foundation

Classification of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

UNIT - VI: Well Foundation

Different shapes of well foundations –Forces acting on well foundation– Design of individual Components– Construction and sinking of well foundations – Tilts and shifts.

Text Books:

1. Soil Mechanics and Foundation Engg.By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Geotechnical Engineering by C. Venkataramiah, New age International Pvt.Ltd,(2002).
3. Geotechnical Engineering Principles and practices of soil mechanics and foundation engineering by VNS Murthy – CRC Press.

Reference Books:

1. Basic and Applied Soil Mechanics by GopalRanjan & ASR Rao, New age International Pvt. Ltd, New Delhi
2. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
3. Geotechnical Engineering by Manoj Dutta&Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.
4. Foundation Analysis and Design by Joseph E. Bowles - McGraw-Hill

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WATER RESOURCES ENGINEERING - II

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with various types of dams and selection of suitable type depending on site conditions.
- To impart the knowledge on design criteria of gravity dams and modes of failure.
- To learn about the structures for conveying water across, over or under the natural streams.

Learnaing Outcomes:

Students will be able to

- understand the purpose of different types of reservoirs.
- evaluate seepage pressure and exit gradient for hydraulic structures.
- explain the design aspects and modes of failures of gravity dams.
- understand the design concepts of canal drops and falls.
- familiarize the design principles of cross drainage works.

UNIT - I: Diversion Head Works

Types of Diversion head works-diversion and storage head works, weirs and barrages, layout of diversion head works, components. causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure, impervious floors using Bligh's and Khosla's theory, exit gradient, functions of u/s and d/s sheet piles.

UNIT - II: Reservoirs and Dams

Types of reservoirs, selection of site for reservoir, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve, types of dams, merits and demerits, factors affecting selection of type of dam, factors governing selecting site for dam.

UNIT - III: Gravity Dams

Gravity dams, forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a low gravity dam, stability analysis, drainage galleries.

UNIT - IV: Spillways & Canal Falls

Spillways: Types of spillways, design principles of Ogee spillways, Energy dissipation below spillways- stilling basin and its appurtenances.

Canal Falls: Types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall.

UNIT-V: Canal Regulation Works

Head and Cross Regulator, Principles of design of distributary and head regulators, canal outlets, proportionality, sensitivity and flexibility.

UNIT-VI: Cross Drainage Works

Types, selection of site, design principles of aqueduct, siphon aqueduct and super passage.

Text Books:

1. Irrigation engineering and hydraulic structures by S.K Garg, Khanna publishers.
2. Irrigation and Water power engineering by B.C Punmia.

Reference Books:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers.
2. Concrete dams by Varshney.
3. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta.
4. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers.

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DESIGN & DRAWING OF R.C STRUCTURE

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the different types of design philosophies.
- To estimate primary design loads on structural elements using appropriate IS standards.
- To model building structure and analyse the structural elements for design forces and deflections.
- To design reinforced concrete structural elements for design forces to satisfy strength and serviceability criteria.

Learning Outcomes:

Students will be able to

- analyze and design the structural elements for limit state of collapse and serviceability.
- design the structures subjected to shear, bond and torsion.
- determine the reinforcement details of tension, compression and flexural members.
- carryout design of reinforced concrete elements using fundamental principles and also design aids.

UNIT - I: Limit State Method

Introduction:

Materials of reinforced concrete, Loading Standards as per IS 875, grades of concrete and grades of steel used in concrete. Introduction to working stress, Ultimate load and limit state methods .Elastic theory, design constants; modular ratio - Depth of neutral axis and moment of resistance -balanced, under-reinforced and over-reinforced sections.

Limit State Method:

Concepts of limit state design – Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance

UNIT - II : Analysis of Beams

Limit state analysis of singly reinforced, doubly reinforced, rectangular, T and L beam sections.

UNIT - III: Shear and Deflection

Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions.

Limit state design for serviceability for deflection, cracking and code provisions.

UNIT - IV: Design of Beams

Design of singly reinforced, doubly reinforced and flanged beams; simply supported, cantilever and continuous beams- Examples with detailing.

UNIT - V: Design of Slabs

Design of Two-way slabs, one way slab, continuous slab Using IS coefficients .Design of waist- slab for stair case and detailing .

UNIT - VI: Design of Compression Members

Design Of Compression members: Effective length of the column, design of short and long columns – under axial loads, uniaxial and biaxial bending.

Note: All designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Detailing of One way, Two way and continuous slabs
4. Reinforcement particulars of columns

Final Examination Pattern:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Text Books:

1. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
2. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishers, New Delhi
3. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

Reference Books:

1. Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
2. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
3. Design of concrete structures – Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.
4. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., New Delhi
5. Reinforced concrete structures – I.C. Syal & A.K.Goel, S.Chand Publishers
6. Limit state designed of reinforced concrete – P.C.Varghese, Printice Hall of India, New Delhi.
7. Reynolds's handbook.

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Open Elective - I

REMOTE SENSING AND GIS TECHNIQUES

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To introduce the students to the basic concepts and principles of various components of remote sensin.
- To provide an exposure to GIS and its practical applications in civil engineering.
- To demonstrate the process of remote sensing and theories related to EMR.
- To establish the interpretation of spatial data in various platforms.

Learning Outcomes:

Students will be able to

- Identify various satellites, which are advantage for managing the resources available on earth.
- Develop thematic maps with the help of raster and vector data.
- Employ the analysis and interpretation techniques in the data models.
- Apply the strategies of GIS in land information highway system.

UNIT – I: EMR and Its Interaction with Atmosphere & Earth Material

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzmann and Wien's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

UNIT – II: Platforms and Sensors

Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and spaceborne TIR and microwave sensors.

UNIT – III: Image Interpretation and Analysis

Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.

UNIT – IV: Geographic Information System

Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS software's – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems(DBMS).

UNIT – V: Data Entry, Stprage amd Analysis

Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.

UNIT VI: RS and GIS Applications

Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications, hydrology- flood zone delineation and mapping, groundwater prospects and recharge, reservoir storage estimation.

Text Books:

1. Remote sensing by Basudeb Bhatta, Oxford University Press.
2. Anji Reddy, M. (2001). Textbook of Remote Sensing and Geographical Information System. Second edn. BS Publications, Hyderabad.

Reference Books:

1. Remote sensing and its applications by LRA Narayana University Press 1999.
2. Basics of Remote Sensing & GIS by S.Kumar, Laxmi Publications.
3. Lo. C.P.and A.K.W.Yeung (2002). Concepts and Techniques of Geographic Information Systems. Prentice-Hall of India Pvt. Ltd., New Delhi. Pp:492.
4. Peter A.Burrough, Rachael A.McDonnell (2000). Principles of GIS. Oxford University Press.
5. Ian Heywood (2000). An Introduction to GIS. Pearson Education Asia

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Open Elective - I

ELEMENTS OF CIVIL ENGINEERING
(Other than CE)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand different methods of surveying for various applications.
- To familiarize with various types of building materials, structures and transport systems.

Learning Outcomes:

Students will be able to

- carry out simple land survey and prepare maps showing the existing details.
- find out area of irregular shaped plane areas.
- understand building plan, elevation and section.
- get acquainted with construction materials and transportation systems

UNIT – I: Introduction

Introduction, history of the civil engineering, sub – disciplines of civil engineering.

UNIT – II: Surveying

Introduction, divisions of surveying, classification of surveying, principles of surveying. Linear measurements and errors–introduction, methods of linear measurements, chaining instruments, types of error and correction. Compass surveying – introduction, angular measurement using compass, whole circle bearing and reduced bearing, fore bearing and back bearing. Traverse surveying – introduction, chain and compass traversing, closing error and adjustments. Leveling – introduction, types of leveling instruments, dumpy level, adjustment of level, leveling staff.

UNIT – III: Building Materials and Construction

Materials: Introduction to construction materials like ferrous and non ferrous metals, alloys, Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen.**Construction:**Types of building, different loads considered in building design, types of foundation in building, other developments and constructions of buildings.

UNIT – IV: Fire and Earthquake Protection in Building

Introduction, fire protection in building, structural and architectural safety requirements of resistive structures, fire resistive properties of building materials,

fire exit requirements, force and acceleration on building due to earthquake, building response characteristics, building drift.

UNIT – V: Water Supply, Sanitary and Electrical Works in Building

Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

UNIT – VI: Highway Engineering

Introduction, historical background of road or highway, classification of roads, pavements and roads, traffic control mechanism.

Text Books:

1. Elements of Civil Engineering Author: Mimi Das Saikia, Bhargab Mohan Das and Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering Author: Dr. R.K. Jain and Dr. P.P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I Author: Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain16th Edition Publisher: Laxmi Publication Delhi.
4. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.

Reference Books:

1. Surveying Theory and Practice (7th Edition) Author: James M Anderson and Edward M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.
2. Surveying and Leveling Author: R. Subramanian Publisher: Oxford University.
3. Building drawing Author: M.G.Shah, C.M.Kale and S.Y.Patki Publisher: Tata McGraw Hill.
4. Civil Engg. Drawing Author: S. C. Rangwala Publisher: Charotar Pub. House Anand.

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Open Elective - I

MODELING AND SIMULATION OF ENGINEERING SYSTEMS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Familiarize with programming skills in Equation Solving Software.
- To build Graphic user interface.

Learning Outcomes:

Students will be able to

- develop a Model of a Physical System.
- develop a systematic method to simulate engineering system and asses its performance.

UNIT – I: **Variables, scripts, and operations**

Getting Started, Scripts, Making Variables, Manipulating Variables, Basic Plotting

UNIT – II: Visualization and programming

Functions, Flow Control, Line Plots, Image/Surface Plots, Vectorization

UNIT – III: Solving equations and curve fitting

Linear Algebra, Polynomials, Optimization, Differentiation/Integration, Differential Equations

UNIT – IV: Advanced methods

Probability and Statistics, Data Structures, Images and Animation, Debugging, Online Resources

UNIT – V: Symbolics, Simulink®, file I/O, building GUIs

Symbolic Math, Simulink, File I/O, Graphical User Interfaces

UNIT – VI:

Examples on statistics, optimization, plots

Text Books:

1. "Getting started with MATLAB" by Rudra pratap, Oxford University, 2002.
2. MATLAB and SIMULINK for Engineers by Agam Kumar Tyagi,OUP 2011

Reference Books:

1. Spencer, R.L. and Ware, M (2008), Introduction to MATLAB, Brigham Young Unviersity, available online, accessed, 7, 2008.
2. David F.Griffiths, October (2012) "An introduction to MATLAB" the Unviersity of Dundee, available online, Acessed, October 2012..

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Open Elective - I

RENEWABLE ENERGY SOURCES

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To study various types of non-conventional sources of energy and techniques used in exploiting solar, wind, tidal and geothermal sources of energy and bio-fuels.

Learning Outcomes:

Students will be able to

- analyze the significance of renewable energy.
- understand the principles of solar radiation and design the solar collectors.
- know the functioning of basic components of wind energy and understand the utilization of biomass in power generation.
- understand the working principles of geothermal, ocean, tidal and wave energy techniques.
- know the functioning of direct energy conversion techniques.

UNIT – I:

Introduction: Energy Sources and their availability, Role and potential of renewable source.

Principles of Solar Radiation: The solar constant, Solar Radiation outside the Earth's atmosphere, Solar Radiation at the Earth's surface, instruments for measuring solar radiation and sun shine, solar radiation data, solar radiation Geometry, solar radiation on titled surfaces with numerical problems.

UNIT – II:

Solar Energy Storage and Applications: Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications-solar heating/cooling technique, solar distillation, drying, photovoltaic energy conversion. Solar central power tower concept and solar Chimney

UNIT – III:

Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass: Bio fuels, Methods for obtaining energy from Biomass, Anaerobic/ aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects. Thermal gasification of Biomass.

UNIT – IV:

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles.

Tidal and wave energy: Potential and conversion techniques, Mini-hydel power plants and their economics.

UNIT – V:

Direct Energy Conversion: Need for DEC, limitations, principles of DEC. Thermo-electric Power – See-beck, Peltier, joule, Thomson effects, Thermo-electric Power generators, Figure of merit, Selection of materials, applications.

UNIT – VI:

MHD power Generation: Principles, dissociation and ionization, Hall Effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects.

Fuel cells: Principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Text Books:

1. Tiwari and Ghosal, "Renewable energy resources", Narosa.
2. G.D. Rai, "Non-Conventional Energy Sources", Dhanpat Rai and Sons

Reference Books:

1. Twidell & Weir, "Renewable Energy Sources "
2. Sukhatme, "Solar Energy", Tata McGraw-Hill Education.
3. B.S Magal Frank Kreith & J.F Kreith, "Solar Power Engineering "
4. Frank Krieth & John F Kreider, "Principles of Solar Energy"

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Open Elective - I

ELEMENTS OF MECHANCIAL ENGINEERING
(Other than ME)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objective:

- To familiarize with the basic principles of Mechanical Engineering required in various fields of engineering.

Learning Outcomes:

Students will be able to

- understand the fundamentals of mechanical systems.
- understand and appreciate significance of mechanical engineering in different fields of engineering.

UNIT – I: Simple stress and strains

Elasticity and plasticity – Types of stresses & strains–Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic Moduli & the relationship between them.

UNIT – II: Power Transmission Devices

Introduction to power transmission, belt, rope, chain and gear drives, couplings, clutches (Theoretical treatment only)

Power Transmission through Shafts: Introduction, Torsion of Circular Shafts, Torsion equation, Hollow Circular Shafts, Torsional Rigidity, Power Transmitted by the Shaft (simple Problems).

UNIT – III: Basic Manufacturing Methods

Principles of casting , green sand moulds , Advantages and applications of casting ; Principles of gas welding and arc welding, Soldering and Brazing ; Hot working – hot rolling , Cold working – cold rolling ;

UNIT – IV: Basics of Machine Tools and Engineering Materials

Basics of Machine Tools: Description of basic machine tools- Lathe – operations – turning, threading, taper turning and drilling ;

Engineering Materials : Classification of engineering material, Composition of cast iron and carbon steels on Iron-Carbon diagram and their mechanical properties. Alloy steels and their application

UNIT – V: IC Engines

Introduction , Main components of IC engines , working of 4-stroke petrol engine and diesel engine , working of 2- stroke petrol engine and diesel engine , differences between petrol and diesel engines, differences between 4- stroke and 2- stroke engines. (Theoretical treatment only)

Steam Boilers: Function, classification, differences between water and fire tube boilers, mountings and accessories with their functions, construction and working of cochran, vertical, Lancashire and Babcock & Wilcox boiler (Theoretical treatment only).

UNIT – VI:

Power Plants: Introduction, working principle of steam and gas turbine power plant, working of hydraulic turbines and pumps (Theoretical treatment only).

Refrigeration & Air conditioning: Definition – COP, Unit of Refrigeration, Applications of refrigeration system, vapour compression refrigeration system , simple layout of summer and winter air conditioning system (Theoretical treatment only).

Text Books:

1. Elements of Mechanical Engineering – R.K.Rajput, Lakmi Pub., Delhi.
2. Elements of Mechanical Engineering – D.S.Kumar, S.K. Kataria and Sons

Reference Books:

1. Elements of Mechanical Engineering – K.R.Golala Krishnan, S.Gopala Krishnana, S.C.Sharma, Subhas Stores.
2. Elements of Mechanical Engineering – S.Tryambaka Murthy, I.K. International publishing house pvt. Ltd.

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Open Elective - I

COMPUTER NETWORKS
(Other than CSE & IT)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with different transmission media.
- To gain knowledge of various protocols used for efficient transmission of data over network.

Learning Outcomes:

Students will be able to

- understand basic network topologies.
- choose appropriate transmission media for establishing a network.
- differentiate various data link layer protocols.
- choose appropriate routing algorithm suitable for the network for an organization.
- differentiate various transport layer protocols.
- analyze the type of network used in an organization.

UNIT – I: Introduction

OSI, TCP/IP, Examples of Networks: Novel Networks, Arpanet, Internet, Network Topologies, Classification of networks: LAN, MAN, WAN.

UNIT – II: Physical Layer

Transmission media- copper, twisted pair, wireless, switching and encoding asynchronous communications, Narrow band, broad band ISDN.

UNIT – III: Data link layer & Medium Access sub layer

Data link layer: Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window, Data link layer in HDLC, Slip, and PPP.

Medium Access sub layer: ALOHA, Carrier sense multiple access. IEEE 802.x Standards, wireless LANs. Bridges

UNIT – IV: Network Layer

Virtual circuit and Datagram subnets, Routing algorithms- shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing, congestion control algorithms.

UNIT –V: Transport Layer

Transport Services, TCP, SCTP and UDP protocols.

UNIT – VI: Application Layer

Domain name system, SNMP, Electronic Mail, WWW

Text Books:

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/ PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

Reference Books:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

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Open Elective - I

OBJECT ORIENTED PROGRAMMING
(Other than CSE & IT)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To get acquainted with the concepts of object-oriented programming.
- To create GUI using AWT components

Learning Outcomes:

Students will be able to

- understand the programming constructs of JAVA.
- apply concepts of inheritance.
- implement interfaces and packages through JAVA.
- simulate the concept of multi threading.
- handle run time errors.
- design and implement an effective GUI for various applications.

UNIT – I: Fundamentals of OOP and Java

Need of OOP, Principles of OOP Languages, Procedural Languages vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features.

Java Programming constructs: variables, primitive data types, identifiers, keywords, literals, operators, arrays, type conversion and casting,

UNIT – II: Class Fundamentals and Inheritance

Class fundamentals, declaring objects, methods, constructors, this keyword, garbage collection, overloading methods and constructors, argument passing, recursion, access control.

Inheritance- Basics, types, using super keyword, method overriding, dynamic method dispatch, abstract classes, using final with inheritance, object class, string class.

UNIT – III: Interfaces and Packages

Interfaces: Defining an interface, implementing interfaces, nested interfaces, applying interfaces, variables in interfaces and extending interfaces.

Packages: Defining, creating and accessing a package.

UNIT – IV: Exception Handling and Multithreading

Exception Handling- exception-handling fundamentals, exception types, uncaught exceptions, using try and catch, multiple catch clauses, nested try statements, throw, throws, finally, java's built-in exceptions, user-defined exception sub classes.

MultiThreading- differences between multi threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT – V: Applets and Event Handling

Applets- Concepts of Applets, differences between applets and applications, life cycle of an applet, creating applets.

Event Handling- Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes.

UNIT – VI: AWT

The AWT class hierarchy, user interface components- label, button, checkbox, checkboxgroup, choice, list, scrollbar, menubar, layout managers –Flow, Border, Grid, Card, GridBag.

Text Books:

1. Herbert schildt, Java The complete reference, TMH, 7th edition.
2. Sachin Malhotra, Saurabh choudhary, Programming in JAVA, Oxford.

Reference Books:

1. Joyce Farrel, Ankit R.Bhavsar, JAVA for Beginners, Cengage Learning, 4th edition.
2. Y.Daniel Liang, Introduction to Java Programming, Pearson, 7th edition.
3. P.Radha Krishna, Object Oriented Programming Through Java, Universities Press.

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Open Elective - I

DATA STRUCTURES USING C
(Other than EEE, ECE, CSE & IT)
III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge of linear and non-linear data structures.
- To familiarize with different sorting and searching techniques.

Learning Outcomes:

Students will be able to

- implement single, circular and double linked list.
- implement stacks and queues using arrays and linked lists.
- implement various operations on binary trees.
- apply appropriate sorting and searching techniques for the given data.
- implement various operations on Graphs.

UNIT – I: Linked lists

Introduction- Concept of data structures, overview of data structures, implementation of data structures.

Linked Lists- Single linked list, Circularlinked list, Double linked list, Circular double linked list.

UNIT – II: Stacks

Representation using Arrays and Linked List, operations on stack, factorial calculation, evaluation of arithmetic expression.

UNIT – III: Queues

Representation using Arrays and Linked List, operations on queue, circular queue, queue using stack.

UNIT - IV: Trees

Binary Trees: Basic tree concepts, Properties, Representation of Binary Trees using Arrays and Linked List, Binary Tree Traversals, threaded binary tree.

Binary search trees: Basic concepts, BST operations: Search, insertion, deletion and traversals, Creation of binary search tree from in-order and pre (post)order traversals.

UNIT - V: Sorting and Searching

Searching: Linear Search, Binary Search, Fibonacci search.

Sorting (Internal): Basic concepts, Sorting by: insertion (Insertion sort), selection (selection sort), exchange (Bubble sort, quick sort), distribution (radix sort) and merging (merge sort).

UNIT - VI: Graphs

Basic concepts, representations of graphs, operations on graphs- vertex insertion, vertex deletion, find vertex, edge addition, edge deletion, graph traversals (BFS & DFS).

Text Books:

1. Debasis samanta, Classic Data Structures, PHI, 2nd edition, 2011.
2. Richard F, Gilberg , Forouzan, Data Structures, 2nd edition, , Cengage.

Reference Books:

1. Seymour Lipschutz, Data Structure with C, TMH.
2. G. A. V. Pai, Data Structures and Algorithms, TMH, 2008.
3. Horowitz, Sahni, Anderson Freed, Fundamentals of Data Structure in C, University Press, 2nd edition.

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Open Elective - I

CYBER LAWS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To expose the need of cyber laws to prosecute cybercrimes in the society.
- To understand the IT ACT 2000 for Cyber Crime and Cyber Justice.
- To introduce the Criminal Activities based on Internet.
- To familiarize various Licensing Issues Authorities for Digital Signatures.

Learning Outcomes:

Student will be able to

- outline the pros and cons of Internet.
- operate on Confidential data in a precautious manner.
- demonstrate about the Criminal Justice in India and its Implications.
- define the Cyber Consumers under the consumer Protection Act.
- devise the legal framework for Confidential Information.
- outline e-commerce issue for copyright protection and Defend Personal Data from being hacked.

UNIT – I: The IT Act, 2000- A Ccritique

Crimes in this Millennium, Section 80 of the IT Act, 2000 – A Weapon or a Farce?, Forgetting the Line between Cognizable and Non - Cognizable Officers, Arrest for "About to Commit" an Offence Under the IT Act, A Tribute to Darco, Arrest But No Punishment.

UNIT – II: Cyber Crime and Criminal Justice

Penalties, Adjudication and Appeals Under the IT Act, 2000: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber fraud and Cyber Cheating, Virus on Internet Deformation, Harassment and E- mail Abuse

UNIT – III: Cyber Pornography

Cyber Pornography, Other IT Offences, Monetary Penalties, Adjudication and Appeals Under IT Act 2000, Network Service Providers, Jurisdiction and Cyber Crimes, Nature of Cyber Criminality Strategies to Tackle Cyber Crime and Trends, Criminal Justice in India and Implications.

UNIT – IV: Digital Signatures, Certifying Authorities and e-Governance

Introduction to Digital Signatures, Certifying Authorities and Liability in the Event of Digital Signature compromise, E - Governance in the India. A Warming to

Babudom, Are Cyber Consumers Covered under the Consumer Protection, Goods and Services, Consumer Complaint Defect in Goods and Deficiency in Services Restrictive and Unfair Trade Practices

UNIT – V: Traditional Computer Crime

Early Hacker and Theft of Components Traditional problems, Recognizing and Defining Computer Crime, Phreakers: Yesterday's Hackers, Hacking, Computers as Commodities, Theft of intellectual Property

UNIT – VI: Web Based Criminal Activity

Interference with Lawful Use of Computers, Malware, DoS (Denial of Service) and DDoS (Distributed Denial of Service) Attacks, Spam ,Ransomware and Kidnapping of Information, Theft of Information, Data Manipulation, and Web Encroachment Online Gambling Online Fraud, Securities Fraud and stock Manipulation, Ancillary crimes

Text Books:

1. Vivek Sood, " Cyber Law Simplefied", Tata McGraw Hill.
2. Marjie T. Britz, "Computer Forensics and Cyber Crime", Pearson

Reference Book:

1. Cyber Laws Texts and Cases, Ferrera, CENGAGE.

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Open Elective - I

OPEN SOURCE SOFTWARE

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the opportunities for open source software in the global market.
- To familiarize the different steps in implementing the open source.

Learning Outcomes:

Students will be able to

- analyze the open source software need and applications.
- explain LINUX operating systems concepts.
- work with MySQL database.
- design and develop a web application using PHP.

UNIT – I: Introduction

Introduction to Open sources – Need of Open Sources – Advantages of Open Sources–Application of Open Sources.

UNIT – II: LINUX

LINUX Introduction – General Overview – Kernel Mode and user mode , Process – Advanced Concepts – Scheduling – Personalities – Cloning – Signals – Development with Linux.

UNIT – III: Introduction to MySQL

MySQL: Introduction – Setting up account – Starting, terminating and writing your own SQL programs – Record selection Technology – Working with strings – Date and Time

UNIT – IV: Working with MySQL

Sorting Query Results – Generating Summary – Working with metadata – Using sequences – MySQL and Web.

UNIT – V: Open Source Programming Languages

PHP- Introduction – Programming in web environment – variables – constants – data types – operators – Statements – Functions – Arrays – OOP – String Manipulation and regular expression – File handling and data storage

UNIT – VI: PHP and SQL

PHP and SQL database –PHP and LDAP – PHP Connectivity – Sending and receiving E-mails –Debugging and error handling – Security – Templates.

Text Books:

1. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications,2003.
2. Steve Suchring, “MySQL Bible”, John Wiley, 2002

Reference Books:

1. Rasmus Lerdorf and Levin Tatroe, “Programming PHP”, O’Reilly, 2002.
1. Steven Holzner, “PHP: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
3. Vikram Vaswani, “MYSQL: The Complete Reference”, 2nd Edition, Tata McGraw –Hill Publishing Company Limited, Indian Reprint 2009.

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Open Elective - I

FUNDAMENTALS OF DATA BASE MANAGEMENT SYSTEMS
(Other than CSE & IT)

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives

- To introduce the database management systems and applications, Database System Architectures.
- To expose E- R Modeling and Design.
- To explain Relational Data Model and Relational Algebra.
- To demonstrate Structured Query Language and apply different operations on Database.
- To explain Transaction management.

Learning Outcomes:

Students will be able to

- develop Conceptual(ER- modeling) and Logical models specified requirements of data base.
- describe the basics of SQL. Can construct tables and answer queries using SQL.
- perform Schema refinement.
- interpret the basic issues of transaction processing.

UNIT – I: Introduction to Data Base

Purpose of Database Systems Vs File System, Data Models, Schema and instances, DBMS Architecture, E- R Model- Attributes and Keys, Relationship Types, Weak Entity set, Strong Entity Set.
(Practice: Execute DDL, DML, DCL and TCL Commands.)

UNIT – II: Enhanced E–R Modeling

Specialization and Generalization, Database design for Banking Enterprise, Relational model concepts, constraints.
(Practice:. Execute basic SELECT operations.)

UNIT – III:SQL

DDL, DML, DCL, Set operations, Aggregate Functions, Null values, Nested queries. Defining different constraints on a table, apply joins on tables, Creating Views and Indices.
(Practice: Execute a single line and group functions for a table, set operations on various Relations.)

UNIT – IV: Database Bottom Up Design

Functional Dependencies and Normalization for Relational Databases: Informal design guidelines for relation schemes, Functional dependencies,
(Practice: Execute Orderby, Groupby clause on various Relations)

UNIT – V: Normal forms

First, second and third normal forms, Boyce- Cod normal form, Multi valued & Join Dependencies, 4th & 5th Normal forms.
(Practice: Implement the following Integrity Constraints
a. Primary Key b. Foreign Key c. Unique d. Not NULL and Check.)

UNIT – VI: Transaction Management

Transaction concept, ACID properties, Concurrent execution of transactions
(Practice: Execute Nested Queries)

Text Books

1. Korth & Sudarshan *Database system concept*, TMH.
2. Raghu Ramakrishnan, Johannes Gehrke *Database Management Systems,* TMH

Reference Books

1. Peter Rob & C Coronel *Database Systems design, Implementation, and Management*, 7th Edition.
2. Elmasri Navrate *Fundamentals of Database Systems* , Pearson Education.
3. C.J.Date *Introduction to Database Systems,* Pearson Education.

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Open Elective - I

FUZZY MATHEMATICS

III Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To know the fundamentals of fuzzy algebra.
- To know the basic definitions of fuzzy theory.
- To know the applications of fuzzy Technology.

Learning Outcomes:

Students will be able to

- understand the fundamentals of fuzzy algebra.
- apply fuzzy logic.

UNIT – I:

Introduction – Fuzzy subsets – Lattices and Boolean Algebras – L fuzzy sets.

UNIT – II:

Operations on fuzzy - α levels sets – properties of fuzzy subsets of a set. Sections 1.1-1.10.

UNIT – III:

Algebraic product and sum of two fuzzy subsets – properties satisfied by addition and product – Cartesian product of fuzzy subsets. Sections 1.11 -1.13.

UNIT – IV:

Introduction – Algebra of fuzzy relations – logic – connectives. Sections 2.1-2.4.

UNIT – V:

Some more connectives – introduction – fuzzy subgroup – homomorphic image and Pre-image of subgroupoid. Sections 2.5,3.1-3.3.

UNIT – VI:

Fuzzy invariant subgroups - fuzzy subrings. Section 3.4 and 3.5.

Text Books:

1. Recommended Text S.Nanda and N.R.Das "Fuzzy Mathematical concepts, Narosa Publishing House, New Delhi.

Reference Books:

1. Fuzzy Logic with Engineering Applications, Second Edition, Wiley Publications, Timothy J.Ross.
2. Fuzzy Set Theory and Its Applications, Fourth Edition,Yes Dee Publishing Pvt. Ltd., Springer, H.-J. Zimmermann.

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CONCRETE TECHNOLOGY LAB

III Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To develop the skill of testing the building materials like cement & aggregates.
- To study the properties of fresh concrete.
- To study the strength properties of hardened Concrete.
- To understand the concepts of non-destructive testing.

Learning Outcomes:

Students will be able to

- conduct tests on cement and aggregates.
- evaluate the workability of fresh concrete by conducting different tests.
- evaluate the compressive and tensile strengths of the hardened concrete by different testing procedures.
- use NDT methods to evaluate strength of concrete.

List of Experiments:

1) Normal Consistency and Fineness of Cement.
2) Initial and Final Setting Times of Cement.
3) Specific Gravity and Soundness of Cement.
4) Compressive Strength of Cement.
5) Specific Gravity and Bulking of Sand
6) Fineness Modulus of Fine Aggregate and Coarse Aggregate.
7) Workability test on concrete by compaction factor, slump and Vee-bee.
8) Compressive strength & Split tensile strength of concrete
9) Flakiness index of Coarse aggregate.
10) Elongation index of Coarse aggregate.
11) Specific Gravity of Coarse aggregate.
12) Non-Destructive testing on concrete.

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GEOTECHNICAL ENGINEERING LAB

III Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To conduct the tests for determining the dry density of soils.
- To familiarize with different tests procedures for obtaining shear strength of soils.
- To appraise the soil properties by compaction and consolidation process.
- To familiarize with the tests for finding out the permeability of soils.

Learning Outcomes:

Students will be able to

- conduct index tests and classify the soils.
- determine in-situ density and compaction control of soils.
- determine the compaction and consolidation parameters of soils.
- determine the engineering properties of the soils.

List of Experiments:

1) Determination of Liquid Limit and Plastic Limit of the Soil.
2) Field Density- Core Cutter and Sand Replacement Method.
3) Standard Proctor Compaction Test (I. S. Light Compaction).
4) Determination of Free Swell Index (FSI).
5) Laboratory California Bearing Ratio (CBR) Test.
6) Grain Size Analysis.
7) Determination of Undrained Shear Strength of Soil By Unconfined Compression (UCC) Test.
8) Determination of Shear Strength Parameters of a Soil Specimen by Tri-axial Compression Test.
9) Determination of Shear Strength Parameters of the Soil By Direct Shear Test (Box Shear Test).
10) Determination of Undrained Shear Strength of Soil By Laboratory Vane Shear Test.
11) Determination of Density Index (Relative Density) of Cohesionless Soils.
12) Determination of Coefficient of Permeability of the Soil By Variable (Falling) Head method.

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FLUID MECHANICS & HYDRAULIC MACHINES LAB

III Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To verify the principles of channel flow in laboratory by conducting experiments.
- To understand the principles of various types of hydraulic machines by conducting laboratory experiments.
- To draw performance curves for various hydraulic machines.

Learning Outcomes:

Students will be able to

- calculate the discharge in pipes.
- measure the discharge through open channel flow.
- conduct load test on various hydraulic machines.
- determine the energy loss in conduit.

List of Experiments:

1. Determination of Coefficient of discharge of Venturimeter.
2. Determination of Coefficient of discharge of Orifice meter.
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by falling head method.
5. Determination of Coefficient of discharge of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Verification of Bernoulli's equation.
8. Impact of jet on vanes.
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.

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ENVIRONMENTAL ENGINEERING

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the principles and methods of water treatment.
- To impart knowledge on various disposal methods of sewage.
- To learn the treatment and disposal methods of solid waste and hazardous waste.

Learning Outcomes:

Students will be able to

- design water treatment system.
- design sewage treatment system.
- apply various disposal methods of sewage.
- manage the solid waste & hazardous waste disposal.

UNIT - I: Introduction

Waterborne diseases – protected water supply. Population forecast- design period – water demand –factors affecting – fluctuations – fire demand. Storage capacity – water quality and testing – drinking water standards as per IS 10500

UNIT - II: Sources of Water and Water Treatment Sedimentation

Intakes – infiltration galleries, Distribution systems – Requirements – methods and layouts - Hardy Cross and equivalent pipe methods – Capacity by Mass Curve Method. Types of Joints and valves, water meters – Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation-flocculation

UNIT - III: Filtration and Disinfection

Filtration – theory – working of slow and rapid gravity filters –design of filters-multimedia filters – Pressure filters – troubles in operation of filters - comparison of gravity and pressure filters– disinfection practices – theory of chlorination, chlorine demand, other disinfection practices - Miscellaneous treatment methods ,Reverse Osmosis, Ozonation, ultrafiltration.

UNIT - IV: Sewage Handling and Treatment of Sewage and Sludge

Characteristics of sewage –examination of sewage– C.O.D, B.O.D equations– ultimate disposal of sewage - one pipe and two pipe systems of plumbing, house drainage – Components - Requirements – sanitary fittings-traps, Sewer

appurtenances –-Oxygen Sag Curve. Introduction to aerobic and anaerobic ponds, oxidation ponds, sludge digestion tanks, and soak pits. Working principles and design of septic tank.

UNIT - V: Waste Water Treatment

Layout and general outline of various units in a waste water treatment plant – primary treatment - Design of screens – grit chambers – skimming tanks – sedimentation tanks – introduction to biological treatment – Trickling filters – standard and high rate, Activated sludge process.

UNIT - VI: Solid Waste Management

Sources-types-composition-properties of solid waste- collection and handling-separation and processing-land filling-incineration-composting, 5R concept (refuse, reduce, reuse, recover, recycle).

Hazardous waste management:

Definition and types- disposal and control methods of bio-medical waste-chemical, nuclear and e-wastes.

Text Books:

1. Water Supply and Sanitary Engineering by G.S.Birdi, Dhanpat Rai & Sons Publishers
2. Water Supply Engineering Vol I, Waste Water Engineering Vol II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt Ltd.
3. Environment Engineering by Peavy, Rowe & Tchobanoglous.

Reference Books:

1. Elements of environmental engineering by K.N.Duggal ,S.Chand publishers.
2. Environmental science and engineering by J.G.Henry and G.W.Heinke-Pearson education;
3. Waste water Engineering by Metcalf and Eddy.
4. Environmental Science and and Engineering by Dr.H.S.Bharia- Galgotia Publications (P) Ltd., Delhi.

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TRANSPORTATION ENGINEERING

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To explain factors affecting road network alignment.
- To familiarize with highway cross section elements.
- To describe At-Grade Intersections.
- To explain gradients, cant and negative super elevation.
- To understand wind rose diagram.

Learning Outcomes:

Students will be able to

- classify and plan the highways.
- develop geometric design of transport systems.
- design highway intersections.
- collect the traffic data and design the traffic signaling system.

UNIT - I: Highway Development and Planning

Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys.

UNIT - II: Highway Geometric Design

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment-Design of Superelevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT - III: Traffic Engineering

Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies-Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics. Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Design of Traffic Signals –Webster Method –IRC Method.

UNIT - IV: Intersection Design

Types of Intersections – Conflicts at Intersections- Types of At-Grade Intersections-Channelisation: Objectives –Traffic Islands and Design criteria-Types of Grade

Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT - V: Railway Engineering

Permanent way components – Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density. Gradients- Grade Compensation- Cant and Negative Superelevation- Cant Deficiency.

UNIT - VI: Airport Engineering:

Factors affecting Selection of site for Airport – Aircraft Characteristics- Geometric Design of Runway- Computation of Runway length – Correction for runway length – Orientation of Runway – Wind Rose Diagram

Text Books:

1. Highway Engineering – S.K.Khanna &C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Railway Engineering – A text book of Transportation Engineering – S.P.chadula – S.Chand& Co. Ltd. – (2001).
3. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.
4. Airport Planning and Design- S.K.Khanna and Arora,Nemchand Bros.

Reference Books:

1. Highway Engineering – S.P.Bindra , DhanpatRai& Sons. – 4th Edition (1981)
2. Traffic Engineering & Transportation Planning – Dr.L.R.Kadyali, Khanna publications – 6th Edition – 1997.
3. Railway Engineering – August – Prabha& Co., 15th Edition – 1994.
4. Air Transportation Planning & design – Virendhra Kumar &StatishChandhra – Gal Gotia Publishers (1999).

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DESIGN & DRAWING OF STEEL STRUCTURE

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To familiarize with the types of rolled steel sections, plastic analysis and IS code provisions.
- To understand the principles for design of tension members and compression members using I.S. code.
- To study the use of I.S code for designing laterally supported and unsupported beams.
- To know about various elements of a welded plate girder and understand the procedure of designing the elements using I.S code.
- To classify the types of roof trusses and to understand the design of tension and compression members of a truss.

Learning Outcomes:

Students will be able to

- calculate the strength of welded joint for eccentric loads.
- design the members subjected to direct tension and compression using I.S code.
- apply the design principles of lacing / batten columns.
- identify various elements of welded plate girder and design the elements and curtailment of plate girder.
- use the I.S code for design of simple truss elements.

UNIT - I: Connections

Structural steel – Rolled steel sections – Convention for member axes – Types of loads – Concept of Plastic Analysis – Idealized stress – strain curve, Full plasticity of beam section under bending – Plastic hinges, shape factors of rectangle, circle, triangle, T, channel and I sections – load factor – classification of cross – sections as per IS code - limit states of strength and serviceability.

Riveted, bolted and pin connections – Strength of rivet / bolt welded connections – Introduction – Advantages and disadvantages of welding - Strength of welds – Butt and fillet welds; permissible stresses – IS code requirements Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT - II: Tension and compression Members

General Design principles of members subjected to direct tension - Design of tension members – Effective length of columns – Slenderness ratio – Permissible stresses – Design of compression members, struts & etc.

UNIT - III: Design of Coloumn Foundations

Built-up compression members – Design of lacing and battens – Design principles of eccentrically loaded columns – Splicing of columns. Design of column foundations – Design of slab base and gusseted base – Column bases subjected to moment.

UNIT - IV: Beams

Design principles of simple and compound beams – Allowable stresses – Design requirements as per IS code – Design of laterally supported and unsupported beams – Cheek for shear, buckling, bearing and deflection – Design of lintel beams and purlins in roof trusses.

UNIT - V: Design of Plate Girder

Design of welded plated girders – Design considerations – I.S.code recommendations – curtailment of flange plates, stiffeners – Splicing and connections

UNIT - VI: Roof Trusses

Different Types of roof trusses – Design loads – Load combinations – I.S. Code recommendations – Structural Details – Design of simple roof trusses involving design of purlins, members and joints – Tubular trusses.

Note:

1. Use of IS – 800 (2007), I.S-860 - Part III and Steel tables are allowed in the examination Hall.
2. Welding connection should be used in Units II to VI.
3. Students should prepare five plates, one from each of II to VI units.

Final examination pattern:

The end examination paper should consist of part A and part B. Part A consists of two questions in Design and Drawing, out of which one question is to be answered. Part B consists of five questions out of which three are to be answered. Weightage for part A is 40% and for Part B 60%.

Text Books:

1. "Limit state Design of Steel Structures" by S.K.Duggal, Tata Mc.Graw Hill Education Pvt. Limited.
2. "Steel Structures – Design and Practice" by N.Subramanian Oxford University Press.

Reference Books:

1. "Structural Design and Drawing" N.Krishnam Raju University press.
2. Design of Steel Structures by limit state method as per IS – 800 -2007 by S.S.Bhavikatti, I.K. International publishing house Pvt. Ltd.
3. "Design of Steel Structures" by P.Dayaratnam, S.Chand Publishers.
4. "Structural Design in Steel" by Sarwar Alam Raz, New age International Publishers.

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Elective - I

PRESTRESSED CONCRETE

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the concepts of prestressing.
- To impart knowledge on determining losses of prestress.
- To learn the analysis and design of prestressed concrete members under flexure and shear.

Learning Outcomes:

Students will be able to

- apply the principles of prestressing in practice.
- design the members for flexure and shear.
- calculate the losses of prestressing.
- analyze and design the end blocks.
- explain the deflection criteria of prestressed concrete beams.

UNIT - I: Introduction

Historic development – General principles of prestressing, pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

UNIT - II: I.S. Code Provisions

I.S. Code provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT - III: Losses of Prestress

Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage bending of member and frictional losses.

Analysis of sections for flexure:

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

UNIT - IV: Design of Section for Flexure and Shear

Design of Section for Flexure and Shear:Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure, shear, and principal stresses – design for shear in beams – Kern – lines, cable profile.

UNIT - V: End Blocks

Analysis of End Blocks by Guyon's method and Mugnel method, Anchorage zone stresses - Approximate method of design –Anchorage zone reinforcement - Transfer of prestress pre-tensioned members.

UNIT - VI: Deflections of Prestressed Concrete Beams

Importance of control of deflections –factors influencing deflections–short term deflections of uncracked members prediction of long term deflections, Deflection of Cracked members.

Text Books:

1. Prestressed Concrete by N Krishna Raju; - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.

Reference Books:

1. Advanced reinforced concreteDesign – P.C.Varghese, Printice Hall of India, New Delhi.
2. Reinforced Concrete design –AK Jain Nem Chand &Bros, Roorkee.
3. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.

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Elective - I

STRUCTURAL DYNAMICS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the concept of vibratory system, principles and objectives of dynamics.
- To know the different degree of freedom systems and to formulate equations of motion for different dynamic loads.
- To familiarize on obtaining natural frequencies and mode shapes of MDOF systems.
- To appreciate the methods of earthquake analysis using IS-1893(2002) code.

Learning Outcomes:

Students will be able to

- develop differential equation of motion for an undamped single degree freedom system.
- understand different types of damping and the concept of logarithmic decrement.
- formulate stiffness and mass matrices for carrying out free vibration analysis.
- develop differential equation of motion for a beam element with different end conditions.
- obtain response against earthquake motion applying mode super position method.

UNIT - I: Theory of Vibrations

Introduction – Elements of vibratory system- Degrees of freedom- Lumped mass idealisation-Oscillatory Motion- Simple Harmonic Motion- Free vibrations of single degree of freedom system-Undamped and Damped vibrations- Critical damping – Logarithemic decrement- forced vibrations of SDOF System- harmonic excitation- Dynamic magnification factor- Phase angle

UNIT - II: Introduction to Structural Dynamics

Fundamental objectives of dynamic analysis- Types of prescribed loading- Methods of discretization- Formulation of equations of motion by different methods- Direct equilibrium using Newton's law of motion, D'Alembert's principle, Principle of virtual work and Hamilton principle.

UNIT - III Single Degree of Freedom System

Formulation and solution of the equation of motion- Free vibration response-Response to harmonic, impulsive and general dynamic loadings-Duhamel Integral

UNIT - IV: Multi Degree of Freedom Systems

Selection of degrees of freedom-Evaluation of structural property matrices-Formulation of the MDOF equations of motion- Undamped free vibrations- solutions of Eigen value problems for natural frequencies and mode shapes- Analysis of dynamic response- Normal Coordinates- Uncoupled equations of motion-Orthogonal properties of normal modes- Mode superposition method- numerical examples up to second degree.

UNIT - V: Practical Vibration Analysis

Continous Systems:

Introduction- Flexural vibration of beams-Elementary Case-Derivation of governing Differential equation of Motion- Analysis of undamped free vibrations of beams in flexure- Natural frequencies and mode shapes of simple beams with different end conditions – Principles of application to continuous beams.

UNIT - VI: Introduction to Earthquake Analysis

Introduction- Excitation by rigid base translation- Lumped mass approach- SDOF and MDOF systems- Dynamic analysis :different types –Seismic coefficient method as per IS 1893:2002-Lateral design loads at different floor levels.

Text Books:

1. Structural Dynamics by Mario Paz, C.B.S Publishers, New Delhi.
2. Basics of Structural Dynamics and A seismic Design by S.R. Damodara Swamy & Kavitha.
3. I.S: 1893 – 2000 " Code of practice for Earth Quake resistant Design of Structures"

Reference Books:

1. Earthquake resistance design by Pankaj Agarwal.PHI publications
2. Dynamics Of Structures by Clough & Penzien, McGraw Hill, New York.
3. Dynamics of structures by Anil K Chopra, Pearson Education(Singapore), Delhi.

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Elective - I

PROJECT MANAGEMENT

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To define the importance of project management and causes of failure in construction projects.
- To identify PM network objectives and techniques and basics of network analysis.
- To understand planning and execution of project in stipulated time.
- To learn the importance of TQM (total quality management) on projects with ISO standards.
- To impart knowledge on the benefits of H&S and safety budgeting for fire hazards in projects.

Learning Outcomes:

Students will be able to

- apply the principles of project management in construction industry.
- adopt the applications of CPM & PERT techniques in planning civil engineering projects.
- implement management and leadership skills in project management.
- appraise continuous improvement techniques in time, cost control and crash cost.

UNIT - I:

Projects; Project management; causes of project failure. Planning, Scheduling and controlling, Steps involved in planning; Objectives; Principles; Advantages; Limitations; Stages of planning; Scheduling, Preparation of construction schedules; Methods of scheduling; Bar charts; Mile stone charts; Controlling; Job layout; Factors affecting job layout; Project work break down structure; Activities involved and its duration.

UNIT - II:

Project Management through Networks Objectives of network techniques; Fundamentals of network analysis; Events; Activities; Dummies; Types of networks; Choice of network type; Advantages of network techniques over conventional techniques.

PERT & CPM

Time estimates-earliest expected time, Latest allowable occurrence time, Slack. Critical path- Probability of completion time for a project, difference between

CPM and PERT. Earliest event time, Latest event time, Activity time, Float, Critical activities and critical path.

Cost Control- Direct cost, indirect cost, Total project cost, Optimization of cost through networks, Steps involved in optimization of cost.

UNIT - III:

Role of Management and Leadership in Project environment – Individual Skills and Attributes – Individual Motivation – Structural and Cultural Implications for Project managers – Management Style– Development of Management Thinking.

UNIT - IV:

Project Review – Project Completion & Handover – Long term Project audit and review – Continuous improvement technique – Bench Marking of Performance and Process – The role of Project Leaders in the World Class Projects.

UNIT - V:

Quality Control- Importance of quality; Elements of quality; Organization for quality control; Quality assurance technique; Documentation; Quality control circles; (TQM) Total quality management; ISO – 9000s.

UNIT - VI:

(H&S) Health &Safety Management. Accident prevention programme; Immediate attention in case of accident; Approaches for safety improvements in construction; Safety benefits to employers, employees and customers; Prevention of fires in construction industries; Fault free analysis; Safety information system; Safety budgeting.

Text Books:

1. Harvey Maylor, Mac Millan India Ltd., Delhi
2. Construction Engineering and Management by Dr. S. Seetharaman; Umesh Publications, NaiSarark, Delhi.
3. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee; Khanna Publishers, Nai Sarak; Delhi.

Reference Books:

1. Punmia: Laxmi Publications
2. Construction Management & Planning by B. Sengupta& H. Guha; Tata McGraw – Hill Publishing Co. Ltd., New Delhi.
3. Construction Planning, Equipment & Methods by Peurifoy R. L.; McGraw - Hill International Book Company.
4. PERT & CPM Principles and applications by L. S. Srinath; Affiliated East West Press.

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Elective - I

GROUND IMPROVEMENT TECHNIQUES

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the need of ground improvement techniques.
- To familiarize various dewatering methods.
- To know the methods of various stabilization processes.

Learning Outcomes:

Students will be able to

- identify the problems relating to different ground conditions.
- select suitable ground improvement technique according to ground condition.
- apply the concepts of soil confinement systems.

UNIT - I: Introduction

Need and objectives of Ground Improvement, Classification of Ground Modification Techniques – suitability and feasibility

UNIT - II: Mechanical Modification

Principles of Mechanical Modifications - Methods of compaction, Shallow compaction, Deep compaction techniques – Vibro-floatation, Blasting, Dynamic consolidation, precompression and compaction piles.

UNIT - III: Hydraulic Modification

Methods of dewatering – open sumps and ditches, Well-point system, Electro-osmosis, Vacuum dewatering wells; pre-loading with sand drains - strip drains, Design of vertical drains.

UNIT - IV: Physical and Chemical Modification

Stabilization with admixtures like cement, lime, calcium chloride, fly ash and bitumen. Grouting – materials and methods.

UNIT - V: Reinforced Earth Technology

Concept of soil reinforcement, Reinforcing materials, Backfill criteria, Design of reinforcement for internal stability, Applications of Reinforced earth structures.

UNIT - VI: Ground Anchors and Soil nailing

Types of ground anchors and their suitability, Uplift capacity of anchors; Soil nailing and Applications.

Soil Confinement Systems: Concept of confinement, Gabion walls, Crib walls, Sand bags, Evergreen systems and fabric form work.

Text Books:

1. Hausmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi

Reference Books:

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons, New York, USA.
3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy, USA
4. Basic and Applied soil Mechanics by GopalRanjan and A.S.R.Rao, New Age International Publications.

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Open Elective - II

DISASTER MANAGEMENT

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about disaster occurrence, strategies and remedial measures.

Learning Outcomes:

Students will be able to

- explain the aspects of disaster management and adopt remedial measures.
- access the impact of hazards on structures.
- explain the vulnerability conditions.
- adopt the rehabilitation procedures.

UNIT – I: Introduction

Concept of Disaster Management. Types of Disasters. Disaster mitigating agencies and their organizational structure at different levels.

UNIT – II: Overview of Disaster Situations in India

Vulnerability of profile of India and Vulnerability mapping including disaster – pone areas, communities, places. Disaster preparedness – ways and means; skills and strategies; rescue, relief reconstruction. Case Studies: Lessons and Experiences from Various Important Disasters in India

UNIT – III: Flood and Drought Disaster

Raising flood damage, assessing flood risk, flood hazard assessment, flood impact assessment, flood risk reduction options. Drought and development, relief management and prevention, drought mitigation and management- integrating technology and people.

UNIT – IV: Landslide and Earthquake Disaster

Land slide hazards zonation mapping and geo environmental problems associated with the occurrence of landslides. The use of electrical resistivity method in the study of landslide. Studies in rock mass classification and land slide management in a part of Garwal-Himalaya, India. Causes and effects of earth quakes. Secondary effects. Criteria for earthquake resistant design.

UNIT – V: Cyclone and Fire Disaster

Cyclone occurrence and hazards. Cyclone resistant house for coastal areas. Disaster resistant construction role of insurance sector. Types of fire. Fire safety and fire fighting method, fire detectors , fire extinguishers.

UNIT – VI: Rehabilitation

Rehabilitation programmes, Management of Relief Camp, information systems & decision making tools

Text Books:

1. Disaster Management, RB Singh (Ed), Rawat Publications, 2000.
2. Disaster Management Future Challenges and Opportunities, jagbir singh, I.K international publishing house

Reference Books:

1. Natural Hazards in the Urban habitat by Iyengar, CBRI, Tata McGraw Hill
2. Natural Disaster management, Jon Ingleton (Ed), Tulor Rose, 1999
3. Anthropology of Disaster management, Sachindra Narayan, Gyan Publishing house, 2000.

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Open Elective - II

SOLID WASTE MANAGEMENT
(Other than CE)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn about Solid Waste management
- To describe the collection, treatment and disposal methods of Solid waste

Learning Outcomes:

Students will be able to

- identify the types and sources of solid waste, and its characteristics.
- employ the treatment and disposal methods of solid waste.
- apply the concepts of solid waste management.

UNIT – I: Introduction

Definition of solid waste, garbage, rubbish-Sources and Types of solid wastes-Municipal waste, industrial waste, plastic waste, electronic waste, bio-medical waste and hazardous waste - Characteristics of Solid Wastes: Physical, chemical and biological characteristics- Problems due to improper disposal of solid waste.

UNIT – II: Functional Elements of Solid Waste Management

Waste generation and handling at source-onsite storage-Collection of solid wastes-Collection methods and services-storage of solid waste- guidelines for collection route layout.

UNIT – III: Transfer and Transport of Wastes

Transfer station-types of vehicles used for transportation of solid waste-Processing and segregation of the solid waste- various methods of material segregation.

UNIT – IV: Processing and Transformation of Solid Wastes

Recycling and recovery principles of waste management- Composting: definition-methods of composting-advantages of composting- Incineration: definition-methods of incineration advantages and disadvantages of incineration.

UNIT – V: Treatment and Disposal of Solid Waste

Volume reduction, Open dumping, land filling techniques, Landfills: classification-Design and Operation of landfills, Land Farming, Deep well injection.

UNIT – VI: Waste Minimization

Introduction to waste minimization, waste minimization techniques-5R (refuse, reduce, reuse, recover, recycle), municipal waste minimization, industrial waste minimization.

Text Books:

1. Solid and hazardous waste management by M.N.Rao and Razia sultana, BS publications
2. Environmental Engineering by Howard S.Peavy, Donald R.Rowe and George Tchobanognous

Refence Books:

1. Integrated Solid Waste Management by Tchobanognous.
2. Environmental engineering by Y.Anjaneyulu, B.S publication.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill

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Open Elective - II

ENERGY AUDIT, CONSERVATION AND MANAGEMENT

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic concepts of Energy Auditing and Management.
- To familiarize the various Techniques of Electrical Energy Conservation.

Learning Outcomes:

Students will be able to

- understand the Process of Energy Audit of Industries.
- apply the concepts of Energy management for Efficient Energy Utilization and Conservation.
- identify a suitable method for Energy Conservation of various electric devices.
- analyze the benefits of energy conservation from the Economic aspects.

UNIT - I: Basic Principles of Energy Audit

Energy audit- definitions, concept , types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit.

UNIT - II: Energy Management

Principles of energy management, organizing energy management program, initiating, planning,controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions, language, Questionnaire – check list for top management.

UNIT - III: Energy Efficient Motors

Energy efficient motors , factors affecting efficiency, loss distribution , constructional details, characteristics - variable speed , variable duty cycle systems, RMS hp-voltage variation-voltage unbalance- over motoring- motor energy audit.

UNIT - IV: Power Factor Improvement

Power factor – methods of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on power factor, power factor motor controllers

UNIT - V: Lighting and Energy Instruments

Good lighting system design andpractice, lighting control ,lighting energy audit – Energy. Instruments- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers, application of PLC's.

UNIT - VI: Economic Aspects and Analysis

Economics Analysis-Depreciation Methods, time value of money, rate of return , present worth method , replacement analysis, life cycle costing analysis- Energy efficient motors- calculation of simple payback method, net present worth method- Power factor correction, lighting - Applications of life cycle costing analysis, return on investment .

Text Books:

1. Energy management by W.R. Murphy AND G. Mckay Butter worth, Heinemann publications.
2. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998

Reference Books:

1. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition,1995.
2. Energy management hand book by W.C.Turner, John wiley and sons.
3. Energy management and good lighting practice: fuel efficiency- booklet12-EEO

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Open Elective - II

MATERIAL SCIENCE
(Other than ME)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Familiarise with the crystallography of materials and their properties i.e. Mechanical, Electrical and Optical and their field of applications.

Learning Outcomes:

Students will be able to

- understand of contemporary issues relevant to Crystal Structures.
- identify the defects in crystals and understand the mechanisms of plastic deformation.
- draw Equilibrium/phase diagrams.
- understand Mechanical, Electrical, Optical properties of Materials.

UNIT - I: Crystal Structure

Introduction, Space lattice, Unit cell, Lattice parameters, Bravis lattices, Structure and packing fractions of simple cubic, Body centred cubic, Face centred cubic crystals. Directions and planes in crystals, miller indices, Diffraction of X-rays by crystal planes, Bragg's law.

UNIT - II: Plastic Deformation

Plastic deformation of single crystals. Deformation by slip, CRSS for slip, Deformation of single crystal. Deformation by twinning, Stacking faults, hot working, and cold working. Recovery, recrystallization and grain growth. Grain size, Halt-Petch equation. Dislocations, types, Burgers' Vector, Dislocation movement by climb and cross slip.

UNIT - III: Equilibrium Diagrams and Phase Transformation

Solid solutions, Hume-Rothery's rules, Intermediate compounds, Phase diagrams, Gibb's phase rule, Equilibrium diagram of a binary system. Applications of phase transformations, Iron –carbon equilibrium diagram.

UNIT - IV: Mechanical properties

Tensile stress-strain diagrams, proof stress, yield stress diagrams, modules of elasticity. Hardness Testing: -Rockwell, Brinell and Vickers. Impact , toughness, Charpy V-Notch, fracture, ductile, brittle, Griffith criteria for brittle failure, creep, creep mechanisms, fatigue-mechanism-factors to improve fatigue resistance.

UNIT - V: Electrical Properties of Materials

Electronic conductivity, free electron theory, Super conductivity, Magnetic properties, Dia, para, ferro, ferri magnetism. Soft and hard magnetic materials.

UNIT - VI: Optical Properties

Optical properties of materials. Reflection, Refraction, Absorption and transmission of electromagnetic radiation in solids Polymerization, classification of polymers. Uses of polymers.

Text Books:

1. Materials Science and Engineering by V.Raghavan, Prentice Hall of India, Fifth edition.
2. Mechanical Metallurgy – GE Dieter., Mechanical metallurgy, 1988, edition, McGraw-Hill.
3. Material science and Engineering an introduction William D. callister, David G. Rethwisch.

References Books:

1. Essentials of Material Science by A.G.Guy, McGraw-Hill(1976).
2. Material Science for Engineers – Schakleford.

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Open Elective - II

AUTOMOTIVE ELECTRONICS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the electronic systems inside automotive vehicle.
- To know the advanced safety systems

Learning Outcomes

Students will be able to

- broad understanding of automotive technology
- knowledge in operating principles and performance of various subsystems of automotive systems.
- understand the operation of microcomputer systems.
- acquire knowledge in automotive sensors and control systems.
- develop communications & navigation/routing in automotive telematics

UNIT - I: Automotive Fundamentals

Use of electronics in the automobile, evolution of automotive electronics, the automobile physical configuration, evolution of electronics in the automobile, survey of major automotive systems, engine control or electronic control unit, ignition system

UNIT - II: Electronics Fundamentals

Semiconductor devices- diodes, rectifier circuit, transistors, field effect transistors; transistor amplifiers, use of feedback in op amps, summing mode amplifier, analog computers, digital circuits- binary number system, combinational- Basic logic gates, multiplexer (IC 74151), 3 to8 decoder (IC74138) , sequential- flip flops, decade counters(IC 7490).

UNIT - III: Automotive Micro-Computer System

Microcomputer fundamentals-digital versus analog computers, basic computer block diagram, microcomputer operations, CPU registers, accumulator registers, condition code register-branching; microprocessor architecture, memory-ROM, RAM; I/O parallel interface, digital to analog converter and analog to digital converters with block diagram, microcomputer application in automotive systems.

UNIT - IV: Basics of Electronics Engine Control

Motivation for electronic engine control, exhaust emissions, fuel economy, concept of an electronic engine control system, engine functions and control, electronic fuel control configuration, electronic ignition with sensors.

UNIT - V: Sensors and Actuators

Introduction; Basic sensor arrangement; Types of Sensors such as oxygen sensors, Crank angle position sensors, fuel Metering/vehicle speed sensors and detonation sensors, altitude sensors, flow Sensors, throttle position sensors, solenoids, stepper motors, relays. Actuators – Fuel Metering Actuator, Fuel Injector, Ignition Actuator

UNIT - VI: Future Automotive Electronic Systems

Telematics, Safety: Collision Avoidance Radar warning System with block diagram, speech synthesis, sensor multiplexing, control signal multiplexing with block diagram, fiber optics inside the car, automotive internal navigation system, GPS navigation system, voice recognition cell phone dialling, advanced cruise control system.

Text Books:

1. William B. Ribbens, "Understanding Automotive Electronics", 6th Edition, SAMS/Elsevier Publishing (UNIT I to VI).
2. Robert Bosch Gambh, "Automotive Electrics Automotive Electronics Systems and Components", 5th edition, John Wiley& Sons Ltd., 2007.

Reference Books:

1. Ronald K Jurgen, "Automotive Electronics Handbook", 2nd Edition, McGraw-Hill,1999.
2. G. Meyer, J. Valldorf and W. Gessner, "Advanced Microsystems for Automotive Applications", Springer, 2009.
3. Robert Bosch, "Automotive Hand Book" SAE, 5th Edition, 2000.

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Open Elective - II

INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS
(Other than EEE, ECE, CSE & IT)

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives

- To familiarize the students with architecture of 8086 microprocessor and 8051 microcontroller.
- To introduce the assembly language programming concepts of 8086 processor.
- To expose the students to various interfacing devices with 8086 using 8255.
- To introduce the concepts of interrupt mechanism and serial communication standards.

Learning Outcomes:

Students will be able to

- understand the architecture and instruction set of 8086 Microprocessor and 8051 micro controller.
- design and develop various interfacing circuits with 8086 using 8255.
- understand the concepts of interrupt mechanism and serial communication.
- develop 8051 based different kinds of applications.

UNIT - I: 8086 Microprocessor

Introduction 8086 Processor, Architecture-Functional diagram, Register Organization, Memory Segmentation, Physical memory organization, signal descriptions of 8086- common function signals, Minimum and Maximum mode signals, Timing diagrams.

UNIT - II: Instruction Set and Assembly Language Programming of 8086

Instruction formats, addressing modes, instruction set, assembler directives, macros, simple programs involving logical, branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

UNIT - III: Basic Peripherals and Their Interfacing

8255 PPI various modes of operation and interfacing to 8086. Interfacing keyboard, display, stepper motor interfacing, D/A and A/D converter, Keyboard/Display Controller-8279,

Memory interfacing to 8086, Interfacing DMA controller 8257 to 8086

UNIT - IV: **Interrupt Structure and Serial Communication**

Interrupt structure of 8086, Vector interrupt table, Interrupt service routine, Interfacing Interrupt Controller 8259, Serial communication standards, Serial data transfer schemes,8251 USART architecture and interfacing, RS- 232, IEEE-4-88, Prototyping and trouble shooting.

UNIT - V: **Introduction to 8051 Microcontroller**

Overview of 8051 microcontroller, Architecture, I/O Ports, Memory organization, addressing modes and instruction set of 8051, Interrupts, timer/ Counter and serial communication.

UNIT - VI: **Interfacing and Applications of 8051**

Interfacing 8051 to LED's, Push button, Relays and latch Connections, Keyboard Interfacing, Interfacing Seven segment display, ADC and DAC Interfacing

Text Books:

1. D. V. Hall' "Microprocessors and Interfacing", TMGH.2'1 edition 2006.(I to IV Units).
2. Muhammad Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontrollers and Embedded Systems", Pearson, 2nd Ed.(IV to VI Units)

Reference Books:

1. Barry B.Brey, "The Intel Microprocessors", PHI, 7th Edition 2006.
2. Liu and GA Gibson, "Micro Computer System 8086/8088 Family Architecture. Programming and Design", PHI, 2nd Ed.,
3. Kenneth. J. Ayala, "The 8051 Microcontroller", 3rd Edition, Cengage Learning, 2010.

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Open Elective - II

CLOUD COMPUTING
(Other than CSE & IT)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:
- To understand Virtualization, Virtual Machine and different models of VM.
- To familiarize Cloud computing architecture and its security aspects.

Learning Outcomes

Students will be able to
- know about basics of cloud computing.
- cloud computing and its services available today.
- distinguish Virtualization and Virtual Machine and its need, Types of Virtualization.
- understand how to provide security for the cloud .
- understand disaster recovery and disaster management.
- design a Cloud for an Enterprise.

UNIT - I: Cloud computing

Introduction, what it is and what it isn't, from collaborations to cloud- a short history of cloud computing, the network is the computer- How cloud computing works, companies in the cloud- Cloud computing today.

UNIT - II: Ready for Computing in the cloud

The pros and cons of Cloud Computing, Developing Cloud Services- Why Develop Web-Based Applications?, The Pros and Cons of Cloud Service Development, Types of Cloud Service Development, Discovering Cloud Services Development services and Tools.

UNIT - III: Virtulization

Virtualization for cloud, Need for Virtualization – Pros and cons of Virtualization – Types of Virtualization –System Vm, Process VM, Virtual Machine monitor – Virtual machine properties - Interpretation and binary translation, HLL VM - Hypervisors – Xen, KVM , VMWare, Virtual Box, Hyper-V.

UNIT - IV: Security

Data Security, Data Control Encrypt Everything, Regulatory and Standards compliances, Network Security, Firewall rules, Network Intrusion detection, Host Security, System Hardening, Antivirus Protection, Host Intrusion detection, Data segmentation, Credential Management.

UNIT - V: Disaster

What is Disaster, Disaster Recovery Planning, The Recovery Point objective, The Recovery Time Objective, Disasters in the Cloud, Backups and data retention, Geographic redundancy, Organizational redundancy, Disaster Management, Monitoring, Load Balancer Recovery, Application server recovery, Database Recovery.

UNIT - VI: Defining Clouds for the Enterprise

Storage-as-a-Service, Database-as-a- Service, Information-as-a-Service, Process-as-a-Service, Application-as-a- Service, Platform-as-a-Service, Integration-as-a-Service, Security-as-a-Service, Management/Governance-as-a-Service, Testing-as-a-Service Infrastructure-as- a-Service.

Text Books:

1. Michael Miller, Cloud Computing – Web Based Applications That change the way you work and Collaborate Online –Person Education.
2. George Reese Cloud Application Architectures, Ist Edition O'Reilly Media.

Reference Books:

1. David S. Linthicum, Cloud Computing and SOA Convergence in your Enterprise : A Step-by-Step Guide- Addison-Wesley Professional.
2. Kai Hwang, Geoffery C.Fox, Jack J, Dongarra, Distributed & Cloud Computing From Parallel Processing to the Internet of Things.

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Open Elective - II

WEB TECHNOLOGIES
(Other than CSE & IT)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:
- To develop real time web applications.
- To get acquainted with skills for creating websites and web apps through learning various technologies like HTML, CSS, JavaScript, XML, Servlets, JSP and JDBC.

Learning Outcomes:
Students will be able to
- develop UI for web applications using markup languages.
- build dynamic web pages using Java Script .
- build web pages using XML.
- design and implement one or more Java servlets; test and debug the servlets; deploy the servlets.
- design and implement one or more Java Server Pages; test and debug the JSPs; deploy the JSPs.
- update and retrieve the data from the databases using JDBC-ODBC.

UNIT - I: HTML & CSS
HTML - Basic HTML Tags, Working with Lists, Tables, Forms, Frames, Images and Image maps.
Cascading Style sheets - CSS rules, Selectors, Types of CSS, CSS Properties for Styling Backgrounds, Text, Fonts, Links, Lists, Tables and Positioning.

UNIT - II: Java Script
Introduction to Java Script, Variables, Data types, Functions, Operators, Control flow statements, Objects in Java Script, Event Handling. DHTML with Java Script

UNIT - III: XML
Basic building blocks, Validating XML Documents using DTD and XML Schemas, XML DOM, XML Parsers- DOM and SAX, XSLT, using CSS with XML.

UNIT - IV: Web Servers and Servlets
Tomcat web server, Introduction to Servlets, Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization parameters, The javax.servlet HTTP package, Using Cookies-Session Tracking.

UNIT - V: JSP

The Problem with Servlet. The Anatomy of a JSP Page, Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Declaring Variables and Methods, Passing Control and Data between Pages, Sharing Session and Application Data.

UNIT - VI: Database Access

JDBC Drivers, Database Programming using JDBC, Studying Javax.sql.* package, accessing a database from a JSP Page and a Servlet page, introduction to struts.

Text Books:

1. Web Technologies, "Black book", Kogent Learning Solutions, Dreamtech press.
2. Chris Bates, "Web Programming: building internet applications", WILEY Dreamtech, 2nd edition.

Reference Books:

1. Uttam K Roy, "Web Technologies", Oxford.
2. John Duckett, "Beginning Web Programming".
3. Wang Thomson, "An Introduction to web design and Programming".
4. Robert W Sebesta, "Programming the World Wide Web", Pearson publications, Fourth edition.

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Open Elective - II

VIRTUAL REALITY

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To Understand key elements of virtual Reality with the components in VR systems.
- To gain knowledge of various input and output devices required for interacting in virtual world along with rendering and modeling.

Learning Outcomes:

Students will be able to

- identify basic elements of virtual Reality with the components in VR systems
- describe various input and output devices required for interacting in virtual world along with rendering and modeling.
- differentiate various types of modeling,
- apply the concepts of Virtual Reality for an application.

UNIT – I: Introduction

The three I's of virtual reality, commercial VR technology and the five classic components of a VR system

UNIT – II: Input Devices

Trackers, Navigation, and Gesture Interfaces- Three-dimensional position trackers, Navigation and manipulation, interfaces and gesture interfaces.

UNIT – III: Output Devices

Graphics displays, sound displays & haptic feedback.

UNIT – IV: Modeling

Geometric modeling, kinematics modeling, physical modeling, behavior modeling, model Management.

UNIT – V: Human Factors

Methodology and terminology, user performance studies, VR health and safety issues.

UNIT – VI: Applications

Medical applications, military applications, robotics applications.

Text Books:

1. Virtual Reality Systems, John Vince, Pearson Education.
2. Virtual Reality Technology, Second Edition, Gregory C. Burdea & Philippe Coiffet, John Wiley & Sons, Inc.,

Reference Books:

1. Understanding Virtual Reality, interface, Application and Design, William R.Sherman, Alan Craig, Elsevier (Morgan Kaufmann).

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Open Elective - II

SCRIPTING LANGUAGES

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge of various scripting languages.
- To familiar with development of web application using scripting languages.

Learning Outcomes:

Students will be able to

- employ JavaScript as a general purpose web-based client-side scripting language.
- utilize both XML and PHP to develop interactive web applications.
- describe and apply files concepts in traditional web applications.
- utilize PERL to solve a wide range of text processing problems.

UNIT – I: Advanced Java Script

Java Script Events, Objects, DHTML, DOM and Forms, Introduction to AJAX

UNIT – II: XML

XML Introduction and Overview, XML Syntax, XML Namespaces, Document Type Definitions (DTDs), XML Schemas, Parsing XML,X Path and XML Transformation

UNIT – III: Python

Syntax and Style – Python Objects – Numbers – Sequences – Strings – Lists and Tuples –Dictionaries – Conditionals and Loops

UNIT – IV: Files

Files – Input and Output – Errors and Exceptions – Functions – Modules – Classes and OOP –Execution Environment.

UNIT – V: Introduction to PERL

Perl backgrounder – Perl overview – Perl parsing rules – Variables and Data – Statements and Control structures – Subroutines

UNIT – VI: Working with PERL

Packages and Modules- Working with Files –Data Manipulation.

Text Books:

1. Web Technologies , Uttam Roy, OXFORD University press.
2. Remy Card, Eric Dumas and Frank Mevel, “The Linux Kernel Book”, Wiley Publications,2003.

Reference Books:

1. Wesley J. Chun, “Core Phython Programming”, Prentice Hall, 2001.
2. Martin C. Brown, “Perl: The Complete Reference”, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.

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Open Elective - II

BIG DATA
(Other than CSE & IT)
III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the fundamental concepts of cloud for laying a strong foundation of Apache Hadoop (Big data framework).
- To gain knowledge of HDFS file system, MapReduce frameworks and relevant tools.

Learning Outcomes:

Students will be able to

- describe the fundamentals of Bigdata and cloud architectures.
- utilize HDFS file structure and MapReduce frameworks to solve complex problems.
- know how to analyze data using UNIX tools and Hadoop.
- understand how to develop environment for analyzing Bigdata.
- understand how to use mapper and reducer functions

UNIT - I: Introduction to Big Data

What is Big Data, Why Big Data is Important, Meet Hadoop- data, Data Storage and Analysis, Comparison with other systems, Grid Computing, a brief history of Hadoop, Apache Hadoop and the Hadoop Eco System.

UNIT - II: MapReduce

Analyzing data with unix tools, Analyzing data with hadoop, Java MapReduce classes (new API), Data flow, combiner functions, Running a distributed MapReduce Job.

UNIT - III: Hadoop Distributed File System

HDFS concepts, Command line interface to HDFS, Hadoop File systems, Interfaces, Java Interface to Hadoop, Anatomy of a file read, and write, Replica placement and Coherency Model

UNIT - IV: Developing a MapReduce Application

Setting up the development environment, Managing configuration, Writing a unit test with MRUnit, Running a job in local job runner, Running on a cluster, Launching a job.

UNIT - V: MapReduce Working-I

Classic MapReduce, Job submission, Job Initialization, Task Assignment, Task execution, Progress and status updates

UNIT - VI: MapReduce Working-II

Job Completion, Shuffle and sort on Map and reducer side, Configuration tuning, MapReduce Types, Input formats, Output formats .

Text Books:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition, O'Reilly Publications, 2012.
1. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

Reference Book:

1. Frank J.Ohlhorst, "Big Data Analytics: Turning Big Data Into Big Money",2nd Edition, TMH,2012.

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Open Elective - II

MULTI-VARIATE ANALYSIS AND SPECIAL FUNCTIONS

III Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the multivariate analysis concepts.
- To know special functions.

Learning Outcomes:

Students will be able to

- to analyze the multivariate data using dependence techniques.
- to apply interdependence techniques.

UNIT – I: Introduction

Nature of multivariate analysis – classifying multivariate techniques - Analysis of dependence.

UNIT – II: Analysis

Analysis of inter dependence - influence of measurement scales.

UNIT – III: Analysis of Dependence

Multiple regression analysis – Discriminant analysis – Multivariate Analysis of variance (MANOVA)

UNIT – IV: Analysis of inter Dependence

Factor Analysis – Cluster analysis – Multidimensional scaling.

UNIT – V: Legendre Functions

Legendre Polynomials. Properties, Rodrigue's formula, Recurrence Relations and orthoganality.

UNIT – VI: Bessel Functions

Solution of Bessel's equation, Properties, Recurrence Relations, orthoganality.

Text Books:

1. Richard Arnold Johnson, Dean W. Wichern, Applied Multivariate Statistical Analysis, Pearson Prentice Hall, 2007.
2. William G.Zikmund, Business Research Methods 7th Edition, Cengage Learning.
3. Tabachnick B., Fidell, L using multivariate statistics, 5th Edition, Pearson Education, Inc 2007.
4. J.N.Sharma, R.K.Gupta, Special Functions, Krishna Prakashan Media (p) Ltd., Meerut.

Reference Books:

1. Yang, K, Trewn, J. Multivariate Statistical Methods in Quality Management Mc Graw-Hill.
2. Larry C. Andrew, Special Functions of Mathematics for Engineers, SPIE Press, 1992.

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ENVIRONMENTAL ENGINEERING LAB

III Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To identify the suitability of water for drinking considering physical and chemical parameters.
- To learn the properties of sewage.
- To identify the suitability of water for aquatic life.

Learning Outcomes:

Students will be able to

- test the quality of water as per IS standards.
- assess the quality of sewage.
- determine the optimum coagulant dosage.

List of Experiments:

1. Determination of pH and Conductivity of water
2. Determination of Turbidity and Total dissolved solids
3. Determination of Alkalinity / Acidity
4. Determination of Chlorides in water
5. Determination and Estimation of total solids, organic solids and inorganic solids
6. Determination of iron
7. Determination of Dissolved Oxygen with D.O. Meter
8. Determination of Nitrogen
9. Determination of Total Phosphorous
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum Coagulant Dose
13. Determination of Chlorine Demand
14. Physical Parameters – Colour, Odour, Taste
15. Determination of Total hardness

NOTE: At least 12 of the above experiments are to be conducted

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COMPUTER AIDED DRAWING (CAD) PRACTICE LAB

III Year – II Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To learn CAD software.
- To draw various building components using CAD software.

Learning Outcomes:

Students will be able to

- understand the concept of CAD software.
- draw various building components using CAD software.
- visualize various aspects in 3D views of buildings by using software.
- draw plan, section and elevation of residential buildings and commercial buildings.

List of Experiments:

1. Familiarize with basic commands of CAD software.
2. Drawing conventional signs of building materials.
3. Drawing Building components like doors, windows etc.
4. Drawing Plan, Section and Elevation for a single storied Buildings.
5. Drawing Plan, Section and Elevation for a two storied Buildings.
6. Drawing different layout diagrams using CAD software.
7. Drawing diagrams by using different layers in CAD software.
8. Drawing plan of a single storied Residential Buildings.
9. Drawing plans of a Commercial buildings.
10. Drawing different aspects in 3D views.

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Learn about various types of business organizations.
- Access the demand for a particular product.
- Study the various types of cost concepts.
- Have an idea about the types of markets.
- Make the students expertise in account principles and concepts.
- Learn about capital and capital budgeting & ratio analysis.

Learning Outcomes:

Students will be able to

- know the various factors that influence demand of particular product.
- forecast the future demand using various tools & techniques.
- access the minimum level of production that a firm should carry by using bep.
- aware of costs incurred in the production.
- know various methods to determine the pricing.
- establish the suitable business organization with available resources.
- knowledge about the capital budgeting helps the students to accept or reject the new projects in business.
- predict and analyze the organization financial soundness.
- the concept and preparation of trial balance, ledger & final accounts.
- the knowledge about the accounting principles that make the students expertise in maintaining accounting books.

UNIT - I: Introduction to Managerial Economics

Definition, Nature and Scope of Managerial Economics– Relation of Managerial Economics with other disciplines.Demand Analysis: Demand Determinants, Law of Demand and its exceptions, Significance & Types of Elasticity of Demand. Factors governing demand forecasting- Methods of Demand forecasting.

UNIT - II: Theory of Production and Cost Analysis Production Function

Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas production function. Production function, Laws of Returns, Internal and External Economies of Scale.

Cost Analysis: Cost concepts & BEP Analysis Break-Even Point (simple problems).

UNIT - III: Introduction to Markets & Pricing Strategies Market Structures

Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price & output determination under Perfect Competition.

Pricing strategies: Methods of Pricing: Cost Plus Pricing, Marginal Cost Pricing, Sealed Bid Pricing, Going Rate Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Block Pricing, Bundling Pricing, Peak Load Pricing, Cross Subsidization.

UNIT - IV: Introduction to Business Organizations

Characteristic features of Business, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, Public Enterprises and their types, Changing Business Environment in Post-liberalization scenario & Phases of Business Cycle.

UNIT - V: Introduction to Accountancy

Introduction to Accountancy, Types of Accounts, Ledgers, Maintenance of Ledgers & Trial Balance, Introduction to Final Accounts, Problems on Trading , Profit & Loss Account and Balance sheet, Problems with simple adjustments

UNIT - VI: Ratio Analysis & Capital Budgeting

Ratio Analysis: Introduction to financial Analysis; analysis& Interpretation of financial statements through Liquidity ratios, Profitability & Solvency ratios, turnover ratios.

Capital budgeting: capital & its significance, estimation of fixed & working capital requirements, methods of raising capital, introduction to capital budgeting, traditional methods of capital budgeting & discounted cash flow methods(simple problems).

Text Books:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2003.

Reference Books:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. H. Craig Peterson & W. Cris Lewis, Managerial Economics, PHI, 4th Ed.
3. Suma Damodaran, Managerial Economics, Oxford University Press.
4. Lipsey & Chrystel, Economics, Oxford University Press.

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ESTIMATING, COSTING AND VALUATION

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Understand the concept of types of estimates and estimating a work.
- Learn calculating road works quantities and canal work quantities.
- Understand the different specifications for civil works.
- Appreciate rate Analysis, contracts and valuation.

Learning Outcomes:

Students will be able to

- prepare detailed and abstract estimates for civil engineering works.
- evaluate road works quantities.
- distinguish the specifications for civil works and contracts.
- calculate rate analysis and prepare valuation reports for roads and buildings.

UNIT - I: General Items of Work in Building

Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating. Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement. Detailed Estimates of Buildings:- Individual wall method, Center line method for various types of buildings with varendah & different rooms.

UNIT - II: Earthwork for Roads and Canals

Quantity and cost estimation of a Road. Quantity and cost estimation of a Canal

UNIT - III: Rate Analysis

Specifications, Purpose and method of writing specifications; General specifications. Detailed Specifications for Brick work; R.C.C; Plastering; Mosaic Flooring; R.R.Stone Masonary

Analysis of Rates:

Task or out – turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work: I) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring vi) White washing.

UNIT - IV: Reinforcement Bar Bending and Bar Requirement Schedules

Quantity estimation and bar bending schedule for RCC roof slab Quantity estimation and bar bending schedule RCC beam - Quantity estimation and bar

bending schedule RCC Column with foundation footing Quantity estimation and bar bending schedule RCC retaining wall

UNIT - V: Contracts

Types of contracts – Contract Documents – Conditions of contract, PWD Accounts And Procedure Of Works Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

UNIT - VI: Valuation of Buildings

Valuation, Cost, Price & value. Methods of valuation, Depreciation, Methods for estimating cost depreciation, Valuation of building.

Miscellaneous Topics

Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage. Standard specifications for different items of building construction.

Final examination pattern:

The end examination paper should consist of part A and part B. Part A consists of two questions in Estimation of quantities by center line method or individual wall methods, out of which one question is to be answered. Part B consists of five questions out of which three are to be answered. Weightage for part A is 40% and for Part B 60%.

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie

Reference Books:

1. Standard Schedule of rates and standard data book by public works department.
2. I.S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
4. National Building Code.
5. Valuation of Real properties by S. C. Rangwala; Charotar Publishing House, Anand.

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Elective - II

FINITE ELEMENT METHODS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn the fundamentals of Finite element method.
- To solve the structural problems of 1D and 2D by FEM.
- To learn the concept of axisymmetric and isoparametric formulation.

Learning Outcomes:

Students will be able to

- understand the fundamentals of finite element method.
- solve the problems of 1D and 2D by FEM.
- apply the concepts of axisymetric and isoparametric formulation for solving problems.
- derive the shape functions and stiffness matrices for CST and higher order elements.
- solve higher order element problems by numerical techniques.

UNIT - I: Fundamental Concepts

Introduction, Need of FEM, Historical background, Applications of FEM, Advantages & Dis advantages energy principles , Discretization – Rayleigh –Ritz Method method of functional approximation, Weight Residual Techniques, Basic steps of FEM.

UNIT - II: One Dimensional Problems

Finite element modeling, Co-ordinates & shape functions, one dimensional scalar variable problems, Application to structural problems, Element stiffness of bar element due to axial loading, Formulation of stiffness matrix of bar element by direct stiffness method, minimum potential energy principle.

UNIT - III: Beams &Trusses

Derivation of stiffness matrix for beams by strain energy concept & direct stiffness method and problems on these concepts, Derivation of Stiffness matrix for trusses, stress calculations, temperature effects and problems on these concepts.

UNIT - IV: Two Dimensional Problems

Finite element modeling of 2-D elements, Derivation of shape functions for two dimensional linear element (Triangular) by area coordinates , problems on these concept.

Derivation of shape functions for CST element, Stress strain relationship matrix formulation for 3D & 2D systems, stiffness matrix for CST element, Isoperametric representation & Problems on these concepts.

UNIT - V: Axisymmetric Problems

Introduction, Axisymmetric formulation, Derivation of shape function for axisymmetric triangular element, stress –strain relationship matrix, stain & stress displacement matrices & Problems on these concepts.

UNIT - VI: Isoparametric Elements & Numarical Integration

Introduction, Isoparametric formulation, Higher order elements, Derivation of shape functions for a four noded quadrilateral element using natural coordinates, strain displacement matrix, stress-strain relationship matrix, stiffness matrix for isoparametric element, Numerical Integration , Gauss quadrature method for rectangular elements,.

Text Books:

1. Finite Elements Methods in Engineering by TirupatiR.Chandrapatla and Ashok D.Belgaundu.
2. Finite Element Analysis by Sk.Md ,Jalaludin , Anuradha Publishers

Reference Books:

1. FEA –Theory & Programming by C.S.Krishna Murthy- Tata Mcgraw Hill, New Delhi.
2. FEA by S.S. Bhavakatti-New age international publishers FEA by David V Hutton,TataMcgraw Hill, New Delhi.

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Elective - II

ADVANCED STRUCTURAL ANALYSIS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the basics of theory of elasticity.
- To introduce the concepts and tools used in structural dynamics.

Learning Outcomes:

Students will be able to

- explain the basics of theory of elasticity.
- distinguish between the rectangular and polar co-ordinates in two dimensional problems.
- appreciate the issues related to the dynamic elastic behavior of structures.
- determine the response of structures for free and forced vibrations.

UNIT - I: Introduction to Theory of Elasticity

Introduction to theory of elasticity: Notations for forces and stresses, components of stresses and strains, Hooke's Law

UNIT - II: Plane Stress and Plane Strain Conditions

Plane stress and strain: Definitions, differential equations of equilibrium, boundary conditions and compatibility equations

UNIT - III: Two Dimensional Problems

Two dimensional problems in rectangular co-ordinates:Airy stress function, solution by polynomials, Saint venant principle.Two dimensional problems in polar co-ordinates, general equations in polar co-ordinates general solution of bi-hormonic equation.

UNIT - IV: Introduction to Structural Dynamics

Introduction to structural Dynamics-dynamic loadings, Equation of motion-Newton's second law, D'Alemberts Principle, solution of undamped single degree of freedom system

UNIT - V: Free Vibrtions

Damped single degree of freedom system, viscous damping, equation of motion, different types of damping

UNIT - VI: Forced Vibrations

Response of single degree of freedom system to harmonic loading, Damped and undamped harmonic excitations

Text Books:

1. Theory of Elasticity by Timoshenko and Goodier, McGraw Hill Publishers
2. Basics of Structural Dynamics and a seismic design by S R Damodhara swamy and S.Kavitha by PHI Publications

Reference Books:

1. Theory of Elasticity by Sadhu Singh, Khanna Publishers
2. Dynamics of Structures by A.K. Chopra , Prentice Hall of India
3. Structural Dynamics by Mario Paz,CBS Publishers,New Delhi

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Elective - II

ADVANCED ENVIRONMENTAL ENGINEERING

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To outline the planning of Environmental Impact Assessment and prepare environmental audit.
- To learn the industrial waste treatment.
- To familiarize with the effects and control measures of air and noise pollution.
- To learn self purification of streams.

Learning Outcomes:

Students will be able to

- apply the methods of sanitation different purposes.
- analyze the characteristics of industrial effluents and suggest treatment methods.
- select the sources, effects and control measures of air and noise pollution.
- explain self purification of streams.

UNIT - I: Environmental Sanitation

Introduction-Sanitation methods for hostels, hotels, hospitals, swimming pools, public bathing places, melas and fairs , schools and institutions-rural sanitation.

UNIT - II: Environmental Impact Assessment (EIA)

Impact evaluation& analysis-EIA methodologies-Assessment impacts on surface water and air-Environmental Audit-preparation of EIA- Case studies.

UNIT - III: Theories of Industrial Waste Treatment

Volume reduction-strength reduction-neutralization-equalization- proportioning-recirculation of industrial wastes

UNIT - IV: Air Pollution

Sources and classification-global effects and control measures of air pollution-Meteorology in air pollution-Atmospheric stability and temperature inversions-Effective stack height and mixing depths-Wind direction and speed; Plume behavior -Gaussian Dispersion Model; Plume rise; Wind rose.

Noise Pollution:

Introduction- Levels of noise; Noise rating systems; Measurement of noise; Sources of noise and their noise levels; Acceptable noise levels; Effects of noise; Control of noise.

UNIT - V: Advanced Waste Water Treatment Methods

UASB filters, Fluidized bed reactors, Aerated Lagoons, Rotating Biological Contactors, Stabilization ponds.

UNIT - VI: Stream Sanitation

Introduction; Self-purification in streams; factors affecting self-purification; Dissolved Oxygen Balance in streams; Streeter-Phelps's Dissolved Oxygen Model; Zones of Self-purification; Impact of pollutants on stream waters and usage of stream water with special reference to flora and fauna.

Text Books:

1. Municipal and Rural sanitation by Victor Ehalers & Earnest W Steel.
2. Environmental science and engineering by J.G.Henry and G.W.Heinke-Pearson education.
3. Environmental Pollution Control Engineering by C.S. Rao; Wiley Eastern Ltd., New Delhi.
4. Environmental engineering by Y.Anjaneyulu, B.S publication.
5. Air Pollution by M.N. Rao and H.V.N. Rao; Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.

Reference Books:

1. Environmental Pollution and control by Dr. H.S.Bharia- Galgotia publication(P) Ltd., Delhi.
2. Water and Wastewater Engineering by Fair and Gayer.
3. Environmental Engineering by Peavy.
4. Air pollution and control by M.N.Rao and H.N.Rao.
5. Environmental engineering by Gerad Kiley, Tata Mc Graw Hill.
6. Environmental sanitation by K.V.S.G.Murali Krishna, Reem Publication, New Delhi.

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Elective - II

DESIGN & DRAWING OF IRRIGATION STRUCTURES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with fundamental principles and design concepts relating to various structures.
- To enhance practical design concept.

Learning Outcomes:

Students will be able to

- Design and draw different types of cross drainage works.

Design and Drawing of

1. Surplus weir
2. Tank sluice with tower head
3. Canal drop-Notch type
4. Canal regulator
5. Syphon Aqueduct type - III

Final Examination Pattern: Any two questions of the above five questions may be asked out of which the candidate has to answer one question

Text Books:

1. Water resources engineering principles and practice by C.Styanarayana Murthy. New age international publishers

Reference Books:

1. Irrigation and water power engineering by Punmia & Lal, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation engineering and hydraulic structures by Sk.Garg standard book house.

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Elective - III

DESIGN OF INDUSTRIAL STRUCTURES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To impart the concepts of planning and functional requirements of Industrial structures.
- To understand the types of loadings and configurations.
- To impact the knowledge on plastic behavior, plastic moment and plastic mechanism of steel structures like simple beams and portal frames.
- To enhance students to understand the analysis and design principles of water tanks, silos and bunkers.

Learning Outcomes:

Students will be able to

- prepare an industrial layout.
- identify the configuration of loadings on different industrial structures.
- design water tanks, silos and bunkers.
- adopt suitable prefabrication techniques.

UNIT - I: Planning and Functional Requirements

Classification of Industrial structures, choice of site, General requirements of different types of industries for safety, Space requirement, Services and Land planning for layout, Requirements regarding lighting, Ventilation and fire safety, Protection against noise and vibration, Guidelines from factories act, Codes of practice in design and construction.

UNIT - II: Loads on industrial Buildings, Various Configurations

Load on industrial structures – gravity load, live load, wind load & Earthquake load, configuration of various industrial buildings, Need for large column free areas, various types of floors, roofs and roof covering.

UNIT - III: Water Tanks

Rectangular and circular elevated steel water tanks- loading, analysis and design

UNIT - IV: Silos and Bunkers

Design of steel silos and bunkers- loading, analysis and design.

UNIT - V: Plastic Analysis

Plastic analysis of steel structures – Plastic bending in beams - Fully plastic Moment – Shape factor and application to simple beams and portal frames

UNIT - VI: Prefabrication and Construction Techniques

Pre-casting techniques - Planning, Analysis and design considerations suitability For Industrial structures. Handling techniques – Transportation, Storage and Erection of structures. Test on precast elements - Quality control - Repairs and Economical aspects on prefabrication.

NOTE: Designs are by limit state method as per IS 800-2007.

Text Books:

1. B.C.Punmia, Ashok kumar jain & Arun kumar jain "Comprehensive Design of steel structures" Laxmi publications, New Delhi.
2. S.K.Duggal " Design of Steel Structures" Tata Mc Graw Hill, New Delhi.
3. N.Subramanian: " Design of Steel Structures" Oxford publications.
4. SP32 – 1986, BIS, 1990 hand book on functional requirements of industrial buildings.

References:

1. A.S.Arya & J.L.Ajmani "Design of Steel Structures" Nemchand & Brothers, New Delhi.
2. P.Dayaratnam "Design of Steel Structures" Wheeler publishing, New Delhi.
3. V.N.Vazirani & M.M.Ratwani "Steel Structures" Khanna publications, New Delhi.
4. Relevant steel codes of Bureau of Indian standards.

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Elective - III

AIR POLLUTION & ITS CONTROL

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn the concept of air pollution, types, sources and effects.
- To know about Meteorology and plume Dispersion and study their effects.
- To understand the process of controlling gaseous emissions using various equipment.

Learning Outcomes:

Students will be able to

- identify different sources of air pollution and its effects and suggest control measures.
- describe thermodynamics and kinetics of air pollution.
- explain control of gaseous pollution at sources.
- illustrate examples on controlling gaseous emissions.

UNIT - I: Introduction

Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants ; Classifications – Natural and Artificial ,Primary and Secondary, point and Non-Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT - II: Effects of Air Pollution

Effects of Air pollutants on man, material and vegetation, Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes

UNIT - III: Removal and Control Methods

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SOx, NOx, CO, HC. Air-fuel ratio, computation and control of products of combustion.

UNIT - IV: Meteorology and Plume Dispersion

Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality wind rose diagrams. Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT - V: Control of Particulates

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

UNIT - VI: Control of Faseous Emissions

General Methods of Control of NO_2 and SO_2 emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

Text Books:

1. Air pollution by M.N.Rao and H.V.N. Rao-Tata McGRAW Hill company.
2. Air pollution and control by KVSG Murali Krishna.

Reference Books:

1. An introduction to air pollution by R.K.Trivedi and P.K.Goel, B.S.publications.
2. Air pollution by wark and warner –Harper&Row, Newyork.

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Elective - III

EARTHQUAKE RESISTANT DESIGN

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives

- To introduce the basics of earthquake, to study the seismic waves, intensity of earthquake and its magnitude.
- To learn the basic concepts of structural dynamics.
- To impart the knowledge on causes and effects of earth quake
- To learn the various codal provisions for common irregularities in earthquake resistant design.

Learning Outcomes:

Students will be able to

- explain earthquake mechanism and its effects.
- design earthquake resistant structures using current codal provisions.
- estimate earthquake loads at different floor levels of buildings
- explain the behavior of shear walls.

UNIT - I: Earthquake Engineering

Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc - Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelerograms.

UNIT - II: Introduction to Structural Dynamics

Theory of vibrations – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration –Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT - III: Multi-Degree of Freedom (MDOF) Systems

Formulation of equations of motion – Free vibration –Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response. Rigid base excitation – Formulation of equations of motion for SDOF .

UNIT - IV: Codal Design Provisions

Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic

coefficient and response spectrum methods –Displacements and drift requirements – Provisions for torsion.

UNIT - V: Codal Detailing Provisions

Ductility considerations in earthquake resistant design of RCC buildings Introduction; Impact of ductility; Requirements for ductility; Assessment of ductility– Member/element ductility, Structural ductility; Factor affecting ductility; Ductility factors; Ductility considerations as per IS13920.

Review of the latest Indian Seismic codes IS: 4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints .

UNIT - VI: Seismic Planning & Design of Shear Walls

Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems– Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities –Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

Shear walls: Design of Shear walls as per IS:13920 – Detailing of reinforcements.

Text Books:

1. Earthquake Resistant Design of Structures – PankajAgarwal& Manish Shrikhande – Prentice Hall of India, New Delhi
2. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press.

Reference Books:

1. Dynamics of Structures – Clough &Penzien, McGraw Hill – International Edition.
2. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
3. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
4. JaiKrishna and Chandrasekharan, “Elements of Earthquake Engineering”,3rd Edition, Saritha Prakasham, Meerut.
5. Relevant Indian Standard Codes: IS-875, IS-1893, IS -4326, IS- 13920.

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Elective - III

ARCHITECTURE & TOWN PLANNING

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand the architecture of ancient structures
- To understand the principles of designing of architectural structures
- To understand the historical background of town planning
- To list the standards of modern town planning

Learning Outcomes:

Students will be able to

- explain principle of town planning in ancient civilizations.
- apply the principles of architectural planning.
- develop sky scrapers, floating towns and surroundings.

UNIT - I: History of Architecture

Introduction: Western architecture; Egyptian, Greek, Roman Architects; Orders. Indian Architecture; Vedic age, Indus valley Civilzation- Buddhist period; Stambas, stupa, toranas, Chaityas, Viharas- Hindu temples; Dravidian and Indo Aryan styles- principle factors- Temple of Aihole, Mahabalipuram, Madurai, Deogarh, Bhuvaneswar, Mount Abu. Indo Saranic Architecture: Mosque- palace-Fort-Tomb.

UNIT - II: Architectural Design and Principles of Planning

Principles of designing- composition of plan- relation between plan and elevation- building elements, form, surface texture, mass, line, color, tone- principles of composition: unity, contrast, proportion, scale, balance, Circulation, rhythm, character, expression. Principles of planning a residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors.

UNIT - III: Post - Classic Architecture

Introduction to post- classic architecture- contribution of eminent architects to modern period.

Brief summary of post- classic architecture- Indian and western architectural contributiuon of eminent architects: Edward Lutyens, Le Corbusier, Frank Lloyd Wright, Walter Grouping.

UNIT - IV: Historical Back Ground of Town Planning

Town planning in India- Town plans of mythological Manasa- town plans of ancient Indian towns: Harappa, Mohenjodaro, Pataliputra, Vijayanagara, Delhi- Town plans of Egypt, Acropolis, Jerusalem, Mecca, Rome, Paris, London, , Istanbul.

UNIT - V: Modern Town Planning and Standards of Town Planning

Zoning-Roads and road traffic- Housing-Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning- Neighbourhood planning.Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation- planning regulations and limitations.

UNIT - VI: Land Scaping and Scaping and Sky Scrapers

Land Scaping and Exapansion of towns: Land scaping for the towns, horizontal and vertical expansion of towns- garden cities, satellite towns- floating towns- sky scrapers.

Text Books:

1. The great ages of world Architecture by G.K. Hiraskar.
2. Drafting and Design for Architecture by Hepler, Cengage Learning.
3. Planning and Design of Buildings- Section of architecture by Y.S. Sane.
4. Modern Ideal Homes for India by R.S. Deshpande.
5. Fundamentals of Town planning- G.K. Haraskar.

Reference Books:

1. Architect's Portable Handbook by John Patten Guthrie- McGraw Hill International Publications.
2. Indian Architecture- Vol. I and II by Percy Brown, Taraporevala Publications, Bombay.
3. Town and Country planning – A.J.Brown and H.M. Sherrard.
4. Town Design- Federik Glbbard, Architectural press, London.

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Open Elective - III

BUILDING SERVICES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the concepts of basic services and its applications.
- To equip students with the required information and technologies of building services.
- Application of this knowledge in architectural design project.
- Evolving understanding in students to choose appropriate systems and integrate the same in their design projects.

Learning Outcomes:

Students will be able to

- understand the measures to be taken while planning for sanitation and installation of various sanitary units.
- identify the minimizing and disposal techniques of waste and garbage.
- evaluate the illumination strategies by consuming less energy resources.
- acquaint with distribution of electricity to all units of the project.
- provide fire protection units at service points.

UNIT - I: Water Supply

Tapping of water, Storage and distribution of water in premises, Pipes, piping network, specials, materials, joinery, installation of network both open and concealed, all appurtenances required for installations e.g. taps, faucets, mixing units, valves, flushing cisterns, flushing valves and other fittings.

UNIT - II: Drainage and Sanitation

Study of sanitary fittings with reference to use, materials and functions, traps and their uses, classification of traps as per use and shape, pipes and piping systems, specials, vent and anti-siphonage systems, jointing and installations, storm water and roof drainage systems and their installations, underground drainage systems with application of ventilation, self cleansing velocity, laying of drains to required gradients and testing of drains, disposal of sewage within the premises using septic tanks, effluent treatment plants, their function and layouts.

UNIT - III: Room Acoustics

Key terms & Concepts, Introduction, Acoustic principles, Sound power and pressure levels, Sound pressure level, absorption of sound, Reverberation time,

Transmission of sound. Sound pressure level in a plant room, out door sound pressure level, Sound pressure level in intermediate space, noise rating, Data requirement, output data.

UNIT - IV: Lighting and Ventilation

Indoor lighting- natural and artificial, systems of lighting such as direct, indirect, diffused, applications of lighting systems with reference to levels of illumination for various uses and lumen method calculations, light fittings/ luminaries-All types of energy efficient lamps, optic fiber, led etc. Ventilation - Introduction, Ventilation requirements, Natural and Mechanical systems, Removal of heat gains Psychrometric cycles, Ventilation rate measurement, Material for ventilation duct work.

UNIT - V: Electrification

Introduction to generation and distribution of electric power in urban areas, substations for small schemes in industrial units, electrical system installations in a building from the supply mains to individual outlet points, including meter board, distribution board and layout of points with load calculations, electrical wiring systems for small and large installations including different material specification electrical control and safety devices- switches, fuse, circuit breakers, earthing, lightning conductors etc.

UNIT - VI: Fire Protection, Plant and Service Areas

Key terms and concepts, introduction, Fire classification, Portable existing gushers, Fixed – Fire fighting installation, fire detectors and alarus, smoke ventilation. Key terms and conditions, Introduction, Mains and services, Plant room space requirements, service ducts, pipe, duct and cable supports, plant connections, Co-ordinated service drawings boiler room ventilation.

Text Books:

1. S.C.Rangwala, Water supply and sanitary engineering, Charotar publishing house.
2. A. Kamala & DL Kanth Rao, Environmental Engineering, Tata McGraw – Hill publishing company Limited.

Reference Books:

1. Technical teachers Training Institute (Madras), Environmental Engineering, Tata McGraw Hill publishing Company Limited.
2. M.David Egan, Concepts in Building Fire Safety.28
3. V.K.Jain, Fire Safety in Building.
4. E.G.Butcher, Smoke control in Fire-safety Design.
5. National Building Code 2005.

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Open Elective - III

MODERN OPTIMIZATION TECHNIQUES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the concepts of evolutionary optimization
- To develop an understanding of Genetic Algorithm
- To expose students to Particle Swarm Optimization
- To introduce the principles of Differential Evolution
- To gain knowledge on Ant Colony Optimization

Learning Outcomes:

Students will be able to

- analyze the pros and cons of different optimization techniques.
- describe the concepts of various techniques.
- develop suitable algorithms for the implementation of above techniques.
- apply these techniques to solve various engineering optimization problems .
- compare the performance of various techniques.
- select a suitable technique to optimize a given problem.

UNIT – I: Definition-Classification of optimization problems

Unconstrained and Constrained optimization-Optimality conditions, Evolution in nature-Fundamentals of Evolutionary algorithms- Evolutionary Strategy and Evolutionary Programming.

UNIT – II: Genetic Algorithm

Basic concepts- search space- working principle -encoding-fitness function - Genetic Operators-Selection: Roulette-wheel, Boltzmann, Tournament, Rank and Steadystate-Elitism- Crossover: single-pint, two-point, multi-point, uniform, matrix and cross over rate.

UNIT – III: Mutation

Mutation, mutation rate. Variations of GA: Adaptive GA and Real coded GA - Issues in GA implementation-Particle Swarm Optimization: Introduction-Fundamental principles of Particle Swarm Optimization-Velocity Updating-Advanced operators-Parameter selection.

UNIT – IV:

Binary, discrete and combinatorial PSO-Implementation issues-Convergence issues, Multi-objective PSO (Dynamic neighbourhood PSO-Vector evaluated PSO)-Variations of PSO: weighted, repulsive, stretched, comprehensive learning, combined effect PSO and clonal PSO.

UNIT V: Differential Evolution

Introduction-Fundamental principles of Differential Evolution- different strategies of differential evolution-function optimization formulation-mutation and crossover operators-estimation and selection-Discrete Differential Evolution.

UNIT VI: Ant Colony Optimization

Introduction-Fundamental principles of Ant colony optimization-Ant foraging behaviour-initialization-transition strategy-pheromone update rule- applications.

Text Books:

1. Kalyanmoy Deb, "Multi objective optimization using Evolutionary Algorithms", John Wiley and Sons, 2008.
2. E. Goldberg, Genetic Algorithms in search, Optimization and machine learning, 1989
3. Particle Swarm Optimization, An overview by Riccardo Poli, James Kennedy, Tim Blackwell, Springer
4. Differential Evolution, A Practical Approach to Global Optimization, Authors: Price, Kenneth, Storn, Rainer M., Lampinen, Jouni A. , Springer
5. Ant Colony Optimization by Marco Dorigo, Thomas Stutzle, MIT Press.

Reference Books:

1. Soliman Abdel Hady, Abdel Aal Hassan Mantawy, "Modern optimization techniques with applications in Electric Power Systems", Springer,2012.
2. M. Mitchell, 'Introduction to Genetic Algorithms", Indian reprint, MIT press Cambridge, 2nd edition, 2002.
3. R.C. Eberhart, Y.Sai and J. Kennedy, Swarm Intelligence , The Morgan Kaufmann Series in Artificial Intelligence, 2001.
4. K.M. Passino, Biomimicry for optimization, control and automation, Springer-Verlag, London, UK, 2005.
5. G. C. Onwubolu, & B. V. Babu, New Optimization Techniques in Engineering, Springer- Verlag Publication, Germany, 2003.

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Open Elective - III

ELECTRICAL POWER UTILIZATION
(Other than EEE)
IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with the mechanics of train movement.
- To gain knowledge on selection of appropriate heating method.
- To introduce the laws of illumination.
- To develop an understanding of refrigeration and air-conditioning.
- To expose students to the process of elctrolysis.

Learning Outcomes:

Students will be able to

- analyze the appropriate type of traction system.
- select a suitable method of heating for a given application.
- design an illumination system.
- calculate the required tonnage capacity for a given air-conditioning system.
- select a suitable charging method.
- evaluate domestic wiring connection and debug any faults occured.

UNIT – I: Electrical Traction

Features of an Ideal Traction System, Systems of Electrical Traction, Traction Supply System, Mechanism of Train Movement, Speed- Time Curve, Traction Motors, Tractive Effort and Horse Power, Speed Control Schemes, Electric Braking, Recent Trends in Traction.

UNIT – II: Electric Heating

Classification, Heating Element, Losses in Oven and Efficiency, Resistance Furnace, Radiant Heating, Induction Heating, High Frequency Eddy Current Heating, Dielectric Heating, Arc Furnace, Heating of Furnace, Electric Welding, Methods and Equipments.

UNIT – III: Illumination

Radiant Energy, Terms and Definitions, Laws of Illumination, Polar Curves, Photometry, MSCP, Integrating Sphere, Luminous Efficacy, Electrical Lamps, Design of Interior and Exterior Lighting Systems, Illumination Levels for Various Purposes, Light Fittings, Factory Lighting, Flood Lighting, Street Lighting, Energy Conservation in Lighting.

UNIT – IV: Air Conditioning and Refrigeration

Control of Temperature, Protection of Motors, Simple Heat-Load and Motor Calculations, Various Types of Air Conditioning, Functioning of Complete Air Conditioning System, Type of Compressor Motor, Cool Storage, Estimation of Tonnage Capacity and Motor Power.

UNIT – V: Electro-Chemical Processes

Electrolysis – Electroplating – Electro deposition – Extraction of metals current, Efficiency - Batteries – types – Charging Methods.

UNIT – VI: Basics of Domestic Electrical Wiring

Types of Cables, Flexible Wires Sizes and Current Capacity, Use of Fuse, MCB and MCCB (Working and Construction), Idea about Megger, Earthling – Domestic and Industrial.

Text Books:

1. Garg and Girdhar, "Utilisation of Electric Energy" 1982, Khanna Publisher.
2. Pratab H., "Art and Science of Utilization of Electrical Energy", Second Edition, Dhanpat Rai and Sons, New Delhi.

Reference Books:

1. Wadhwa C.L., "Generation, Distribution and Utilization of Electrical Energy",1993, Wiley Eastern Limited,
2. S.C.Tripathy, "Electric Energy Utilization and Conservation",1993, Tata McGraw Hill.
3. R.K. Rajaput, . "Utilization of Electric Power", Laxmi Publications, 1st Edition, 2007.
4. N.V.Suryanarayana, "Utilization of Electric Power", New Age International, 2005
5. C.L.Wadhwa, "Generation, Distribution and Utilization of Electrical Energy, New Age International, 4th Edition, 2011.
6. M. Prasad, Refrigiration and Air-conditioning, Wiley Eastern Ltd., 1995 .
7. Taylor E. Openshaw, "Utilization of Electrical Energy", 1968, Orient Longman.
8. Gupta J. B., "Utilization of Electric Power and Electric Traction", 2002,S. K. Kataria and Sons.

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Open Elective - III

ROBOTICS
(Other than ME)
IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with anatomy, kinematics, sensors and dynamics of a programmable machine, robot.

Learning Outcomes:

Students will be able to

- distinguish between fixed automation and programmable automation.
- identify various components of robot.
- select appropriate type of actuator for a joint.
- illustrate robot applications in manufacturing.
- analyze kinematics of a robot.
- derive equations of motion of a manipulator for a particular application.
- write a programme to control a robot for execution of a work cycle.

UNIT – I: Introduction

Automation and Robotics, Components of Robot – Mechanical manipulator-control system and end effectors-Types of end effectors — Requirements and challenges of end effectors classification of robots by coordinate system and control system. Control resolution, accuracy, repeatability and work volume of robot.

UNIT – II: Robot actuators and Feed back components

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.
Feedback components: position sensors – potentiometers, resolvers, encoders – Velocitysensors.

UNIT – III: Robot Application in Manufacturing

Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.
Future applications of robots.

UNIT – IV: Motion Analysis

Homogeneous transformations as applicable to rotation and translation – problems.

Manipulator Kinematics: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

UNIT – V:

Differential transformation and manipulators, Jacobians – problems.Dynamics: Lagrange – Euler and
Newton – Euler formations – Problems.

UNIT – VI:

Trajectory planning and avoidance of obstacles, path planning, Slew motion, joint integrated motion – straight line motion – Robot programming, languages and software packages.

Text Books:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

Reference Books:

1. Robotics / Fu K S/ McGraw Hill.
2. An Introduction to Robot Technology, / P. Coiffet and M. Chaironze / Kogam Page Ltd. 1983 London.
3. Robotic Engineering / Richard D. Klafter, Prentice Hall.
4. Robot Analysis and Intelligence / Asada and Slow time / Wiley Inter-Science.
5. Introduction to Robotics / John J Craig / Pearson Edu.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.

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Open Elective - III

ASSISTIVE TECHNOLOGIES

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Understand the laws that govern the use of assistive technology in higher education.
- Evaluate appropriate pieces of technology according to a student's specific disability and academic needs.

Learning Outcomes:

Students will be able to

- identify the legislative policies connected with assistive
- discuss Universal design principles in the context of general education environments and curriculum materials.
- explore the process for finding the right technology and the right applications, and determine how to pay for it.
- explore and discuss how to establish a technology team with an assistive technology representative, perform a school wide assessment of all student needs and develop a school and/or classroom tech plan.

UNIT – I: Introduction to Assistive Technology (AT) Devices and Services

Assistive Technology Defined. Historical Overview of Assistive Technology. Multidisciplinary Nature of at Service Provision.

UNIT – II: Adaptations Framework for Considering Assistive Technology

Introduction to the Adaptations Framework, Setting-Specific Demands, Person-Specific Characteristics, Adaptations, Evaluation of Effectiveness of Adaptations.

UNIT – III: Assistive Technology Assessments

Overview of Assessment Issues, Overview of General Assessments , Assistive Technology Assessments, Assessment Components.

UNIT – IV: Enhance Speech Communication

Nature of Spoken Language, Introduction to Augmentative and Alternative Communication Systems, Selection Techniques for Aided Communication Systems, Overview of Nonelectronic Systems and Electronic Devices.

UNIT – V: Mobility & Access to Information

Introduction to Mobility Adaptations, Basic Design Considerations, Seating and Positioning Issues. Introduction to Information Access, Computer Access, Telecommunication, Listening and Print Access.

UNIT – VI: Enhance Independent Living

Introduction to Independent Living, Devices for Daily Life, Switches and Scanning. Environmental Control Units, Access to Management Devices.

Text Books:

1. Diane P edrotty Bryant, Brian R. Bryant, Allyn and Bacon "Assistive Technology for People with Disabilities", 2nd edition ***Psycho-Educational Services***
2. Amy G.Dell, Deborah A.Newton, Jerry G.Petroff, "Assistive Technology in the class room Enhancing the school experiences of students with disabilities", Pearson Publications

Reference Books:

1. Marion A.Hersh, Michael A.Johnson , " Assistive Technology for the Hearing-impaired, Deaf and Deafblind", Springer Publications
2. Meeko Mitsuko K.Oishi, Ian M.Mitchell, H.F. Machiel vanderloss, "Design and use of Assistive Technology, Springer Publications.
3. Eckehard Fozzy Moritz, "Assistive Technologies for the Interaction of the Elderly", Springer Publications.

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Open Elective - III

INTRODUCTION TO EMBEDDED SYSTEMS

(Other than ECE, CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To gain knowledge on basic quantitative principles of embedded system design and performance measurements.
- To study about different embedded firmware and RTOS concepts

Learning Outcomes:

Students will be able to

- know the design concepts of different embedded systems.
- know the embedded system components and firmware.
- learn about the techniques of the task communication and RTOS concepts
- design principles of RTOS Based Embedded System Design

UNIT – I: Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

UNIT – II: Typical Embedded System

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory selection for Embedded Systems, Processor selection for embedded system.

UNIT – III: Embedded System Components and Firmware

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware design approaches and Development languages.

UNIT – IV: Embedded communication interface

Communication Interface: Onboard and External Communication Interfaces, Serial/ Parallel Communication – Serial communication protocols -RS232 standard – RS485 –Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C).

UNIT – V: RTOS Based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT – VI: Task Communication

Task Synchronization, Task communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

Text Books:

1. Shibu K.V, “Introduction to Embedded Systems “,Mc Graw Hill. (I to VI Units)
2. Raj Kamal,”Embedded Systems”, TMH. (IV Unit)

Reference Books:

1. Frank Vahid, Tony Givargis,”Embedded System Design”, John Wiley.
2. Lyla, “Embedded Systems”, Pearson, 2013
3. David E. Simon, “An Embedded Software Primer”, Pearson Education.

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Open Elective - III

SOCIAL NETWORKS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To provide basic concepts of Social networks and make them learn the psychological foundations of Social networks.
- To Know about Network Influence and diffusion

Learning Outcomes:

Students will be able to

- describe Social network concepts.
- categorize segmentation and Characteristics.
- analyze psychological foundation of Social networks.
- evaluation of various organizations of networks.
- define Network Influence and diffusion.
- design social network systems in different areas.

UNIT – I:

Basic social network concepts-Distributions- Multiplexity-Roles and positions-Embedded of the informal within instituted or named networks.

UNIT – II:

Network segmentation-Named and Unnamed Network segments-segmenting groups on the basis of cohesion-structural similarity and structural equivalence.

UNIT – III:

Psychological foundations of social networks-safety-effectiveness-Status-Limits on individual networks

UNIT – IV:

Organizations and networks Information-Driven organizations-Bridging the gaps: Network size, diversion and social cohesion

UNIT – V:

Networks, Influence and diffusion – influence and decision making-epidemiology and network diffusion.

UNIT – VI:

Network as social capital –Individual level social capital-social capital as an attribute of social systems.

Text Books:

1. Understanding Social Networks: Theories, Concepts, and Findings By Charles Kadushin.

Reference Books:

1. Social Networks and the Semantic Web By Peter Mika.
1. **Social Network Analysis: Methods and Applications** By Stanley Wasserman, Katherine Faust

Open Elective - III

MOBILE APPLICATION DEVELOPMENT

(Other than CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To prepare students with skills and knowledge of Mobile application development using J2ME Technology.
- Understand the Android OS architecture and able to develop the applications for mobile devices

Learning Outcomes:

Students will be able to

- configure a J2ME environment for development.
- plan and design of J2ME applications.
- access and work with database under the J2ME.
- reproduce the installation of the Android Eclipse SKD.
- implement the user interface for android applications.
- use best design practices for mobile development, designing applications for performance and responsiveness and also implement communication between the mobile devices.

UNIT – I: J2ME Overview

Inside J2ME, How J2ME Is Organized, J2ME and Wireless Devices, What J2ME Isn't, Other Java Platforms for Small Computing Devices.

J2ME Architecture and Development Environment : J2ME Architecture ,Small Computing Device Requirements, Run-Time Environment, MIDlet Programming .Java Language for J2ME ,J2ME Software Development Kits ,Hello World J2ME Style Multiple MIDlets in a MIDlet Suite ,J2ME Wireless Toolkit.

UNIT – II:

Commands, Items, and Event Processing: J2ME User Interfaces ,Display Class ,The Palm OS Emulator ,Command Class ,Item Class ,Exception Handling .High-Level Display: Screens :Screen Class , Alert Class, Form Class ,Item Class ,List Class, Text Box Class, Ticker Class.

Canvas: The Canvas, User Interactions Graphics, Clipping Regions, Animation

UNIT – III:

Record Management System : Record Storage ,Writing and Reading Records, Writing and Reading Mixed Data Types ,Record Enumeration ,Sorting Records, Searching Records ,Record Listener .

J2ME Database Concepts: Data, Databases, Database Schema, Overview of the JDBC Process, Database Connection.

UNIT – IV:

Installation and configuration of android, starting an android application project: components, debugging with eclipse. Application design: the screen layout and Main.xml file, components ids, controls, creating and configuring android Emulator, communication with emulator.

UNIT – V:

controls and user interface: radio buttons, radio group ,the spinner, data picker, buttons, array adapter .

view class: combining graphics with a touch listener ,canvas, bitmap, paint ,motion event.

UNIT – VI:

working with images :display images ,using images stored on android devices ,image view, working with text files ,working with data tables, using sqlite ,using xml for data exchange, cursor, content values, XML PUL Parser, XML Resource parser.

Client -server applications: socket, server socket, HTTP URL connection, URL.

Text Books:

1. J2ME: The Complete Reference by James Keogh ,McGraw-Hill/Osborne.
2. Android Application development for java programmers by James C Sheusi, Cengage Learning

Reference Books

1. **Core J2ME Technology by John W. Muchow, Prentice Hall PTR; 1st edition.**
2. **Enterprise J2ME : developing mobile java applications –Michael juntao yuan,pearson Education ,2004.**
3. **Beginning java ME platform, Ray Richpater, Après, 2009.**
4. **Android apps for absolute Beginners by Wallace Jackson, Apress.**
5. **Begining android 4 application development, Wei-meng Lee, wiley** Programming android, Ziguord Mednieks, Laired Dornin, G.Blake Meike & Masumi Nakameera, Orelly

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Open Elective - III

REAL - TIME SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize with the concepts of Real – Time systems.

Learning Outcomes:

Students will be able to

- understand the use of multi tasking techniques in real time systems.
- evaluate the performance of soft and hard real time systems.
- analyze multi task scheduling algorithms for periodic, aperiodic and sporadic tasks.
- design real time operating systems.

UNIT – I:

Real-Time systems, typical real-time applications, hard versus soft real-time systems, a reference model of real-time systems.

UNIT – II:

Commonly used approaches to hard real-time scheduling, clock-driven scheduling,

UNIT – III:

Priority-driven scheduling of periodic tasks, scheduling aperiodic and sporadic jobs in priority- driven systems.

UNIT – IV:

Resources and resource access control, multiprocessor scheduling and resource access control.

UNIT – V:

Scheduling flexible computations and tasks with temporal distance constraints.

UNIT – VI:

Real-Time Communications, Operating Systems.

Text Books:

1. Jane Liu, Real-Time Systems, Prentice Hall, 2000.
2. Philip.A.Laplante, Real Time System Design and Analysis, 3rd Edition, PHI, 2001.

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Open Elective - III

NETWORK MANAGEMENT SYSTEMS

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand key elements of Network Management.
- To understand the various Network management tools.

Learning Outcomes:

Students will be able to

- analyze the key elements of Network Management.
- distinguish different types of SNMPs.
- apply the remote monitoring mechanism for an application.

UNIT – I: Data communications

Analogy of Telephone Network Management, Communications protocols and Standards, Challenges of Information Technology Managers

UNIT – II: Network Management

Goals, Organization, and Functions, Network and System Management, Network Management System Platform, Current Status and future of Network Management.

UNIT – III: SNMPV1 Network Management

Organization and Information and Information Models.

Managed network: Case Histories and Examples, The History of SNMP Management, The SNMP Model, The Organization Model, System Overview, The Information Model.

UNIT – IV: SNMPv1 Network Management

Communication and Functional Models, The SNMP Communication Model, Functional model

UNIT – V: SNMP Management

SNMPv2: Major Changes in SNMPv2, SNMPv2 System Architecture, SNMPv2 Structure of Management Information, the SNMPv2 Management Information Base, SNMPv2 Protocol, Compatibility with SNMPv1

UNIT – VI: SNMP Management

RMON: What is Remote Monitoring? , RMON SMI and MIB, RMON1, RMON2, ATM Remote Monitoring

Network Management Tools and Systems: Network Management Tools, Network Statistics Measurement Systems.

Text Book:

1. Network Management, Principles and Practice, Mani Subrahmanian, Pearson Education.

Reference Books:

1. Network management, Morris, Pearson Education.
2. Principles of Network System Administration, Mark Burges, Wiley Dreamtech.
. Distributed Network Management, Paul, John Wiley.

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Open Elective - III

FUNDAMENTALS OF E-COMMERCE

(Other than CSE & IT)

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To introduce the basic concepts of E-Commerce.
- To gain the knowledge on various Mercantile Process models.
- To identify the fundamental concepts in E-Payment systems like smart card, credit card..etc
- To expose to electronic data interchange (EDI) problems.

Learning Outcomes:

Students will be able to

- outline the fundamentals in E-Commerce.
- describe various Mercantile Process models.
- discuss about various E-Payment systems.
- identify electronic data interchange (EDI) problems.
- describe various Advertising techniques on internet

UNIT – I: Electronic Commerce-Frame work

Electronic Commerce-Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

UNIT – II: Consumer Oriented Electronic commerce

Consumer Oriented Electronic commerce - Mercantile Process models.

UNIT – III: Electronic payment systems

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

UNIT – IV: Inter Organizational Commerce

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.

UNIT – V: Intra Organizational Commerce

Work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT – VI: Advertising and Marketing

Information based marketing, Advertising on Internet, on-line marketing process, market research

Text Book:

1. Kalakota, Whinston *Frontiers of electronic commerce*, Pearson.

Reference Books:

1. Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang *E-Commerce fundamentals and applications*, John Wiley.
2. S.Jaiswal – Galgotia *E-Commerce.*
3. Kenneth C.Taudon, Carol Guyerico Traver *E-Commerce – Business, Technology, Society.*

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Open Elective - III

STATISTICAL METHODS USING R SOFTWARE

IV Year – I Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To understand statistical concepts.
- To know R software.

Learning Outcomes:

Students will be able to

- examine the relationship between the variables and forecast.
- apply suitable range of statistical tests.
- use R for statistical programming, Computation, Graphics, and modeling.
- expand their knowledge of R on their own.

UNIT – I: Correlation-Regression

Simple correlation for ungrouped data , rank correlation and simple regression.

UNIT – II: Testing of Hypothesis

Introduction - population-sample-large sample and small sample. Testing of hypothesis - hypothesis - null hypothesis - alternative hypothesis - level of significance - degrees of freedom - one tailed and two tailed tests - procedure of testing of hypothesis.

UNIT – III: One Sample Significance Tests

One sample tests: Large sample - Test for single mean, single proportion, Small sample tests: t-test for single mean.

UNIT – IV: Two Sample Significance Tests

Two sample tests : Large sample - test for two means, two proportions, Small sample: t-test for two means, F-test.

UNIT – V: Introduction to R software

An introductory R session- R as a calculator- Getting help and loading packages- Data entry and exporting data.

Correlation and Regression using R: Calculating correlation coefficient-calculating rank correlation-finding regression lines- interpretations

UNIT – VI: One Sample and Two Sample Tests using R

Large sample: Calculating Z value for single and two means - interpretation - Calculating Z value for single proportion and two proportions-interpretations

Small sample: Calculating t for single mean and two means- interpretations Calculating F value -interpretations

Text Books:

1. S.C.Gupta and V.K.kapoor-Fundamentals of Mathematical Statistics-S.chand & co.
2. Probability and Statistics, Dr. T. K. V. Iyengar, Dr. B. Krishna Gandhi, S. Ranganatham and Dr. M.V. S. S. N. Prasad, S. Chand & Company Ltd.
3. Peter Dalgaard. Introductory Statistics with R (Paperback) 1st Edition Springer-Verlag New York, Inc. ISBN 0-387-95475-9
4. W. N. Venables and B. D. Ripley. 2002. Modern Applied Statistics with S. 4th Edition. Springer. ISBN 0-387-95457-0

Reference Books:

1. An Introduction to R. Online manual at the R website at http://cran.r-project.org/manuals.html
2. Andreas Krause, Melvin Olson. 2005. The Basics of S-PLUS. 4th edition. Springer-Verlag, New York. ISBN 0-387-26109-5.

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STRUCTURAL ENGINEERING LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with advanced equipment for testing of materials.
- To impart knowledge of Non destructive testing.

Learning Outcomes:

Students will be able to

- obtain the strength of structural member using NDT.
- design concrete mix by different methods.
- obtain structural response under dynamic loading test.

List of Experiments:

1. Strain measurement - Electrical resistance strain gauges
2. Non destructive testing- Rebound Hammer test
3. Non destructive testing- UPV test
4. Qualifications tests on Self compaction concrete- L Box test, J Boxtest, U box test,
5. Design a concrete mix by using I.S. Code method
6. Design a concrete mix by using ACI Code method-Road Note method
7. Measurement of Cover and bar diameter by poroscope/re bar locator
8. Buckling of columns
9. Determination of horizontal thrust in two hinged arch
10. Determination of horizontal thrust in three hinged arch
11. Repair and rehabilitation of concrete beam.
12. Shake table.

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TRANSPORTATION ENGINEERING LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To develop the skill of testing the road aggregates.
- To study the properties of bitumen.
- To Study the Traffic characteristics.
- To calculate the quantities of earthworks.

Learning Outcomes:

Students will be able to

- characterise the highway aggregates.
- conduct tests on suitability of bitumen.
- design the traffic intersection based on traffic surveys.
- perform earth work calculation based on LS & CS method.

List of Experiments:

1) Aggregate Crushing Value Test.
2) Aggregate Impact Value Test.
3) Shape Tests.
4) Flakiness index.
5) Elongation index.
6) Attrition Test.
7) Abrasion Test.
8) Specific gravity & Water absorption test.
9) Penetration and Ductility of bituminous material.
10) Softening point and flash & fire point of bituminous material.
11) Parking Studies.
12) Earthwork Calculations based on LS & CS method.

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COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB

IV Year – I Semester

Practical	: 3	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To solve the civil engineering problems by using problem solving languages.
- To understand the concept of designing structures by using software.

Learning Outcomes:

Students will be able to

- develop a program for solving a simple civil engineering problems.
- design an RC structural element by using software.

List of Experiments:

Write any Six Programs Using C or C++, JAVA etc

1. Design a Reinforced beam for flexure by Limit state method
2. Design a T beam by Limit state method
3. Design of one way/Two way slab.
4. Design of RCC compression member
5. Design of slab base for steel column
6. Classification of soil by Indian classification system
7. Determination of bearing capacity of soil by IS code
8. Design of an open channel
9. Determination of height of a building when the base is accessible.
10. Determination of Sight distances.

Analyze and Design any SIX of the following Elements using STAAD Pro or STRUDS or STRAP

11. Analyze and design any type of determinate structure
12. Analyze and design any continuous beam
13. Analyze and design any portal frame without sway
14. Analyze and design any portal frame with sway
15. Analyze a simple truss
16. Design of a one way slab
17. Design of Two way slab
18. Design of Isolated footing
19. Design of pile foundation
20. Design of Retaining wall.

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Elective - IV

ADVANCED CONCRETE STRUCTURES

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn types and design procedure of flat and grid slabs and footings.
- To understand the loading pattern and design elements of silos and bunkers.
- To familiarize the I.R.C loads and their application on design R.C bridge.
- To introduce the design procedure of R.C water tanks.

Learning Outcomes:

Students will be able to

- design the R.C silos and bunkers.
- design R.C. T-beam bridges using I.R.C loadings.
- apply the code provisions for design of different R.C.C structures.
- design elevated R.C water tanks.
- design flat and grid slabs, and retaining walls.

UNIT - I: Footings

Different types of footings – Design of isolated, and combined footings. Rectangular and circular footings subjected to axial loads.

UNIT - II: Flat and Frid Slabs

Design Of Flat slab Direct design method -reinforcement detailing, Shear-beam shear and punching shear, design of grid floor by approximate method (timoshenko's plate theory method)- . Reinforcement detailing IN grid floor

UNIT - III: Retaining Walls

Types of retaining wall, Forces on retaining wall, stability requirements .Design of cantilever and counter fort Retaining walls

UNIT - IV: Silos and Bunkers

Introduction – Concepts of loading and Design, design of Circular silos and rectangular R.C. bunkers

UNIT - V: Bridges

Introduction to concrete bridges – IRC loadings, Deck Slab Bridge – Design concepts

UNIT - VI: Water Tanks

Design of R.C elevated circular and rectangular water tanks.

Text Books:

1. "Advanced Reinforced concrete structures" by Varghese, Prentice Hall India Pvt.Ltd.
2. "Design and Drawing of concrete structures by N.Krishnam Raju, University press 2005.

Reference Books:

1. Reinforced concrete structures Vol.2 by B.C.Punmia, Ashok Kumar Jain & Arun Kumar Jain. Laxmi publications Pvt.Ltd., New Delhi.
2. Essentials of Bridge engineering by D.Johnson Victor, Oxford and IBM publications Co.Ltd.
3. Reinforced concrete structures by I.C.Syal and Goel, S.Chand publishers.
4. All Relevant I.S. codes.
   For Bridges
   IRC-6:2010 – Loading specifications
   IRC-112:2011 – Design specifications
   For Water tanks
   BIS –IS-3370
5. Jain.S.K, Jaiswal.R "Guidelines for seismic design of liquid storage tank" NICEE IITK 2004.
6. Anchor.R.D "Design of liquid retaining structures".

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Elective - IV

ENVIRONMENTAL IMPACT, ASSESSMENT & MANAGEMENT

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To learn various methodologies on EIA and selection.
- To illustrate the Methodology for assessment of soil and ground water.
- To distinguish Impact prediction, Assessment based on significance of impact.
- To identify the need of assessment on wildlife and vegetation and impacts of deforestation.

Learning Outcomes:

Students will be able to

- explain the concept and importance of EIA and various methods involved.
- assess various methodologies of soil and ground water.
- evaluate the effects and impacts of deforestation.
- prepare audit report.

UNIT - I:

Basic concept of EIA: Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT - II:

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis.

UNIT - III:

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives.

UNIT - IV:

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of assessment of Impacts on surface water environment, Air pollution sources, generalized mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the approach for assessment of Air pollution Impact.

UNIT - V:

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation. Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report

UNIT - VI:

Post Audit activities, The Environmental pollution Act, The water Act, The Air (Prevention & Control of pollution Act.), Mota Act, Wild life Act. Case studies and preparation of Environmental Impact assessment statement for various Industries

Text Books:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, KAKINADA.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K., Katania & Sons Publication. New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi.
3. Live case studies, journals and publications.

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Elective - IV

SOIL DYNAMICS & MACHINE FOUNDATIONS

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course objectives:

- To derive free and forced vibrations with and without damping for single degree freedom system.
- To Familiarize field and laboratory methods of determination Dynamic Soil Properties.
- To design foundations for reciprocating machine, impact type and rotary type.

Learning Outcomes:

Students will be able to

- analyze free and forced vibrations with and without damping for single degree freedom system.
- solve one dimensional wave motion using wave propagation theory.
- understand pressure bulb concept by Pauw's Analogy.
- evaluate dynamic soil properties by field and laboratory tests.
- analyze machine foundations.

UNIT - I:

Theory of vibrations: Basic definitions- free and forced vibrations with and without damping for single degree freedom system- Resonance and its effect – magnification – Logarithmic decrement.

UNIT - II:

Natural frequency of foundation – Soil system: Barkan's and IS methods – pressure bulb concept – Pauw's Analogy.

UNIT - III:

Wave propagation: One dimensional wave motion – propagation in an elastic infinite medium – wave propagation in an elastic half space – propagation of flexural waves in beams on elastic foundations.

UNIT - IV:

Dynamic Soil Properties: Field and Laboratory methods of determination – Uphole, Down hole and cross hole methods –Cyclic plate load test – Block vibration test – Determination of Damping factor.

UNIT - V:

Block foundation: Degrees of freedom - analysis under different modes of vibration – codal provisions for design and construction of foundations for reciprocating machine, impact type and rotary type.

UNIT - VI:

Vibration Isolation: Generation and propagation of vibrations – basic concept of vibration isolation – base isolation – shock isolation – seismic isolation of bridges.

Text Books:

1. Handbook of Machine Foundations by P.Srinivasulu and G.V.Vaidyanathan, Tata McGraw Hill.
2. Soil Dynamics by ShamsherPrakash, McGraw Hill Publishers.

Reference Books:

1. Dynamics of Bases and Foundations by Barken, McGraw Hill Publishing Co.,New York.
2. Vibration of Soils and Foundations by Richart, Hall and Woods, Prentice Hall, eaglewood Cliffs, New Jersy, USA.

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Elective - IV

DOCKS & HARBOUR ENGINEERING

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize in site reconnaissance for location and planning of harbours.
- To learn fundamental principles of wave hydrodynamics.
- To design, plan and integrate port and harbour infrastructure.

Learning Outcomes:

Students will be able to

- illustrate various aspects of harbour environment.
- explain the influence of natural phenomenon on harbour.
- design port layout.
- provide optimal designs of coastal structures and harbour facilities.

UNIT - I:

History, development and policy, classification of harbours, major ports in India, administrative set up, harbour economics. Harbour components, ship characteristics, characteristics of good harbour, and principles of harbour planning, size of harbour, site selection criteria and layout of harbours.

UNIT - II:

Wind, waves tides and currents phenomena, their generation characteristics and effects on marine structures, silting, erosion and littoral drift.

UNIT - III:

General design aspects, breakwaters - function, types general design principles, wharves, quays, jetties, piers, pier heads, dolphin, fenders, mooring accessories-function, types, suitability, design and construction features.

UNIT - IV:

Tidal basin, wet docks-purpose, design consideration, operation of lock gates and passage, repair docks - graving docks, floating docks, marine railway.

UNIT - V:

Ferry, transfer bridges, floating landing stages, transit sheds, ware houses, cold storage, aprons, cargo handling equipments, purpose and general description.

UNIT - VI:

Channel and entrance demarcation, buoys, beacons, light house electronic communication devices. Coastal protection-purpose and devices, dredging-capital and maintenance dredging, purpose, methods, dredgers-types, suitability, disposal of dredged material.

Text Books:

1. R. Srinivasan and S. C. Rangwala, Harbour, Dock and Tunnel Engineering, 1995, Charotar Pub.House, Anand
2. S. P. Bindra, A Course in Docks and Harbour Engineering, 1992, Dhanpat Rai & Sons, NewDelhi

Reference Books:

1. Alonzo Def. Quinn, Design and Construction of Ports and Marine Structure, McGraw - Hill Book Company, New York.
2. A Course in Docks and Harbour Engineering S. P. Bindra - Dhanpat Rai & Sons, New Delhi
3. Ashford N. and Wright P.H., Airport Engineering, John Wiley and Sons, Inc., New York Horon jeff R and Mackelvey F.X., Planning and Design of Airports fourth Intl. edition, McGraw Hill Book Co., New Delhi.

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Elective - IV

PAVEMENT ANALYSIS & DESIGN

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To discuss aggregate Properties and their Importance
- To explain factors affecting design of pavements
- To evaluate flexible pavement
- To explain importance of joints in Rigid Pavements
- To discuss types of pavement evaluation

Learning Outcomes:

Students will be able to

- select suitable aggregate for different highways.
- explain factors affecting design of pavements.
- design flexible and rigid pavements using IRC and AASHTO.
- execute construction of pavements.

UNIT - I:

Highway materials – soil, aggregate and bitumen- tests on aggregates – aggregate properties and their importance-tests on bitumen – bituminous concrete-requirements of design mix- Marshall's method of bituminous mix design.

UNIT - II:

Types of pavement – factors affecting design of pavements – wheel loads –ESWL concept- tyre pressure – contact pressure, material characteristics – environmental and other factors.

UNIT - III:

Flexible pavement design: CBR method of flexible pavement design- IRC method of flexible pavement design.- AASHTO method of flexible pavement design stresses in flexible pavement – layered systems concept – one layer system – Boussinesq two layer system – Burmister theory for pavement design.

UNIT - IV:

IRC method of rigid pavement design – importance of joints in rigid pavements-types of joints – use of tie bars and dowell bars. stresses in rigid pavements – relative stiffness of slab, modulus of sub-grade reaction – stresses due to warping, stresses due to loads, stresses due to friction.

UNIT - V:

Highway construction – construction of earth roads- gravel roads – WBM roads-bituminous pavements- cement concrete roads- steps in construction- reinforced concrete pavements – soil stabilization – methods and objectives-soil-cement stabilization and soil-lime stabilization.

UNIT - VI:

Need for highway maintenance- pavement failures- failures in flexible pavements-types and causes-rigid pavement failures- types and causes- pavement evaluation-Benkleman beam method- strengthening of existing pavements-overlays.

Text Books:

1. Highway Engineering – S.K.Khanna & C.J.Justo, Nemchand & Bros.
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal – Khanna publishers.

Reference Books:

1. Principles of pavement design – Yoder & Wit Zorac – Jhonwilley & Sons.

   Codes:

   1. IRC Code for flexible pavement – IRC – 37 -2001.
   2. IRC Code for Rigid pavement – IRC – 58 – 2002.

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Elective - V

INDUSTRIAL WASTE WATER MANAGEMENT

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- Describe the characteristics of industrial effluents.
- Introduce manufacturing processes of different types of industries.
- Learn various treatment methods of industrial waste.
- Describe the operational, maintenance problems and economical aspects of various types of industries.
- Learn the design of common effluent treatment plants.

Learning Outcomes:

Students will be able to

- characterize industrial effluents.
- understand different industrial manufacturing process.
- select suitable treatment method for a given industrial waste.
- select the suitable location for treatment plants.

UNIT - I:

Sources of Pollution – Physical, Chemical and Biological properties of Industrial Wastes – Differences between industrial and municipal wastewaters – Effects of industrial effluents on sewers and treatment plants.

UNIT - II:

Pre and Primary Treatment – Equalization, Proportioning, Neutralization, Oil Separation by Floatation – Waste Reduction - Volume Reduction – Strength Reduction- Recirculation of industrial wastes.

UNIT - III:

Waste Treatment Methods – Nitrification and De-nitrification – Phosphorous removal – Heavy metal removal – Membrane Separation Process – Air Stripping and Absorption Processes – Special Treatment Methods – Disposal of Treated Waste and Wastewater.

UNIT - IV:

Characteristics and Composition of wastewater and Manufacturing Processes of Industries like Dairy, Sugar, Fermentation, Food Processing Industries, fisheries.

UNIT - V:

Characteristics and Composition of Industries like Steel, Petroleum Refineries, Textiles, Tanneries, paper and pulp, Atomic Energy Plants and other Mineral Processing Industries.

UNIT - VI:

Joint Treatment of Raw Industrial wastewaters and Domestic Sewage – Common Effluent Plants (CETPs) – Location, Operation and Maintenance Problems – Economical aspects.

Text Books:

1. Industrial Waste Water Pollution Control by W. Wesley Eckenfelder
2. Waste water engineering by Metcalf and Eddy

Reference Books:

1. Liquid waste of industry by Nemerow.
2. Environment Engineering by Peavy, Rowe & Tchobanoglous
3. Water and Waste Water Engineering by Fair and Gayer ,
4. Environmental Engineering by Peavy.

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Elective - V

GROUND WATER DEVELOPMENT & MANAGEMENT

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To study about ground water movement in confined and unconfined layers.
- To explain about the design and installation of tube wells.
- To derive the inter relation of two miscible fluids in porous media both theoretically and field conditions.

Learning Outcomes:

Students will be able to

- characterize the aquifer properties.
- understand the basic principles of the geophysical methods in groundwater exploration and development.
- employ suitable drilling methods depending upon the hydrogeology.
- suggest the control methods against saline intrusion.
- suggest suitable ground water recharge methods.

UNIT - I: Introduction

Ground Water Occurrence: Ground water hydrologic cycle, origin of ground water, rock properties effecting ground water, vertical distribution of ground water, zone of aeration and zone of saturation, geologic formation as Aquifers, types of aquifers, porosity, Specific yield and Specific retention.

UNIT - II: Geophysics

Surface and sub surface investigations: Surface methods of exploration – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetric applications

UNIT - III: Well Design

Water well design – well diameter well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery

UNIT - IV: Well Construction and Development

Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open-hole, bail-down methods, well development-mechanical surging using compressed air, high velocity jetting of

water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT - V: Artificial Recharge

Artificial Recharge of Ground Water: Concept of artificial recharge – recharge methods, relative merits, Applications of GIS and Remote Sensing in Artificial Recharge of Ground water Groundwater Basin Management: Concepts of conjunction use.

UNIT - VI: Saline Water Intrusion

Saline Water Intrusion in aquifer: Occurrence of saline water intrusions, Ghyben-Herzberg relation, Shape of interface, control of seawater intrusion.

Text Books:

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Groundwater by H.M.Raghunath, Wiley Eastern Ltd.

Reference Books:

1. Groundwater by Bawvwr, John Wiley & sons.
2. Groundwater Syatem Planning &Managemnet – R.Willes&W.W.G.Yeh, Printice Hall.
3. Applied Hydrogeology by C.W.Fetta, CBS Publishers & Distributers.

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Elective - V

REPAIRS AND REHABILITATION OF STRUCTURES

IV Year – II Semester

Lecture	: 3 +1*	Internal Marks	: 40
Credits	: 3	External Marks	: 60

Course Objectives:

- To familiarize the students with various types of deteriorations and need for rehabilitation.
- To impart an awareness of damage assessment of various types of deteriorations.
- To produce Civil Engineering students who have strong foundation in non destructive testing and rehabilitation methods.

Learning Outcomes:

Students will be able to

- identify and evaluate the degree of damage in structures.
- select and suggest suitable retrofitting methods.

UNIT - I: Introduction

Deterioration of structures with aging; Need for rehabilitation.

UNIT - II*:* Distress in Concrete / Steel Structures

Types of damages; Sources or causes for damages; effects of damages; Case studies Non destructive evaluation: Importance- Concrete behaviour under corrosion, disintegrated mechanisms- moisture effects and thermal effects

UNIT - III: Damage Assessment and Evaluation models

Damage testing methods; Non-destructive testing methods. – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT - IV: Rehabilitation Methods

Grouting; Detailing; Imbalance of structural stability; Case studies . Strengthening and stabilization- Techniques- design considerations- Beam shear capacity strengthening- Shear Transfer strengthening stress reduction techniques- Column strengthening-flexural strengthening- Connection stabilization and strengthening

UNIT - V: Methods of Repair

Shortcreting; Guniting; Epoxy-cement mortar injection; Crack ceiling- various applications

UNIT - VI: Seismic Retrofitting of Reinforced Concrete Buildings

Introduction; Considerations in retrofitting of structures; Source of weakness in RC frame building – Structural damage due to discontinuous load path; Structural damage due to lack of deformation; Quality of workmanship and materials; Classification of retrofitting techniques; Retrofitting strategies for RC buildings – Structural level (global) retrofit methods; Member level (local) retrofit methods; Comparative analysis of methods of retrofitting

Text Books:

1. Diagnosis and treatment of structures in distress by R.N.Raikar, Published by R&D Centre of Structwel Designers & Consultants Pvt.Ltd., Mumbai, 1994.
2. Handbook on Repair and Rehabilitation of RCC buildings, Published by CPWD, Delhi, 2002 (freely available through Internet).
3. Earthquake resistant design of structures by Pankaj Agarwal and Manish Shrikhande, Prentice-Hall of India, 2006.
4. Repair and protection of concrete structures by Noel P.Mailvaganam, CRC press London.
5. Concrete repair and maintenance Illustrated by Peter.H.Emmons, Galgotia publishers.
6. Failures and repair of concrete structures by S.Champion, John wiley and sons.
7. Handbook on seismic retrofit of buildings, Narosa Publishing House.

Reference Books:

1. Concrete technology- Neville & Brooks.
2. Special Structural concrete- Rafat Siddique.
3. Concrete repair and maintenance illustrated- Peter H Emmons.
4. Concrete technology-M S Shetty.

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Self Study Course

GLOBAL POSITIONING SYSTEMS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the concept and usage of GPS for various applications.

Learning Outcomes:

Students will be able to

- explain the GPS components.
- choose a specific GPS receiver and GPS survey method.
- interpret the navigational message and signals received by the GPS satellite
- identify location of features and map the geospatial features.

UNIT – I: Overview and Observables of GPS

Basic concept. Space segment- constellation, satellites, operational capabilities, denial of accuracy and access. Control segment- master control station, monitor stations, ground control stations. User segment- user categories, receiver types, information services.

Observables:

Data acquisition- code pseudoranges, phase psecudoranges, Doppler data, biases and noise. Data combinations- linear phase combinations, code, psecudorange smoothing. Atmospheric effects- phase and group velocity ,ionospheric refraction, toposoheric refraction, atmospheric monitoring.

UNIT – II: Surveying with GPS

Introduction- terminology definitions, observation techniques, field equipment. Planning a GPS survey- General remarks, Pre survey planning, field reconnaisence, monumentation, organizational design. Surveying Procedure- preobservation, observation, postobservation, ties to control monuments. In Situ data Processing- data transfer, data processing, trouble shooting and quality control, datum transformations, computation of plane coordinates. Survey report.

UNIT – III: Methods of Processing GPS Data

Data processing- data handling, cycle slip detection and repair. Ambiguity resolutions- general aspects, basic approaches, search techniques, ambiguity validation. Adjustment, filtering and smoothening- least squares adjustments, kalmal filtering, smoothening. Network adjustment- single base line solution,

multipoint solution, single base line versus multi point solution, least squares adjustment of base lines. Dilutin of precision. Accuracy measures- introduction, chi-square distribution, specifications.

UNIT – IV: Applications and Future of GPS

General Uses of GPS- global uses, regional uses, local uses. Attitude determination- theoretical and practical considerations. Air borne GPS for photo control. Interoperability of GPS- GPS and inertial navigation systems, GPS and GLONASS, GPS and other sensors.

Future of GPS:

New application aspects. GPS modernization- future GPS satellites, augmented signal structure. GPS augmentation- ground based and satellite based augmentation. GNSS - GNSS development, GNSS/Loran-C integration.

Text Books:

1. B. Hofmann- Wellnhoff, H.Lichtenegger and J. Collins: GPS theory and practice, fifth edition, Springer Wien, Newyork.
2. Bradford W. Parkinson, James Spilker, Global Positioning System: Theory and Applications, Vol. I, 1996.

Reference Books:

1. Gunter Seeber, Satellite Geodesy Foundations, Methods and Applications, Walter de Gruyter Pub., 2003.
2. Hofmann W.B, Lichtenegger, H, Collins, J Global Positioning System – Theory and Practice, Springer-VerlagWein, 2001.

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Self Study Course

INTERIOR DESIGN

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand concepts, principles, procedures and components of communication; interpret reasons of communication failure and source respective remedies.
- To classify communication and select appropriate media; draft business letters and reports pertinent to interior designing profession.
- To work in groups and teams; demonstrate leadership quality; make use of group skills to achieve goals.

Learning Outcomes:

Students will able to

- implement the key features that can enhance architectural view.
- understand the need of designing construction projects.
- identify the paints and materials for specific interior design.

UNIT – I: Interior Design and Decoration, Decoration and Tools

Importance of design - Optimization, Economics, Time, Maintainability, Multiplicity, Role of Interior Designer-Interest of user with respect to economy, comfort, safety, security, etc, Limitations on design due to existing constraints

Aesthetical tools

a. Principles of Design - Balance, Emphasis, Rhythm, Harmony, Scale and Proportion

b. Elements of design - Point, Line, Shape, Form, colour and colour theory, Texture and Pattern

c. Aesthetical design consideration - Physical such as touch, smell, hearing, Social such as interactive, status symbols, Psychological such as derivable pleasure from use, emotional comfort, Ideological such as environmental, patriotic, socialistic conditions .

Functional tools

a. Ergonomics- Its study - Postures, Anthropometrics, Biomechanics.

b. Zoning, Grids, Modulation of space within and without, enveloping space within the room and furniture.

UNIT – II: Design Notions

Concepts - Manifestation of realization through contemplative germination, Period & Styles - Historical & Cultural approach with stress on ability to identify Occidental

Periods and Oriental styles and with special focus on Contemporary Indian period and styles.

a. Occidental - Classical, Medieval, 19th Century AD, Contemporary
b. Oriental - Japanese, Chinese, Thai, and Indian Themes - The common thread that binds the entire design in a story line on Beach and Mela.

UNIT – III: Planning Process

Understanding process of design (Need-Design brief-Information collection-Developing Alternatives-Analysis-Solution) Planning Process of Interior Design

a. Design Brief - simple and clear description about what is to be designed.
b. Relevant Data collection such as location & condition of site, Client profile & requirements, Materials, etc.
c. Data Analysis - analyzing and forming alternative schemes based on personal interpretations of design brief and relevant data using design tools and design concepts.
d. Selection- finalizing the best scheme through personal justifications.
e. Presentation- representing the final scheme in graphical manner.

UNIT – IV: Materials, Paints, Varinishes and Coatings for Interior Design

Cement, Lime, Sand and Gypsum: Types & Properties of Cement, Lime, Fine and Course Aggregates Types & Applications of Concretes, Mortars and Plasters Properties & Applications of Gypsum & its products.

Paints, varnishes and coatings:

Constituents (Pigment, Thinner, etc.), Classification (Water, Oil, acrylic based), Types (lime wash, distempers, acrylic emulsion, metallic, textured, etc.), Textural quality (Matt, Gloss, Satin, Lustre, etc) and Properties Process of painting (preparation of surface, primer coat, etc.) & application of paint with brush, roller, spray, etc. including applications of paints on different surfaces. Constituents, Types & uses of Varnishes, Polishes & Coatings.

Text Books:

1. Joseph De Chaira Jullius Panero Martin Zelnik Time Saver Standard for Interior Design & Space Planning Mcgraw Hill New York.
2. John Pile Interior Design Harry N. Adry Publishers.

Reference Books:

1. Jullius Panero Martin Zelnik Human Dimensions and Interior Spaces Whitney Library New York.
2. Phillis Sleen Allen Beginning of Interior Environment New York.
3. Shirish Bapat Basic Design of Anthropometry Bela books Publishers.
4. Shirish Bapat Living Area (Interior Space) Bela books Publishers.

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Self Study Course

ELECTRICAL SAFETY MANAGEMENT

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To provide a comprehensive exposure to electrical hazards, safety procedures.
- To familiarize the students with various grounding techniques.

Learning Outcomes:

Students will be able to

- describe electrical hazards and safety equipment.
- analyze and apply various grounding and bonding techniques.
- select appropriate safety method for low, medium and high voltage equipment.
- participate in a safety team.

UNIT – I:

Primary and secondary hazards- arc, blast, shocks-causes and effects-safety equipment- flash and thermal protection, head and eye protection-rubber insulating equipment, hot sticks, insulated tools, barriers and signs, safety tags, locking devices- electrician's safety kit.

UNIT – II:

The six step safety methods- pre job briefings- hot -work decision tree-safe switching of power system, safety equipment, procedure for low, medium and high voltage systems- the one minute safety audit.

UNIT – III:

General requirements for grounding and bonding- definitions- grounding of electrical equipment- bonding of electrically conducting materials and other equipment-connection of grounding and bonding equipment- system grounding- purpose of system grounding- grounding of low voltage and high voltage systems.

UNIT – IV:

Company safety team- safety policy- safety meetings- safety audit- accident prevention- first aid- rescue techniques-accident investigation- national electrical safety code- standard for electrical safety in work place- occupational safety and health administration standards.

Text Book:

1. *Dennis Neitzel*, Al Winfield,'Electrical Safety Handbook', McGraw-Hill Education, 4th Edition,2012.

Reference Books:

1. John Cadick, 'Electrical Safety Handbook', McGraw-Hill School Education Group, 1994.
2. Maxwell Adams.J, "Electrical safety- a guide to the causes and prevention of electric hazards",The Institution of Electric Engineers, 1994.
3. Ray A. Jones, Jane G. Jones, 'Electrical safety in the workplace', Jones & Bartlett Learning, 2000.

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Self Study Course

GREEN ENGINEERING

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To impart knowledge, how engineering fundamentals can be applied to achieve sustainability and minimize environmental impacts in all engineering disciplines across life cycles.

Learning Outcomes:

Students will be able to

- To Create sustainable products, facilities, processes and infrastructure.
- To Design ecofriendly products.

UNIT - I: Introduction

Humanity and Technology, the Concept of Sustainability, Industrial Ecology and Sustainable Engineering Concepts.The Relevance of Biological Ecology to Industrial Ecology, Metabolic Analysis, Technology and Risk, the Social Dimensions of Industrial Ecology.

UNIT - II: Implementation

Sustainable Engineering, Technological Product Development, Design for Environment and Sustainability: Customer Products, Design for Environment and Sustainability: Buildings and Infrastructure.

UNIT - III: Life Cycle Assessment

An Introduction to Life Cycle Assessment, The LCA Impact and Interpretation Stages, Streamlining the LCA Process.

UNIT - IV: Analysis of Technological Systems

Systems Analysis, Industrial Ecosystems, Material Flow Analysis, Energy and Industrial Ecology, Water and Industrial Ecology, Urban Industrial Ecology, Modelling in Industrial Ecology.

Text Books:

1. T E Graedel, Braden R Allenby “Industrial ecology and sustainable engineering” Prentice Hall, ©2010.
2. David T. Allen, David R Shonnard “Sustainable Engineering Concepts, Design and Case Studies” Prentice Hall, 2011.

References Books:

1. Anastas, Paul T, Zimmerman, Julie B, “Innovations in Green Chemistry and Green Engineering”, Springer, First Edition, 2013.
2. Daniel A. Vallero, Chris Brasier, “Sustainable Design: The Science of Sustainability and Green Engineering”, Wiley, First Edition, 2008.

Self Study Course

MANAGING INNOVATION & ENTREPRENEURSHIP

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- Understand process of innovation and its exploitation.

Learning Outcomes:

Students will be able to

- explore opportunities to implement innovative ideas.
- assess the level of risk involved in realizing the innovative ideas as entrepreneur.

UNIT - I:

Innovation and entrepreneurship. A model for innovation and entrepreneurship, the challenge of innovation strategy.

UNIT - II:

The challenge of social entrepreneurship, the potential of" bottom of the pyramid", challenges in managing social entrepreneurship.

UNIT - III:

Developing new products, services and ventures. The global business plan.

UNIT - IV:

International Opportunities for Innovation and Entrepreneurship. The Future Impact on Innovation on Consumers, Business and Government

Text books:

1. John Bessant, Joe Tidd, "Innovation and Entrepreneurship", John Wiley and sons Ltd, second edition, 2011.
2. Robert D Hisrich Claudine Kearney "Managing Innovation and Entrepreneurship" SAGE publications, 2014.

Reference Books:

1. Joe Tidd , John Bessant, "Managing Innovation: Integrating technological, market and organizational change" Wiley, Fifth edition, 2013.
2. Joe Tidd , John Bessant, "Strategic Innovation Management", Wiley, First edition, 2014.
3. Richard Owen , John Bessant , Maggy Heintz , "Responsible Innovation: Managing the Responsible Emergence of Science and Innovation in Society", Wiley, First edition,2013.

Self Study Course

INTERNET OF THINGS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize with IOT levels and Protocols.
- To provide an insight on specific IoT domain.

Learning Outcomes:

Students will be able to

- integrate Internet services and physical objects.
- analyze prototypes of Internet-connected products using appropriate tools.
- apply adequate patterns for user-interaction with connected-objects

UNIT - I: Introduction to Internet of Things

Introduction, History , Objects and things, The identifier, Enabling technology , The internet.

UNIT - II: **RFID**

Introduction and principles , Components- Active, Passive, Semi-active, and Semi-passive; Future of RFID, RFID application scenarios-case study

UNIT - III: **Wireless Sensor Network**

Overview , History, The node, Connecting Nodes, Networking Nodes. Securing communication- standards.

UNIT - IV: Internet of Things Protocols

An Introduction to M2M area network physical layers , Applications, Introduction to Legacy M2M protocols for sensor networks, Examples (Mod Bus, Zig Bee). Introduction to next generation Internet of Things Protocols-IP based protocols.

Text Books:

1. Hakima Chaouchi, “The Internet of Things: Connecting Objects”, John Wiley and sons, ISTE, Briton. (I to III Units).
2. Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things: Key Applications and Protocols”, johnwiley and sons. (IV unit).

Reference Books:

1. Sergei Evdokimov, Benjamin Fabian, Oliver Gunther, Lenka Ivantysynova, Holger Ziekow, “RFID and the Internet of Things: Technology, Applications, and Security challenges”, Now Publishers Inc, 2011.
2. Lu Yan, Yan Zhang, Laurence T. Yang, Huansheng Ning,”The Internet of Things: From RFID to the Next-Generation Pervasive Networked systems”, Auerbach Publications,CRC Press.

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Self Study Course

CONSUMER ELECTRONICS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand working principles of various electronic gadgets and consumer products.
- To study the various technical specifications and facilities of the consumer products.

Learning Outcomes:

Students will be able to

- how to work with latest electronic gadgets.
- understand audio and video processing.
- keen learn with home appliances.
- should able to differentiate old and latest developments in electronic world

UNIT - I: Audio Systems

PA system – Microphone, Amplifier, Loudspeakers, Radio receivers – AM/FM, Audio recording and reproduction – Cassettes, CD and MP3.

UNIT - II: Video Systems

Video system VCR/VCD/DVD players, MP4 players, Set Top box, CATV and Dish TV, LCD, Plasma & LED TV, Projectors – DLP, Home Theatres, Remote Controls.

UNIT - III: Landline and Mobile Telephony

Basic landline equipment – CLI, Cordless Intercom/ EPABX system, Mobile phones – GPRS & Bluetooth GPS Navigation system.

UNIT - IV: Electronic Gadgets

Scanners – Barcode / Flat bed, Printers, Xerox, Multifunction units (Print, Scan, fax, and copy) Digital clock, Digital camera, Handicam, Home security system, CCTV.

Text Books:

1. S. P. Bali ,"Consumer Electronics", Pearson Education ,2008.
2. R. G. Gupta "Audio and Video systems: Principles, Maintenance and Troubleshooting", Tata McGraw Hill (2004).

Reference Books:

1. Ronald K.Jurgen, "Digital Consumer Electronics Handbook", McGraw Hill Professional Publishing, 1997.
2. R.R Gulati, "Colour Television-principles and practice", Wiley Eastern Limited, New Delhi.
3. B.R. Gupta, Vandana singhal,"Consumer Electronics", S.K. Kataria and sons, 2006.

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Self Study Course

e-WASTE MANAGEMENT

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To familiarize the concepts of e-Waste management.
- To gain knowledge in recycling technologies for e-Waste.

Learning Outcomes:

Students will be able to

- analyze the recycling techniques of e-Waste management.
- analyze various toxic releases and health complications due to e-Waste.
- apply various reuse techniques for e-Waste.
- acquire knowledge for handling and management of e-Waste.
- apply waste disposal strategy for e-Waste.

UNIT – I: Introduction to e-Waste Management in India

Global e-waste growth, Dark shadows of digitization on Indian horizon, e-waste generation, migration, Present practice and systems, disposal methods, Present processing practices, Initiatives to manage e-waste, Strengths and weaknesses of the current system.

UNIT – II: WEEE (waste electrical and electronic equipment) - toxicity and health

Hazardous substances in waste electrical and electronic equipment-toxicity and release, Occupational and environmental health perspectives of e-waste recycling.

UNIT – III: Options and Scenarios for e-Waste Management

Actions to be considered to achieve goals of e-waste management, Collection/ take back system, Closing the Plastic loop: Turning the supply chain into a supply cycle by mining plastics from end-of-life electronics and other durable goods.

UNIT – IV: Recycling technologies for e-waste

Recycling of e-scrap in a global environment-opportunities and challenges, Technologies for recovery of resources from e-waste.

Reuse: A Bridge from Unsustainable e-waste to sustainable e-resources.

Text Books:

1. Rakesh Johri, E-waste: Implications, regulations, and management in India and current global best practices .
2. Klaus Hieronymi, Ramzy Kahhat, Eric Williams, E-Waste Management: from Waste to Resource

Reference Books:

1. Satish Sinha, Priti Mahesh,Waste Electrical and Electronic Equipment The EU and India.
2. By Ronald E. Hester, Roy M. Harrison , Electronic Waste Management .

Self Study Course

MANAGEMENT INFORMATION SYSTEMS

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To understand the scope of information systems and strategies.
- To know the types of information systems and their functionalities in an enterprise.
- To know the applications of information systems in various business areas
- To analyze and develop the system.

Learning Outcomes

Students will be able to

- define the basic concepts, strategies and challenges of MIS.
- describe the nature of the information system in the business process.
- analyze the applications of information system in various functional business areas.
- compare various information system design and analysis.

UNIT – I: Introduction to Information Systems

International Information Systems Meaning, Scope of Information Systems**,** Concepts of system and organization, strategic uses, Evolution of MIS, Challenges and New opportunities. Growth of international information systems; Managing global information Systems.

UNIT – II: Information System in the Enterprise

Major types of Systems in the organization; Systems from a functional perspective; Enterprise e application–Enterprise systems, Business Process Reengineering and Information Technology.

UNIT – III: Application of Information Systems to Functional Business Areas

Significance of Information systems; Application of Operational Information System to Business;

UNIT – IV: Systems Analysis and Design

Systems analysis; Structured systems analysis and design; Alternative application development and evaluation, IT Act 2000

Text Books:

1. Kenneth C Laudon & Jane P Laudon, Management Information Systems, 8th Edition, PHI–2003.
2. Robert Schultheis & Mary Sumner, Management Information Systems–The Managers View 20th reprint, TMH –2010.

Reference Books:

1. V.M.Prasad, Management Information Systems, 9th Edition, PearsonEducation–2005.
2. Robert G Murdick, Joel E Ross & James R Claggett , Information Systems for Modern Management, 3rd Edition, PHI - 2007.

Self Study Course

INFORMATION & COMMUNICATION TECHNOLOGY

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To explore the use of internet to access remote information, communicate and collaborate with others.
- To familiarize with social, economic, security and ethical issues associated with the use of ICT.

Learning Outcomes:

Students will be able to

- understand the basic concepts of networking.
- explore internet for learning.
- understand social, economic and security issues associated with the use of ICT.
- apply the concepts of ICT for their professional growth.

UNIT – I: Computer Networks & Internet

Concept, Types & Functions of Computer Networks, Internet and its Applications, Web Browsers & Search Engines, Legal & Ethical Issues.

UNIT – II: E-Learning & Web Based Learning

E-Learning, Web Based Learning, Virtual Classroom- concept, elements, advantages and limitations, EDUSAT

UNIT – III: Effects of using ICT

Software Copyright, Hacking, Viruses & its Management, Employment Patterns, IT in the home, Information from the Internet, Health and Safety**.**

UNIT – IV: ICT for Professional Development

ICT for Personal & Professional Development: Tools & Opportunities.
Open Education Resources: Concept & Significance.

Text Books:

1. Roger Crawford, Heinemann IGCSE ICT, Pearson Education Limited

Reference Books:

1. Agarwal J.P. (2013): Modern Educational Technology. Black Prints, Delhi.
2. Barton,R.(2004).Teaching Secondary Science with ICT. McGraw Hill International
3. Bhaskar Rao (2013): Samachara Prasara Sankethika vidya Shastramu, Masterminds, Guntur.
4. Cambridge, D.(2010).E-Portfolios for Lifelong Learning and Assessment. John Wiley and Sons

Self Study Course

ORGANIZATIONAL BEHAVIOUR

IV Year – II Semester

Lecture	: -	Internal Marks	: 25
Credits	: 2	External Marks	: 50

Course Objectives:

- To provide a basic knowledge of main ideas and key theories relating to organizational behavior.
- To understand basic concepts, theories and techniques in the field of human behaviour at the individual, group and organizational levels in the changing global scenario.
- To increase managerial effectiveness through understanding of self and others.
- To develop an interest in, an appreciation of, and a positive attitude toward the many aspects of the subject matter of management.

Learning Outcomes:

Students will be able to

- eemonstrate clear understanding of a number of established theorists, theories and studies relating to Organizational Behavior.
- explain and evaluate the key assumptions on which behaviour in organizations is currently managed and assess the effect of these ideas on employee attitudes and actions.
- apply problem solving and critical thinking abilities to analyze the kinds of choices available for developing alternative Organizational Behaviour approaches in the workplace.
- form an appreciation of the complexities and uncertainties of Organizational Behaviour by examining your own role in the light of experience of real-time problem settings.

UNIT – I: Introduction

Nature, scope & Importance – linkages with other social sciences – Individual Roles and Organizational Goals - Perspectives of Human Behavior, Approach to Organizational behavior - models of organizational behavior (Autocratic, Custodial, Supportive, Collegial & SOBC).

UNIT – II: Perceptual Management

Nature, importance - Process – selection, organization and interpretation – Influencing factors **-**Motivation – Concepts - Needs and Motives and theories (Maslow & Herzberg) Leadership and Motivating people - Leadership Theories. Attitudes and Values: formation - types – changes and behavior modification techniques.

UNIT – III: Personality Development

Nature - Stages, Factors, Determinants of Personality, Theories of personality - Johari Window - Transactional Analysis, Learning Processes - theories, Creativity and Creative Thinking. Leadership – nature – skills. Decision Making Process**:** Behavioral Dimensions, Groups and their formation - Group Dynamics, Informal Organizations, Group versus Individual Interaction.

UNIT – IV: Inter- Personal Communication

Listening, Feedback, Collaborative Processes in Work Groups, Team Building, Team Decision Making, Conflict Resolution in Groups and Problem Solving Techniques.

Taxonomy, Elements of Structure, Determinants of Structure, Functional Aspects of Structure, Role Impingement, Stress in Organization. Principles Underlying the Design of Organizations, Organizational Culture, Power and Authority. Organizational Development**:** Goals, processes, change – resistance to change – Nature of OD - interventions, OD techniques and OD applications.

Text Books:

1. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma:"Organizational Behavior", Tata McGraw Hill Education, New Delhi, 2008.
2. K.Aswathappa: "Organizational Behavior-Text, Cases and Games", Himalaya Publishing House, New Delhi,

Reference Books:

1. Jerald Greenberg and Robert A Baron: "***Behavior in Organizations***", PHI Learning Private Limited, New Delhi, 2009.
2. Pareek Udai: "***Understanding Organizational Behavior***", Oxford University Press, New Delhi, 2007.
3. Jai B.P.Sinha: "***Culture and Organizational Behavior***", Sage Publication India Private Limted, New Delhi, 2008.
4. Sharma VS, Veluri: "***Organizational Behavior***", JAICO Publishing House, New Delhi, 2009.
5. Slocum,n Helireigel: "***Fundamentals of Organizational Behavior***", Cengage Learning India, New Delhi, 2009.

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