ACADEMIC REGULATIONS

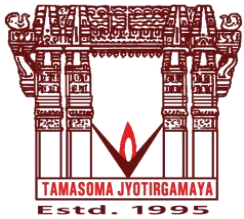
COURSE STRUCTURE AND

DETAILED SYLLABUS

Civil Engineering

B.TECH. FOUR YEAR DEGREE COURSE

(Applicable for the batches admitted from 2012-2013)



VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY

An Autonomous Institute
Approved by AICTE & Affiliated to JNTUH
Accredited by NBA and NAAC with 'A' Grade

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VNR VIGNANA JYOTHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
HYDERABAD
An Autonomous Institute
Approved by AICTE, New Delhi and Govt. of A.P & Affiliated to JNTUH

ACADEMIC REGULATIONS FOR B.TECH. DEGREE COURSE

(Applicable for Students admitted from the academic year 2012-2013)

1. Courses of study

The following courses of study are offered at present for specialization for the B. Tech. Course:

Branch Code	Branch
01	Civil Engineering.
02	Electrical and Electronics Engineering
03	Mechanical Engineering
04	Electronics and Communication Engineering
05	Computer Science and Engineering.
10	Electronics and Instrumentation Engineering
12	Information Technology
24	Automobile Engineering

1.1 Eligibility Criteria for Admission

The eligibility criteria for admission into engineering programmes shall be as mentioned below:

The candidate shall be an Indian National / NRI

The candidate should have completed 16 years of age as on 31st December of the academic year for which the admissions are being conducted.

The Candidate should have passed the qualifying examination (10+2) or equivalent as on the date of admission.

Seats in each programme in the Institution are classified into **Category** A and **Category** B as per the G.Os.

1.1.1 Category – A Seats

These seats will be filled through counseling as per the rank at the Common Entrance Test (EAMCET) conducted by the State Government and as per other admission criteria laid down in the G.Os.

1.1.2 Category - B Seats

These seats will be filled by the institute as per the G.Os Issued by State Government from time to time.

1.1.3 Category: Lateral Entry

The candidate shall be admitted into the Third Semester, based on the rank secured by the candidate at Engineering Common Entrance Test (ECET(FDH)) by the Convener, ECET.

2. Distribution and Weightage of Marks

i. The performance of a student in each Semester shall be evaluated subject –wise with **a maximum of 100 marks for theory and 100 marks for practical subjects.** In addition, an Industry oriented mini-project, Seminar, Comprehensive viva-voce, and Project Work shall be evaluated for **50, 50, 50 and 200 marks** respectively.

ii. For theory subjects the distribution shall be **30 marks for Mid Semester Evaluation** and **70 marks for the End-Examination**.

For theory subjects, Two mid examinations will be conducted in each Semester as per the academic calendar. Each mid examination is evaluated for 25 marks.

Two assignments are to be given to students covering the syllabus of first Mid and second Mid examinations and are evaluated for 5 marks each. .

The first assignment shall be submitted before first mid examinations and second Assignment should be submitted before second mid examination.

At the end of the Semester, Internal Marks (Maximum 30) for the respective subject is assigned as follows:

(a) 25 marks: 80% from the best performed Mid examination and 20% from the other Mid examination.

(b) 5 marks: Average of the two assignment marks

iii. For practical subjects there shall be a continuous evaluation during the Semester for 30 **marks and 70 marks for end examination**. Out of the 30 marks, **day-to-day work in the laboratory shall be evaluated for 10 marks**, and 10 marks for practical examination (two practical examinations will be conducted and the average of the two examinations will be taken into account) and 10 marks for laboratory record.

NOTE: A student who is absent for any assignment/Mid term examination for any reason what so ever shall be deemed to have secured 'zero'

marks in the test/examination and no makeup test/examination shall be conducted.

iv For the subjects having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing, Production Drawing Practice, and Estimation etc.,) the distribution shall be 30 **marks for internal evaluation (15 marks for day-to-day work and 15 marks for Mid examination (**the average of the two examinations will be taken into account**) and 70 marks for end semester examination.** There shall be **two Mid examinations** in a Semester.

V There shall be an **industry-oriented mini-Project**, in collaboration with an industry of their specialization, to be taken up during the a summer vacation after III year II Semester examination. The **mini project shall be evaluated during the IV year I Semester.** The industry oriented mini project shall be submitted in report form and should be presented before a committee, which shall be evaluated for **50 marks.** The committee consists of Head of the Department, the supervisor of mini project and a senior faculty member of the department. There shall be **no Midterm assessment for industry oriented mini project. However, attending the shadow engineering program is a pre – requisite for evaluating industry – oriented mini project**. Students should submit a report on learning outcomes of the shadow engineering. Every student should attend shadow engineering programming an industry for a week days during second year I or II semester.

vi. There shall be a **Seminar presentation in IV year II Semester**. For the Seminar, the student shall collect the information on a specialized topic other than the project topic and prepare a technical report, showing his understanding of the topic, and submit to the department, which shall be evaluated by a Departmental committee consisting of the Head of the department, Seminar supervisor and a senior faculty member. **The seminar will be awarded 50 marks in which 40 marks will be evaluated for seminar report and 10 marks for MTP Record by the committee.**

vii. There shall be a **Comprehensive Viva-Voce in IV year II Semester**. The Comprehensive Viva-Voce will be conducted by a Committee consisting of the Head of the Department and three Senior Faculty members of the Department. The Comprehensive Viva-Voce is aimed to assess the student's understanding in various subjects studied during the B.Tech. course of study. The Comprehensive Viva-Voce is evaluated **for 50 marks** by the Committee. There will be **no Midterm assessment for the Comprehensive viva-voce.**

viii. The Project work shall be started by the student in the beginning of the IV year I Semester. Out of a total of **200 marks** for the project work, **60 marks**

shall be for Midterm Evaluation and **140 marks for the Semester end Examination**. The viva-voce shall be conducted by a committee comprising of an external examiner, Head of the Department and the project supervisor and one senior faculty. The evaluation of project work shall be conducted at the end of the IV year II Semester. **The Midterm Evaluation shall be on the basis of three Seminars conducted during the IV year II Semester for 30 marks by the committee consisting of Head of the Department, project supervisor and senior faculty member of the Department and for 30 marks by the supervisor of the project.**

3. Semester end Examination

(a) Theory Courses

Each course is evaluated for 70 marks. Examination is of 3 hours duration.

(b) Practical Courses

Each lab course is evaluated for 70 marks. The examination shall be conducted by the laboratory teacher and another senior teacher concerned with the subject of the same/other department/Industry. One examiner may be appointed by the Chief Superintendent in consultation with HOD as and when required.

(c) Supplementary Examinations

Supplementary examinations will be conducted along with regular Semester end examinations.

(During even Semester regular examinations: supplementary examinations of odd Semester

and during odd Semester regular examinations: supplementary examinations of even Semester will be conducted).

4. Attendance Requirements

i. A student shall be eligible to appear for the Semester end examinations if he acquires a **minimum of 75% of attendance in aggregate of all the subjects** for Semester.

ii. Condonation of shortage of attendance in aggregate **up to 10% (65% and above and below 75%)** in a Semester may be granted by **Institute Academic Committee.**

iii. A student will not be permitted to write the end examination and not promoted to the next Semester unless he satisfies the attendance requirement of the present Semester, as applicable. He may seek re-admission for that Semester when offered next.

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

v. Students whose shortage of attendance is not condoned in any Semester are not eligible to take their end semester examination of that Semester.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance.

5. Minimum Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No.**4.**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project, if he secures **not less than 35% (25 out of 70 marks)** of **marks in the end examination and a minimum of 40% of marks in the sum total of the Midterm evaluation and end semester examination taken together.**

ii. A student shall be **promoted from II to III year** only if he fulfils the academic requirement of **37 credits from the following examinations,**

- Two regular and one supplementary examinations of I year I Semester
- One Regular and One Supplementary exam of I year II Semester
- one regular examination of II year I Semester irrespective

iii. A student shall be **promoted from III year to IV year** only if he fulfils the academic requirements of total 62 **credits from the following examinations,**

- Three regular and Two supplementary examinations of I B Tech I Semester.
- Two regular and two Supplementary examinations for I B Tech II Semester
- Two regular and one supplementary examinations up to the end of II year I Semester.
- One regular and one supplementary examinations of II year II Semester.
- One regular examination of III year I Semester.

iv. A student shall register and put up minimum academic requirement in all 200 credits and earn the 200 credits. Marks obtained in all 200 credits shall be considered for the calculation of Cumulative Grade Point Average **(CGPA)**.

v. In addition to the above 200 credits the student must complete the non credit courses also. The non-credit courses awarded with a grade of satisfactory or not satisfactory based on the attendance of the student. Minimum attendance for the non-credit course is 75%.

vi. The student should also register and complete any two value added courses offered by the Institute.

vii. Students who fail to earn 200 credits as indicated in the course structure **within eight academic years** from the year of

their admission shall **forfeit their seat** in B.Tech. course and their **admission stands cancelled.**

6. Course pattern

i. The entire course of study is of four academic years. **All the I, II, III and IV years are of Semester pattern .**

ii. A student eligible to appear for the end semester examination in a subject, but absent or has failed in the end semester examination may reappear for that subject at the supplementary examination whenever conducted.

iii. When a student is detained due to shortage of attendance in any Semester, he may be re-admitted into that Semester when it is offered next, **with the academic regulations of the batch into which he gets readmitted.**

iv. When a student is detained due to lack of credits in any year, he may be eligible to be promoted or for promotion into the next year after fulfillment of the academic requirements, **with the academic regulations of the batch into which he gets admitted**

Award of B.Tech. Degree and Class

A student will be declared eligible for the award of the B. Tech. Degree if he/she fulfils the following academic regulations:

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

ii) Registered for **200 credits** and secured **200 credits and other Academic Requirements .**

iii) complete the non-credit courses and value added courses as per their course structure.

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

7. CGPA System:

Method of awarding absolute grades and grade points:
The **absolute grading method** is followed, based on the total marks obtained in internal and external examinations. Grades and grade points are assigned as per the Table given below

B.Tech Program: The Absolute Grading Method is followed, based on the total marks obtained in internal and external examinations. Grades and Grade points are assigned as given below

Marks Obtained	Grade	Description of Grade	Grade Points(GP) Value Per Credit
>=90	O	Outstanding	10.00
>=80 and <89.99	A+	Excellent	9.00
>=70 and <79.99	A	Very Good	8.00
>=60 and <69.99	B	Good	7.00
>=50 and <59.99	C	Fair	6.00
>=40 and <49.99	D	Pass	5.00
<40	F	Remedial	
Not Appeared the Exam(s)	N	Absent	

The student is eligible for the award of the B.Tech degree with the class as mentioned in the Table.

CGPA	CLASS
>= 7.5	First Class with Distinction
>= 6.5 and <7.5	First class
>= 5.5 and < 6.5	Second Class
>=5.0 and < 5.5	Pass class

Calculation of Semester Grade Points Average (SGPA):

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

$$SGPA = \frac{Total\ Earned\ Weighted\ Grade\ Points\ for\ that\ Semester}{Total\ Credits\ for\ the\ Semester}$$

$$SGPA = \frac{\sum_{i=1}^{P} Ci * Gi}{\sum_{i=1}^{P} Ci}$$

Where 'Ci' = Number of Credits allotted to particular subject 'I'

'Gi' = Grade Point corresponding to the letter grade awarded in that subject 'i"

'i"= 1,2,…..P represent the number of subjects for that particular semester

* **SGPA is calculated and awarded for the candidates who pass all the courses in a semester.**

Calculation of Cumulative Grade Point Average (CGPA) for Entire Programme.

The CGPA is calculated as below:

Assessment of the overall performance of a student is obtained by calculating Cumulative Grade Point Average (CGPA), which is weighted average of the grade points obtained in all subjects during the course of study.

$$CGPA = \frac{\sum_{i=1}^{m} Ci * Gi}{\sum_{i=1}^{m} Ci}$$

Where Ci= Number of credits allotted to a particular subject 'I"

Gi = Grade Point corresponding to the letter grade awarded in that subject 'i"

I= 1,2,….m represent the number of subjects of the entire program.

Grade lower than D in any subject is not considered for CGPA calculation. The CGPA is awarded only when the student acquires the required number of credits prescribed for the program.

Grade Card

The grade card issued shall contain the following:

a) The credits for each subject offered in that semester
b) The letter grade and grade point awarded in each subject
c) The **SGPA/CGPA**
d) Total number of credits earned by the student up to the end of that semester.
e) Award list indicating the marks awarded to the student.

8. Withholding of Results

If the student has not paid dues to College, or if any case of indiscipline is pending against him, the result of the candidate may be withheld and he will not be allowed to go into the next higher Semester. The award or issue of the Degree may also be withheld in such cases.

9. **Transitory Regulations**

Students who have discontinued or have been detained for want of attendance or any other academic requirements, may be considered for readmission as and when they become eligible. They have to take up Equivalent subjects, as substitute subject in place of repetition of subjects as decided by the Institute Academic Committee.

10. Minimum Instruction Days

The minimum instruction days for each Semester shall be **90 instruction days.**

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

12. The decision of the Institute Academic Committee will be final in respect of equivalent subjects for those students who are transferred from other colleges. The procedure for permitting students to transfer from other colleges will be decided by the principal / Institute Academic Committee keeping the Government Rules in view.

13. General

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

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

iii. In the case of any discrepancy/ambiguity/doubt arises in the above rules and regulations, the decision of the Principal shall be final.

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

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

(Applicable for students admitted from the academic year 2013-2014)

(i) A student shall register for all 150 credits and earn all the 150 credits. Marks obtained in all 150 credits shall be considered for the calculation of the class.

(ii) A student who fails to earn 150 credits as indicated in the course structure within **six** academic years from the year of their admission shall forfeit their seat in B.Tech. programme and their admission stands cancelled.

(iii) The same attendance regulations are adopted as that of B.Tech. Four year degree course.

(iv) A student shall be promoted from third year to fourth year only on fulfilling the academic requirements of securing 37 credits from the following examinations.

a. Two regular and one supplementary examination of II year I Semester

b. One regular and one supplementary examination of II year II Semester

c. One regular examination of III year I Semester.

In case of getting detained for want of credits the student may make up the credits through supplementary exams of the above exams before the date of commencement of class work for IV year I Semester.

(v) All other regulations as applicable to B.Tech. four year degree course will hold good for B.Tech. (Lateral Entry Scheme).

15. Malpractice Rules

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 candidate 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/year. The Hall Ticket of the candidate is to 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 examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection

		with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the 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/year. The candidate is also debarred for two consecutive semesters from class work and all end semester 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 the 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 and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of	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/year. The candidates are also 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.

	his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the College campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
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 performance in that subject and all the 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/year. 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 for the remaining examinations of the subjects of that semester/year. 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.	If the student belongs to the college, 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/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be 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/year.
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/year.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the academic council of the Institute for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center.

1) Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved through the Principal to his address and to the candidate(s) permanent address regarding the malpractice and seek explanations.
3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquire.

4) Based on the explanation and recommendation of the committee action may be initiated.

5) Malpractice committee:

i. Controller of Examinations	Chairman
ii. Assistant controller of Evaluation	Member
iii. Chief Examiner of the subject/subject expert	Member
iv. Concerned Head of the Department	Member

Vision and Mission of the Institute

VISION

To be a World Class University providing value-based education, conducting interdisciplinary research in cutting edge technologies leading to sustainable socio economic development of the nation

MISSION

- To produce technically competent and socially responsible engineers, managers and entrepreneurs who will be future ready.
- To involve students and faculty in innovative research projects linked with industry, academic and research institutions in India and abroad.
- To use modern pedagogy for improving the teaching-learning process.

Vision and Mission of the Department

VISION

To develop Civil Engineering Department as a Centre of excellence for imparting value based education to the students at undergraduate and post-graduate level to meet industry needs and to develop as a major research center meeting national and international standards.

MISSION

- To impart in-depth and up-to-date knowledge of Civil Engineering concepts with focus on character enhancement, leadership qualities, effective communication, social responsibility and pursuit of lifelong learning and professional development.
- To provide a platform to the students to engage in original research work in association with faculty.

VNR Vignana Jyothi Institute of Engineering & Technology

Program Educational Objectives (PEOs)

I To provide students with a solid foundation in Basic Sciences, Mathematics to analyze, synthesize and evaluate the information to achieve expertise in core areas of Civil Engineering.

II To equip students with modern professional abilities such as effective communication, collaborative work in diverse teams, ethical decision making, successful management of personal and professional career objectives and passion for continuous development through lifelong learning.

III To prepare the students to achieve high level technical expertise in the fields of Environmental Engineering, Geo- Technical Engineering, Structural Engineering, Transportation Engineering, Water Resources Engineering and to excel in the design and construction of various components or systems of Civil Engineering.

IV To provide expertise through learning advanced courses in various streams of Civil Engineering, by offering elective subjects with a view to make the students capable to pursue higher studies and research.

V To provide opportunities for students to learn multidisciplinary subjects such as Elements of Electrical and Mechanical Engineering, C Programming & Data Structures, and other open electives to make them a complete Engineer

VI To establish acquaintance with the practical implementation of the theoretical concepts through laboratories, by bringing the real world into the academics through virtual industry labs, and to enhance experimental skills of students even beyond curriculum and encouraging them to carryout mini and major projects.

VII To prepare the students to continue their professional development based on their awareness of professional society activities, professional licensure requirements and opportunities for further education in graduate school.

VNR Vignana Jyothi Institute of Engineering & Technology

Programme Outcomes (POs)

The program outcomes are:

a: **Engineering Knowledge**: The student is capable of applying the principles of basic sciences and mathematics in learning the Civil Engineering subjects. Graduates will be proficient in the core principles of Civil Engineering as they pertain to the sub-fields of Structural Engineering, Water Resources Engineering, Transportation Engineering, Geotechnical Engineering and Environmental Engineering and will be able to apply these principles in engineering practice.

b: **Problem Analysis**: The Graduates will possess critical thinking skills, problem solving abilities and familiarity with the computational procedures essential to the field.

c: **Design & Development of Solutions**: The student is able to plan, analyse, design and look after the construction of various types of Civil Engineering structures with appropriate consideration for public health and safety and cultural, societal and environmental considerations.

d: **Conduct investigations of complex problems**: The student will use research based knowledge and research methods to design, conduct experiments and to analyze and interpret experimental data.

e**: Modern Tool Usage**: The student will get hands on training in the various Modern Civil Engineering software and modern equipment.

f: **The Engineer and Society**: The Students will apply reasoning informed by the appropriate knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to Civil Engineering practice.

g: **Environment and Sustainability**: As the students possess substantial knowledge in multi- disciplinary subjects, he will be able to plan the various projects well keeping in view of its environmental effects on other related fields.

h: **Ethics**: The student will apply ethical principles and commitment to profession and responsibilities of their profession.

i: **Individual and Team work**: The Graduate is Capable of working productively as individual, as member or leader in driver set teams and in multi -disciplinary settings.

j: **Communication**: The Student will excel in expressing ideas, writing technical reports with good communication skills and managerial skills.

k: **Project Management and Finance**: The Graduates will demonstrate knowledge and understanding of the critical issues for professional practice such as the procurement of works, interaction with contractors during the construction phase of a project and the financial managerial capabilities.

l: **Life-Long learning**: The student will maintain an awareness of contemporary issues and will contribute to the well- being of the community with life-long learning in the broadest context of ever growing technology.

VNR Vignana Jyothi Institute of Engineering & Technology

B. Tech. - CIVIL ENGINEERING

I YEAR I SEMESTER COURSE STRUCTURE

Subject Code	Subject Name	Lectures	T/P/D	Credits
MTH1101	Mathematics – I	3	1	3
PHY1101	Engineering Physics	3	1	3
CHE1102	Chemistry of Engineering Materials	3	0	3
ITD1101	Computer Programming & Data Structures	3	1	3
CED1101	Engineering Mechanics - I	4	1	4
EEE1130	Elements of Electrical & Mechanical Engineering	3	0	3
CED1102	Engineering Graphics – I	2	3	2
ITD1201	Computer Programming & Data Structures Lab	0	3	2
EPC1201	Engg. Physics and Engg.Chemistry Lab	0	3	2
Total		**21**	**13**	**25**

VNR Vignana Jyothi Institute of Engineering & Technology

B. Tech. - CIVIL ENGINEERING

I YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
MTH1102	Mathematics – II	3	1	3
MTH1104	Numerical Analysis & Linear Programming	3	1	3
PHY1102	Physics of Materials	3	1	3
ENG1101	English	3	0	3
CHE1101	Engineering Chemistry	3	0	3
CED1103	Engineering Mechanics - II	4	1	4
CED1104	Engineering Graphics – II	2	3	2
MED1202	Work Shop Practice	0	3	2
ENG1203	English Language Communication Skills Laboratory	0	3	2
Total		**21**	**13**	**25**

- T/P/D: Tutorial/Practical/Drawing Practice

VNR Vignana Jyothi Institute of Engineering & Technology

B. Tech. - CIVIL ENGINEERING

II YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
CED1105	Environmental Studies	3	1	3
CED1106	Building Materials, Construction & Planning	3	1	3
CED1107	Strength of Materials - I	4	1	4
CED1108	Surveying	3	1	3
CED1109	Fluid Mechanics	4	1	4
CMS1101	Business Economics & Financial Analysis	4	0	4
CED1201	Fluid Mechanics Lab	0	3	2
CED1202	Surveying Field Work	0	3	2
NCC1101	Human Values and Professional Ethics	2	**Non Credit Audit Course**	
	Total :	**23**	**11**	**25**

VNR Vignana Jyothi Institute of Engineering & Technology

B. Tech. - CIVIL ENGINEERING

II YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	CREDIT
MTH1106	Probability & Statistics	3	1	3
CED1110	Strength of Materials – II	4	1	4
CED1111	Hydraulics & Hydraulic Machines	4	1	4
CED1112	Concrete Technology	4	0	4
CED1113	Structural Analysis – I	4	1	4
CED1114	Engineering Hydrology	3	0	3
CED1203	Hydraulics & Hydraulic Machines Lab	0	3	2
CED1204	Material Testing Lab	0	3	2
	Total :	**22**	**10**	**26**

VNR Vignana Jyothi Institute of Engineering & Technology

B. Tech. - CIVIL ENGINEERING

III YEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	CREDIT
CED1115	Design of Reinforced Concrete Structures	4	1	4
CED1116	Engineering Geology	3	0	3
CED1117	Irrigation Engineering	3	1	3
CED1118	Geotechnical Engineering – I	4	0	4
CED1119	Structural Analysis – II	4	1	4
CED1205	Engineering Geology Lab	0	3	2
CED1206	Computer Aided Drafting of Buildings	0	3	2
CED1207	Concrete Lab	0	3	2
NCC1102	Soft Skills and Personality Development	2	**Non Credit Audit Course**	
	Total :	**20**	**12**	**24**

VNR Vignana Jyothi Institute of Engineering & Technology

B. Tech. - CIVIL ENGINEERING

III YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
CED1120	Design of Steel Structures	4	1	4
CED1121	Environmental Engineering	4	0	4
CED1122	Geotechnical Engineering – II	4	0	4
CED1123	Transportation Engineering	4	1	4
CED1124	Estimating & Costing	4	1	4
CED1208	Geotechnical Engineering Lab	0	3	2
CED1209	Transportation Engineering Lab	0	3	2
ENG1204	Advanced English Communication Skills Laboratory	0	3	2
	Total :	**20**	**12**	**26**

VNR Vignana Jyothi Institute of Engineering & Technology

B. Tech. - CIVIL ENGINEERING

IVYEAR I SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
CED1125	Finite Element Methods	4	0	4
CED1126	Elements of RS &GIS	4	0	4
CED1127	Environmental Impact Assessment	4	0	4
	Elective-I			
CED1128	Earthquake Resistant Design of Buildings			
CED1129	Advanced Structural Analysis			
CED1130	Advanced Structural Design			
CED1131	Ground Water Development &			
CED1132	Management Design and Drawing of			
CED1133	Hydraulic Structures			
CED1134	Traffic Engineering	4	0	4
CED1135	Airport Planning & Design			
CED1136	Advanced Foundation Engineering			
CED1137	Ground Improvement Techniques			
CED1138	Solid Waste Management			
CED1139	Air Pollution &Control			
	Industrial waste &Waste Water Management			
	Open Elective			
MED1163	Optimization techniques			
CSE1130	Relational Database Management Systems	3	0	3
EEE1127	Renewable Energy Sources			
CED1147	Disaster Management			
CSE1121	Cyber Security			
CED1210	CAD & GIS Lab	0	3	2
CED1211	Environmental Engineering Lab	0	3	2
CED1301	Industry Oriented Mini Project	0	6	2
	Total :	**19**	**12**	**25**

VNR Vignana Jyothi Institute of Engineering & Technology

B. Tech. - CIVIL ENGINEERING

IV YEAR II SEMESTER **COURSE STRUCTURE**

Subject Code	Subject Name	Lectures	T/P/D	Credits
CED1140 CED1141 CED1142 CED1143	**Elective – II** Watershed Management Construction Technology & Project Management Principles of Water quality Management Geospatial Technology & Applications	4	0	4
CED1144 CED1145 CED1146	**Elective – III** Prestressed Concrete Water Resources Planning & Management Pavement Analysis, Design & Evaluation	4	0	4
CED1302	Technical Seminar	0	3	2
CED1303	Comprehensive viva	0	3	2
CED1304	Project work	0	18	12
	Total :	**08**	**24**	**24**

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B.Tech– I sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(MTH1101) MATHEMATICS – I
(Advanced Calculus)

Course Objectives: Student will be able to

- Understand Taylor's theorem and its application to maxima and minima of f(x,y)
- Understand the process of curve sketching
- Understand multiple integrals and its applications
- Apply the integral theorems of vector calculus

Course Outcomes:

At the end of the course Student will be able to

- Solve problems involving the maxima and minima of f(x,y).
- Apply the curve tracing concepts to find arc length of curves, surface area, and volume of solids of revolution.
- Evaluate the multiple integrals using appropriate change of variables.
- Verify the integral theorems.

UNIT - I

Differential Calculus

Mean value theorems - Rolle 's Theorem, Lagrange's theorem, Cauchy's theorem, and generalized mean value theorem (Taylor's Theorem) (statements only), Curvature and Radius of curvature, Curve tracing – Cartesian, polar and parametric curves (standard curves only)

UNIT- II

Functions of Several Variables

Partial differentiation; Euler's theorem,Functional dependence; Jacobian; Maxima and Minima of functions of two variables with constraints and without constraints.

UNIT - III

Improper integrals and multiple integrals

Improper Integrals; Beta, Gamma, and Error integrals - Properties and simple applications. Applications of integration to lengths, volumes and surface areas in cartesian and polar coordinates. Multiple integrals - double and triple integrals, change of variables (Cylindrical and Spherical polar coordinates) and change of order of integration.

UNIT - IV

Vector calculus

Introduction to vector and scalar functions; gradient, curl, divergence, and their related properties of sums and products; Laplacian and second order operators; Vector integration - line integral, work done, potential function; Area, surface, and volume integrals; Statements of Vector integral theorems and their verification (without proofs) - Green's theorem, Stoke's theorem, and Gauss divergence theorem.

UNIT- V

Elementary analysis

Sequences and series - convergence and divergence, ratio test, comparison test, integral test, Cauchy's root test, Raabe's test (statements only for the tests), and absolute and conditional convergence.

TEXT BOOKS

1. Calculus and Analytic Geometry by Thomas and Finney, 9th edition; Publisher: Pearson Education.
2. Higher Engineering Mathematics – by Dr.B. S. Grewal, 40th edition, Publisher: Khanna Publishers.
3. Schaum's Outline of Vector Analysis by Murray R. Spiegel (2011); 2nd edition; Publisher: Tata McGraw Hill.

REFERENCE BOOKS

1. Elementary Analysis: The Theory of Calculus by Kenneth Ross; Publisher: Springer
2. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition; Publisher: John Wiley.

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B. Tech CE-I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(PHY1101) ENGINEERING PHYSICS

Course Objectives: Students will be able to

- Supplement and enhance the basic concepts in Physics essentially required in the study of materials..
- Know and understand some important applications of lasers and optical fibers.
- Learn the importance of wave and particle nature of light and to understand the behavior of an electron in one dimensional potential box.
- Understand the effect of temperature on Fermi Dirac Distribution Function and also learn the behavior of an electron in a periodic potential, the new concept of Effective mass of an electron and to know the classification of materials into conductors, semiconductors and insulators.

Course Outcomes:

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

- Understand the Phenomenon of Interference, Diffraction& Polarization.
- Learn the principle, working, construction and energy mechanism of various lasers and their applications. Explain the light signal propagation and attenuation through optical fiber.
- Understand the differences between particle and wave nature, energy states in one dimensional potential box and also the Consequences of Heisenberg's Uncertainty principle.
- Understand the one dimensional Schrodinger's wave equation and the effect of temperature on Fermi-Dirac Distribution, Kronig Penny model.

UNIT-I

Interference

Superposition principle, resultant amplitude, coherence, methods to obtain coherent sources, interference, Young's double slit experiment, interference in thin films by reflection, Newton's rings Experiment

Diffraction-I

Distinguish between Fraunhofer and Fresnel diffraction, diffraction at single slit (Qualitative and Quantitative (Phasors approach)).

UNIT-II

Diffraction-II

Diffraction at double slit, circular aperture, and multiple slits (grating)(Qualitative Approach), Resolution of spectral lines, Rayleigh criterion, and resolving power of grating.

Polarization

Polarization phenomenon, Brewster's Law and Malus law, examples, types of polarization, double refraction, Nicol prism, Quarter and Half wave plates

UNIT- III

Lasers

Characteristics of Lasers – Spontaneous and Stimulated Emission of radiation, meta stable state, population inversion, lasing action, Einstein's coefficients and relation between them –– Ruby Laser – Helium-Neon Laser –Semiconductor Laser – Applications of lasers.

Fiber optics

Principle of optical fiber and properties – Acceptance angle and acceptance cone – Numerical aperture –Types of fibers and refractive index profiles – Qualitative analysis of attenuation in optical fibers –Application of optical fibers.

UNIT-IV

Elements of statistical mechanics

Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics (non-mathematical treatment); Photon gas, Planck's law of black body radiation; Deduction of Wien's law and Rayleigh-Jeans law from Plank's law.

Principles of quantum mechanics

Waves and particles – De Broglie hypothesis - Matter waves - Davisson and Germer experiment –Heisenberg's uncertainty principle - Schrodinger Wave Equation – Wave function and its Physical Significance - Particle in one dimensional potential box(wave functions, probability densities and energy states).

UNIT - V

Free electron fermi gas

Energy levels in one dimension, Effect of temperature on the Fermi-Dirac distribution, Free electron gas in three dimensions, electrical conductivity & Ohm's law, Electrical Resistivity of Metals (Qualitative).

Band theory of solids

Electron in a periodic potential; Bloch Theorem; Kronig-Penney model (non-mathematical treatment); Origin of energy band formation in solids; Classification of materials into conductors, semiconductors & Insulators; and Concept of effective mass of an electron.

TEXT BOOKS

(1) Physics vol.2, by Halliday, Resnick and Krane; John Wiley & Sons
(2) Concepts of Modern physics by Arthur Beiser, McGraw Hill Inc.
(3) Introduction to Solid State Physics by Charles Kittel : John Wiley & Sons

REFERENCE BOOKS

(1) Engineering Physics by R.K.Gaur and S.L.Gupta; Dhanpat Rai and Sons
(2) Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd.
(3) Optics by Ghatak and Thyagarajan, Tata Mc Graw
(4) Engineering Physics by G Sahashra Buddhe; University Press
(5) Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers

(6) Engineering Physics by Dr M Chandra Shekar and Dr P. Appala Naidu, VGS Book links.
(7) Introduction to Optical Communication by G. Keiser
(8) Quantum Mechanics by Gupta Kumar Sharma

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B. Tech CE-I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(CHE1102) CHEMISTRY OF ENGINEERING MATERIALS

Course Objectives: Students will be able to

- Understand that a sustainable energy supply is needed for promoting economic development as well as protecting the environment.
- Understanding the significance of various Engineering materials like cement abrasives, adhesives and composites in structural enhancement of materials.
- Exposure to refractories and ceramics in industries and most recently, aerospace technology.
- Familiarize lubricants as a basic and fundamental necessity for the maintenance of any machines.

Course Outcomes: At the end of the course student will be able to

- Acquire knowledge of the types of fuels, their sources and purification techniques.
- Understand the manufacturing process of cement, its properties and usage of abrasives, adhesives and composites in various industrial processes.
- Benefits of refractories as heat-resistant materials and applications of ceramics in various fields.
- Knowledge of lubricants in regard to their applications in various machines.

Unit – I:

Energy Sources:

Fuels - classification (solid, liquid, gaseous), calorific value of fuel (HCV, LCV), determination of calorific value by bomb calorimeter; Solid fuels – coal – analysis – proximate and ultimate analysis and their significance; Liquid fuels – petroleum, refining of petroleum, cracking, knocking, synthetic petrol – Bergius and Fischer-Tropsch's process. Biofuels- characteristics, biodiesel (preparation, properties and applications); Gaseous fuels – natural gas, LPG, CNG (composition and uses), Combustion – problems

UNIT-II

Cement

Types of cement**;** Chemical constituents and composition of Portland cement; Manufacturing methods of Portland cement (wet and dry processes); Properties of cement - Setting & Hardening of cement (reactions); Testing of cement; Decay of cement; Cement concrete - RCC.

UNIT-III

Engineering materials

a) Abrasives & Adhesives - Introduction, classification of abrasives, and their applications. Criteria of a good adhesive, classification and their applications.
b) Composites: Need for composites, classification and their applications.

UNIT-IV

Refractories and Ceramics

Refractories: Definition; Classification with examples; Characteristics of a good refractory; Causes for the failure of a refractory material; Properties of refractories - refractoriness, RUL test, porosity.

Ceramics: Introduction; Classification, Glazing and Applications of glazed & non glazed ceramics.

UNIT -V

Lubricants

Criteria of a good lubricant; Classification of lubricants-lubricating oils; Greases or semisolid lubricants; Solid lubricants; Mechanism of lubrication-fluid film lubrication, boundary lubrication, and extreme pressure lubrication; Biodegradable lubricants: types of biodegradable lubricants, advantages and disadvantages of biodegradable lubricants. Properties of lubricants - viscosity, cloud point, pour point, flash & fire point, mechanical stability, oiliness, and carbon residue.

TEXT BOOKS

1. Text book of Engineering Chemistry by Y.Bharathi Kumari, and Jyotsna Cherukuri; Publisher: VGS Book Links.
2. Engineering Chemistry by P.C.Jain & Monica Jain; Publisher: Dhanpatrai.
3. Text book of Engineering Chemistry by S.S. Dhara & Mukkanti; Publisher: S.Chand & Co.

REFERENCE BOOKS

1. Engineering Chemistry by O G Palanna
2. Text book of Engineering Chemistry by Balram Pani; Publisher: Galgotia Publications Pvt.Ltd.
3. Text book of Engineering Chemistry by Shashi Chawla Publisher: Dhanpat rai &Co
4. Engineering Chemistry by R.P.Mani, S.N. Mishra, B.Rama Devi, Cengage Learning Publications.
5. Text book of Engineering Chemistry by R.Gopalan, D.Venkappayya, Sulochana Nagarajan; Publisher: Vikas Publishers.

VNR Vignana Jyothi Institute of Engineering and Technology

I Year B. Tech CE, ME& AME -I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(ITD1101) COMPUTER PROGRAMMING AND DATA STRUCTURES

Course Objectives: Students will be able to

- Gain a working knowledge of C data structure programming
- Learn how to write modular, efficient and readable C and data structure programs
- Utilize pointers to efficiently solve problems
- Utilize searching and sorting concepts to solve problem
- Use functions from the portable C library

Course Outcomes:

- Understand the basic terminology used in computer programming.
- Write, compile and debug programs in C language
- Read, understand and trace the execution of programs .
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Design programs using searching and sorting techniques.
- Understand the dynamics of memory by the use of pointers

UNIT-I

Introduction to Computers-Computer Systems, Computing Environments, Computer languages, creating and running programs, Software Development Methods.

UNIT-II

Algorithm / pseudo code, flowchart, program development steps, structure of C program, identifiers, basic data types, Constants, variables, operators, expressions, precedence and order of evaluation.

Input-output statements, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, example C programs.

UNIT-III

Functions, basic concepts, parameter passing, storage classes, scope rules, user defined functions, standard library functions, recursive functions, example C programs.

Arrays- Basic concepts, one-dimensional and two-dimensional arrays, Character array, string handling functions, example C programs.

UNIT-IV

Derived types- structures- Basic concepts, nested structures, arrays of structures, program examples.

pointers- Basic concepts, pointers and functions, pointers and strings, pointers and arrays, pointers and structures, self referential structures, example C programs.

UNIT-V

Searching - Linear and binary search methods, sorting - Bubble sort, selection sort, Insertion sort.

Introduction to data structures, Dynamic memory allocation, stacks and queues-implementation using arrays.

TEXT BOOKS

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education
3. C Programming andData structures, E.Balagurusamy,TMH.

REFERENCE BOOKS

1. Data Structures Using C - A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.
2. Programming in C - Stephen G. Kochan, III Edition, PearsonEductaion.
3. Data Structures and Program Design in C, R.Kruse, C.L. Tondo, BP Leung, Shashi M, Second Edition, Pearson Education.

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B. Tech CE-I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1101) ENGINEERING MECHANICS - I

Course Objectives:

Student will be able to

- Classify the various types of forces, computes the moment of a force and draw FBD.
- Know various types of friction and the laws of friction
- Distinguish between centroid, centre of mass and centre of gravity.
- Understand the concept of area moment of inertia and mass moment of inertia.

Course Outcomes:

On successful completion of this course, it is expected that students should be able to

- Find the resultant of coplanar concurrent and non-concurrent forces.
- Analyze the bodies on rough horizontal and inclined planes.
- Determine the centroid of composite areas, centre of gravity of composite bodies.
- Determine the moment of inertia of simple areas and mass MI of simple bodies.

UNIT-I

Forces

Introduction to Engineering Mechanics – Basic Concepts, Classification of a force system, Parallelogram law of forces, Triangle law of forces, Polygon law of forces, Lami's theorem, Free Body Diagram, Resultant, Equilibriant, Resultant of coplanar concurrent forces, Equilibrium of coplanar concurrent forces.

UNIT-II

Moments

Moment of a force, Varignon's principle, Parallel forces, Resultant of parallel forces, Couple, Moment of a couple about any point lying in the plane, Resolution of a force into a force-couple and viceversa, Resultant of coplanar non-concurrent forces, Equilibrium of coplanar non-concurrent forces.

UNIT - III

Friction

Types of Friction, Limiting Friction, Laws of Friction, Equilibrium of bodies on rough horizontal and inclined planes, Ladder friction.

UNIT – IV

Centroid, Centre of Mass, Centre of Gravity

Centroids of simple figures (from basic principles) – Centroids of composite figures and built-up sections, Centre of mass of simple bodies, Centre of gravity of simple bodies, Centre of gravity of composite bodies, Pappus theorems.

UNIT – V

Area moment of Inertia

Introduction, Inertia, Inertia of areas, Rotation of areas, Radius of gyration, Polar moment of inertia, Parallel axis theorem, Perpendicular axis theorem, Moments of inertia of simple figures and composite figures.

Mass Moment of Inertia

Moment of inertia of Masses, Significance, Rotation of mass, Mass moment of inertia of simple bodies.

TEXT BOOKS

1. Engineering Mechanics by Timoshenko & Young
2. Engineering Mechanics by S.S. Bhavikatti
3. Engineering Mechanics by R.K. Bansal

REFERENCE BOOKS

1. Singer's Engineering Mechanics by K. Vijaya Kumar Reddy
2. Engineering Mechanics (Statics) by Meriam & Kraige
3. Engineering Mechanics by Tayal
4. Engineering Mechanics by R.K. Rajput
5. Engineering Mechanics by R.S. Khurmi
6. Engineering Mechanics by K.L. Kumar

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B. Tech CE-I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(EEE1130) ELEMENTS OF ELECTRICAL & MECHANICAL ENGINEERING

Course Objectives: Students will be able to

- Understand the basic element of Civil Engineering.
- Understand the utilization of electrical energy in illumination and traction systems.
- Understand the conventional, non-conventional and renewable energy sources.
- Understands the surface and air vehicles and their parts.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Explain the infrastructure development and surveying principles, materials, soils.
- Understand the principle of Power Generation using Steam and Hydel Power Plants.
- Appreciate the utilization of Electrical Energy in heating, welding, illumination and traction systems.
- Aquire the knowledge of power systems.

UNIT-I

Electrical Power Systems

Electrical power generation concept-A.C Generator-principle; Steam Power Plant (thermal power plant); Hydel Power Plant (layouts only); Efficiency- Transformer-principle-need-types; Various methods of power transmission; Losses in power transmission; Fuse -Substation-batteries-simple problems

UNIT-II

Utilization of Electrical Energy

Electrical heating-advantages-resistance heating-design of heating element-simple problems-Illumination-definitions-laws of illumination-working of Incandescent lamp and Fluorescent lamps-Electric Welding-Electric Traction-Block diagram-Simplified speed-time curve-Energy meter

Elements of Mechanical Engineering

UNIT-III

Power (Energy) Systems

Block diagram of a power system; sources of energy; conventional, non-conventional and renewable energy, application, resource availability; power produced, torque, speed, and efficiency; Materials used in turbine shafts, blades, nozzles; diagnostics and condition monitoring, commercial feasibility of power systems.(Turbine)

UNIT-IV

Motor Transport Vehicles –I (Surface)

Road Vehicles – Power plant in vehicles, transmission, steering, chassis, body, wheels and axles Rail vehicles - Distinction of rail vehicles from road vehicles

UNIT-V

Motor Transport Vehicles –II (Air)

Air vehicles - Aeroplane and its parts

Space vehicles - Rockets, 2 stage, 3 stage and 4 stage rockets, solid and liquid fuels

Sea Vehicles – Power plant, transmission, steering, hull

TEXT BOOKS

1. Principles of Power Systems by V.K.Mehta & Rohit Mehta S.Chand & Company Ltd
2. Art & Science of Utilization of Electrical Energy by H.Partap Dhanpat Rai & Co

REFERENCE BOOKS

1. Utilization of Electrical Energy by E.openshaw Tayler Orient Longman
2. Electrical Power System – Soni, Guptha, Batnagar
3. Gneration and Utilization of Electrical Energy by C.L Wadhwa

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B. Tech CE I Sem	**L**	**T/P/D**	**C**
	2	**3**	**2**

(CED1102) ENGINEERING GRAPHICS - I

Course Objectives: Student will be able to

- Learn basic Auto Cad skills.
- Learn basic engineering drawing formats.
- Learn various curves used in engineering practice & types of scales.
- Learn orthographic projections and projection of planes & solids.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Draw two dimensional drawings using Auto Cad.
- Draw various types of scales.
- Draw various curves used in engineering practice
- Draw orthographic projections and projection of planes and solids.

UNIT- I

Introduction to Engineering Drawing

Principles of engineering graphics and their significance - Drawing instruments and their uses -conventions in drawing-lettering – BIS Convention, Different types of scales, scale of chords.

UNIT – II

Curves Used In Engineering Practice & Their Construction

Ellipse, parabola, hyperbola & rectangular hyperbola-cycloid, epicycloids, hypocycloid – involutes.

UNIT- III

Orthographic Projection

Points& straight lines inclined to both planes, true lengths& traces.

UNIT- IV

Projection of Planes

Projection of regular planes inclined to both planes - auxiliary projections.

UNIT- V

Projection of Solids

Projection of regular solids-inclined to both planes - auxiliary projections.

TEXT BOOKS :

1. Elementary engineering drawing by N.D.Bhat, Charotar Publishing House Pvt.Limited
2. Engineering drawing and graphics by Narayana & Kannaiah, Scitech publishers
3. Engineering graphics for degree by K.C.John, PHI learning Publishers

REFERENCE BOOKS

1. Engineering Drawing by M. B. Shah, Pearson Education India

2. Engineering Drawing and Graphics by K Venugopal, New Age International
3. Engineering Drawing by Guptha,IK International Pvt.Limited

VNR VignanaJyothi Institute of Engineering and Technology

I Year B. Tech CE, ME & AME	**L**	**T/P/D**	**C**
	0	**3**	**2**

(ITD1201) COMPUTER PROGRAMMING AND DATA STRUCTURES LABORATORY

Course Objectives: Students will be able to

- Gain a working knowledge of C data structure programming
- Learn how to write modular, efficient and readable C and data structure programs
- Utilize pointers to efficiently solve problems
- Utilize searching and sorting concepts to solve problem
- Use functions from the portable C library

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Understand the basic terminology used in computer programming.
- write, compile and debug programs in C language
- Read, understand and trace the execution of programs .
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.

Week 1

1. Write a program that reads three different integers from the keyboard and prints – sum, average, product, smallest, largest of the numbers.
2. Write a program that reads two integers and prints – difference, quotient and remainder
3. WAP that reads two integers and determines whether the first is a multiple of the other

Week 2

1. Write a C program to find the sum of individual digits of a positive integer.
2. Write a C program for Fibonacci sequence.
3. Write a C program to generate the first n terms of the sequence.
4. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Week 3

1. Write a C program to calculate the following Sum:
   Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
2. Write a C program toe find the roots of a quadratic equation.

Week 4

1. Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.

iii) To solve Towers of Hanoi problem.

Week 5

1. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
2. Write a program to print a given number [0-1000] in words. For example, 123 as One Hundred and Twenty Three

Week 6

1. WAP to check whether a given number is an Armstrong, Palindrome, Perfect, Prime, or a Fibonacci Number
2. Write a C program to find both the largest and smallest number in a list of integers

Week 7

1. Write a C program to generate Pascal's triangle.
2. Write a C program to construct a pyramid of numbers.

Week 8

1. Write a C program to calculate
   i) Minimum and maximum of an 1-d array
   ii) Sorting an array
   iii) Searching an array

Week 9

1. Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices
   iii) To find the determinant of a 3 by 3 matrix

Week 10

1. Write a C program that uses functions to perform the following operations using
   Pointers:

a. To insert a sub-string in to a given main string from a given position.
   ii) To delete n Characters from a given position in a given string.
   iii) To reverse a given string

Week 11

1. Write C Programs to implement Structures and Nested structures with suitable Examples
   (Students has to practice with relevant examples taught in the class room)

Week 12

1. Write C Programs using Pointers and Pointer Arithmetic operations
2. Write C Programs using Pointers to structures, Pointers to Arrays and Pointers to strings
   (Students has to practice with relevant examples taught in the class room)

Week 13

1. Write C Programs to implement the following sorting algorithms
   a. Bubble Sort **b.** Selection sort **c.** Insertion Sort

Week 14

1. Write a C program to implement STACK and QUEUE operations using Arrays

Week 15

1. Write a C programs to implement the following searching techniques.
   a. Linear Search **b.** Binary Search

Week 16 Lab Internal Examination

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B. Tech CE-I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(EPC1201) ENGINEERING PHYSICS AND ENGINEERING CHEMISTRY LABORATORY

ENGINEERING PHYSICS LAB

Course Objectives: Students will be able to

- To practically learn interaction of light with matter through physical phenomena like interference, diffraction and dispersion.
- To expose to the principle of superposition and resonance.
- To demonstrate the formation of standing waves and to understand the mechanical wave behavior and to determine Rigidity Modulus of different material s of wires .
- To demonstrate basic discharge phenomenon in capacitors and to know the characteristics of the circuit elements, like resistors, capacitors and inductors.

Course Outcomes:

On successful completion of the course, it is expected that student should be able to

- Understand clearly the interference principle in wave theory of light and able to relate it to the formation of Newton Rings and Obtain a pure spectrum when light passes through prism
- Understand the formation and propagation of mechanical waves
- Study simple oscillations of a load attached to a string and relate it to nature of material of string
- Understand the physical significance of time constant and related uses

Any Eight Experiments from the following:

1. Dispersive Power of the material of a Prism using Spectrometer
2. Diffraction Grating (both with Laser and non laser source)
3. Single Slit with laser light
4. Newton's Rings
5. Finding thickness of a thin wire or sheet by forming a wedge shaped film
6. Energy gap of a semiconductor material
7. To determine the rigidity modulus of material of a wire
8. Melde's experiment
9. Sonometer Experiment
10. AC frequency by sonometer method
11. Numerical Aperture and Acceptance angle of an optical fiber cable
12. Attenuation and Bending losses in optical fiber
13. Stewart Gee's experiment

14. Characteristics of LED/Laser Diode.
15. Photo cell/ Solar Cel

Book: Essential Practical Lab Manual in Physics: by P.Raghavendra Rao

ENGINEERING CHEMISTRY LABORATORY
LIST OF EXPERIMENTS

1. Titrimetry

a) Estimation of hardness of water by EDTA method.

2. Instrumental methods

(i) Conductometry

a) Conductometric titration of strong acid vs strong base

(ii) Colorimetry

a) Estimation of copper by colorimetric method

(iii) pH metry

a) Titration of strong acid vs strong base by pH metry

3. Physical properties

a) Determination of viscosity of sample oil by Redwood viscometer.

4. Preparations:

a) Preparation of soap

b) Preparation of Nano particles.

TEXT BOOKS

1. Laboratory Manual on Engineering Chemistry by S.K.Bhasin and Sudha Rani; Publisher: Dhanpat Rai.
2. Laboratory Manual on Engineering Chemistry by Y.Bharathi Kumari and Jyotsna Cherukuri; Publisher: VGS Book Links.
3. Laboratory Manual on Engineering Chemistry by Y.Bharathi Kumari, Jyotsna

` Cherukuri, VGS Book Links, Vijayawada.

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B.Tech CE – II sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(MTH1102) MATHEMATICS – II

(Linear Algebra and Ordinary Differential Equations)

Course Objectives: Students will be able to

- Understand the Echolen form and Normal form of a matrix and its applications in solving linear system of equations.
- Understand the methods of solving first order differential equations and learn about its applications to L-R and R-C circuits.
- Apply the convolution theorem to evaluate Laplace Transform of the functions.
- Apply Z-Transforms in solving the difference equations.

Course Outcomes: On successful completion of the course, it is expected that student should be able to

- Find the rank using Echolen form and Normal form.
- Solve the problems in first order and second order differential equations.
- Learn Laplace Transform as a tool.
- Evaluate the Z-Transform of the given function

LINEAR ALGEBRA

UNIT-I

Solution of linear systems

Matrices and linear systems of equations - elementary row transformations, Rank, row Echelon form, and normal form; Solution of linear systems - direct methods - LU decomposition, LU decomposition from Gauss elimination, and solution of Tri-diagonal systems by Thomas algorithm; Eigen values, eigen vectors, and their properties - Liner dependence and independence; Cayley-Hamilton theorem (without proof) - inverse and powers of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix, calculation of powers of a matrix; Modal and spectral matrices.

UNIT II

Linear transformations

Real matrices - symmetric, skew symmetric, and orthogonal linear transformation; Complex matrices - Hermitian, Skew-Hermitian and unitary matrices; Quadratic forms - reduction of quadratic form to canonical form, rank, positive, negative definite, semi definite, index, signature, Sylvester law, and singular value decomposition.

ORDINARY DIFFERENTIAL EQUATIONS

UNIT III

Ordinary differential equations and their applications

Differential equations of first order and first degree - Linear, Bernoulli and exact differential equation; Applications of differential equations of first order and first

degree - Newton's law of cooling, Law of natural growth and decay, Orthogonal trajectories, and basic circuits.

UNIT IV

Differential equations of higher order and their applications

Differential equations of higher order - homogeneous and non-homogenous type, differential equations of second order and higher order with constant coefficients with right hand side term of the type e^{ax}, sin (ax), cos (ax), polynomials in x, e^{ax} V(x), x V(x), and method of variation of parameters and Euler-Cauchy's 2nd order differential equations, applications to mechanical systems and Simple harmonic motion.

UNIT V

Laplace transform and application to ODE

Laplace transform of standard functions; Inverse transform-first shifting theorem; Dirac's delta function; Convolution theorem; Periodic function; Differentiation and integration of transforms; Application of Laplace transforms to ordinary differential equations.

TEXT BOOKS

1. Differential Equations, with Applications and Historical Notes by George F. Simmons and John S. Robertson (2008) 2nd Edition; Publisher: Tata McGraw Hill.
2. A First Course in Differential Equations by Dennis G. Zill; Publisher: Brooks Cole.
3. Advanced Engineering Mathematics by Dennis G. Zill, Warren S. Wright, and Michael R. Cullen, 4th edition; Publisher: Jones & Bartlett Learning.

REFERENCE BOOKS

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th edition; Publisher: John Wiley.
2. Advanced Engineering Mathematics by Peter V. O'Neil, 9th Edition; Publisher: Cengage Learning.
3. Elementary Differential Equations and Boundary Value Problems by William E. Boyce and Richard C. Diprima; Publisher: Wiley.
4. Linear Algebra and its applications by David C Clay; Publisher: Pearson Education.

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B.Tech CE – II sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(MTH1104) NUMERICAL ANALYSIS AND LINEAR PROGRAMMING

Course objectives: Student should be able to

- Understand the numerical methods for non linear systems, evaluating definite integrals and ordinary differential equations.
- Understand various methods of interpolation.
- Understand the simplex method and methods to solve the transportation problem.

Course outcomes: On successful completion of the course, it is expected that student should be able to

- Learn the numerical methods to find a root of algebraic and transcendental equations.
- Apply the numerical methods to find the solutions of ordinary differential equations.
- Use simplex method procedure to optimize a linear function.
- Solve transportation problems

NUMERICAL ANALYSIS

UNIT-I

Solutions of non-linear systems

Introduction; Mathematical preliminaries; Solution of algebraic and transcendental equations – the bisection method, the method of false position, the iteration method,Newton - Raphson method, and their order of convergence.

UNIT II

Interpolation

Introduction; Errors in polynomial interpolation; Finite differences; Forward differences; Backward differences; Central differences; Symbolic relations and separation of symbols; Differences of a polynomial; Newton's formulae for interpolation; Central difference interpolation formulae; Gauss's central difference formulae; Lagrange and Hermite interpolation formulae; Cubic spline interpolation.

UNIT III

Numerical Integration

Trapezoidal rule, Simpson's 1/3 rule, and Simpson's 3/8 rule.

Numerical solutions of ordinary differential equations

Solution of initial value problems by Taylor's series - Picard's method of successive approximations, Euler's method, and Runge - Kutta methods; Predictor Corrector methods - Adams Moulton method, and Milne's method.

UNIT IV

Numerical solutions of partial differential equations (PDE)

Introduction; Classification of second order PDE; Approximation of derivatives by finite difference method; Solution of Laplace equation - Jacobi's method, Gauss-

Seidal (Leibmann's) method, Solution of parabolic equations by explicit and crank Nicolson implicit scheme method; Solution of hyperbolic equations.

LINEAR PROGRAMMING

UNIT V

Linear programming

linear programming - Basic concepts; -problem formulation, graphical method, canonical and standard forms of LPP simplex method, Artificial variables techniques-M method, Transportation problems: Balanced transportation problem-North-West corner rule, Least cost method, Vogel's approximation method and MODI method.

TEXT BOOKS

1. Elementary Numerical Analysis – an algorithmic approach by Samuel D. Conte and Carl De Boor (2006); 3rd edition; Publisher: Tata McGraw Hill.
2. Elementary Numerical Analysis by Dr. B.S.Grewal, 4th edition, Publisher: Khanna Publishers
3. Operations Research: Theory and Applications by Kanthi Swaroop, 4th edition, Macmillan Publishers India Ltd.

REFERENCE BOOKS

1. Advanced Engineering Mathematics by Erwin Kreyszig, 8th Edition; Publisher: John Wiley and Sons.
2. Advanced Engineering Mathematics by Peter V. O'Neil, 9th Edition; Publisher: Cengage Lear

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I Year B. Tech CE - II Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(PHY1102) PHYSICS OF MATERIALS

Course Objectives: Student should be able to

- To learn the structure of solids, crystal systems, packing and arrangement of particles in crystals, simple planes and directions in solids, defects in crystals
- To learn the properties of magnetic materials and classification, Dielectric materials
- To learn the concept and applications of superconductors
- To introduce new concepts like surface phenomena and nano science.

Course Outcomes: On successful completion of the course, it is expected that student should be able to

- Identify different crystal types, various planes and directions in crystals and estimate one dimensional crystal defects
- Learn the magnetic properties of materials & classify the magnetic materials into Dia, Para and ferro.
- Learn the characteristics, properties and applications of superconductors and magnetic materials
- Realize surface phenomena are different from bulk; learn methods to estimate work functions and Compare optical and electron microscopes and learn principles of SEM & TEM

UNIT -I

Crystal structures

Space lattice – Unit cell – Lattice parameter – Crystal systems – Bravais lattices Atomic radius – Co-ordination number - Structures and Packing fractions of Simple Cubic – Body Centered Cubic – Face Centered Cubic crystals – Hexagonal closed packed crystals - Structures of diamond, NaCl.

Bonding in solids

Force and energy between two approaching atoms, primary and secondary bonds, binding energy and cohesive energy, Madelung constant, cohesive energy and Madelung constant for NaCl crystal

UNIT -2:

Directions, planes and x-rd

Miller Indices for Crystal planes and directions – Inter planar spacing of orthogonal crystal systems –Diffraction of X-rays by crystal planes and Bragg's law– Laue method – Powder method.

Defects in solids

Imperfections in crystals – Point defects (Vacancies, Interstitial and Impurities) Schottky and Frenkel defects – (with mathematical treatment)- Line imperfections –

Edge and Screw dislocation – Burger vector – Surface defects and volume defects (Qualitative Treatment).

UNIT -3

Magnetic properties of materials

Permeability, Field intensity, magnetic field induction, Magnetization and Magnetic susceptibility – Origin of magnetic moment, Bohr magneton – Classification of magnetic materials (Dia, Para and Ferro)- Domain theory of ferromagnetism, Hysteresis curve – Soft and Hard magnetic materials – Ferrites and their applications.

UNIT -4

Dielectric properties

Electric dipole, Dipole moment, Dielectric constant, Electronic, Ionic and Orientation Polarization – Calculation of Polarizibilities – Internal fields – Claussius – Mossotti equation –Piezo and Ferro electricity

Superconductors

Experimental survey and superconductivity phenomenon, – Meissner effect – Critical fields and Persistent currents, Type I and Type II superconductors - London equations- flux quantization, Applications of Superconductors.

UNIT -5

Surface physics

Work function, Thermionic emission, Contact Potential, Electron Microscope, Scanning Tunneling Microscope.

Science & technology of nanomaterials

Origin of nanotechnology – (Basic principles of Nanoscience & Technology) surface to volume ratio, quantum confinement – Fabrication of nano materials Bottom up fabrication: sol-gel & combustion methods – Top down fabrication: CVD& PVD methods– Applications of nanotechnology.

TEXT BOOKS

(1) Introduction to Solid State Physics by Charles Kittel (Publishers: John Wiley & Sons)

(2) Applied Physics by P.K.Mittal, IK International Publishing House (P) Ltd

REFERENCE BOOKS

1. Solid State Physics by A.J.Dekker; Macmillan Publishers India Ltd.
2. Engineering Physics by Dr M Chandra Shekar and Dr P. Appala Naidu, VGS Book links.
3. Engineering Physics by G Sahashra Buddhe; University Press
4. Elements of Solid State Physics by J.P.Srivatsva, PHI Publishers
5. Engineering Physics by M.R.Srinivasan, New Age Publishers
6. Solid State Physics by M.A. Wahab.

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I Year B.Tech (Common to all Branches)	**L**	**T/P/D**	**C**
	3	**0**	**3**

(ENG1101) ENGLISH

Introduction

This is the age of information and communication technologies. Engineers and technical professionals need to convey technical information in English for various purposes.

Besides learning general English as an international language, engineering students need to be equipped with adequate writing ability so that they can communicate technical information clearly on at least a basic level. A good English writing proficiency can be a contributing factor to professional recognition and career prospects. This course teaches those writing strategies that scientists, engineers, and others will need in order to write successfully on the job. It initiates the students into Technical Writing. The purposes of technical writing are to inform and persuade. This program aims to train students in writing clear, concise and effective English.

This Syllabus is therefore, a Pragmatic English Writing Program for engineering students with intermediate proficiency. The program covers a syllabus outline and instructional approaches on basic writing skills with particular reference to technical writing.

Objectives: Student should be able to

- To equip the students with all the LSRW skills for advanced writing and speaking.
- To equip the students with basic grammar, infrastructural patterns and grammatical constructions required of in technical writing.
- To acquaint the students with the writing process, beginning with paragraph writing. This would prepare them for academic and workplace writing.
- Equip the students with Oral Communication Skills.

Course Outcomes: On successful completion of the course, it is expected that student should be able to

- Comprehend technical writing produced in the engineering profession
- Understand the writing process and create logical paragraphs
- Use infrastructural patterns in writing and speaking

Methodology

A Task-based, process oriented methodology will be used by the teachers to give a practical orientation to the teaching of language. An inductive approach will be used to demonstrate the use of language in context. This should enable the students to internalize the language structures and vocabulary used in context. Students will be

exposed to numerous examples and ample practice will be given in the contextual use of language structures.

Syllabus Outline

UNIT-I : Review of Grammar

i) Common Errors
ii) Subject-Verb Agreement
iii) Adverbs
iv) Transitional elements
v) Use of Articles and Prepositions
vi) Conjunctions
vii) pronoun reference

UNIT-II : Prose 1

1. Heaven's Gate by Pico Iyer
2. The Connoisseur by Nergis Dalal

UNIT-III Reading and Writing Skills

i) Reading Comprehension -- Skimmimg & scanning
ii) Reading Comprehension -- Intensive reading
iii) Reading Comprehension -- Critical Analysis
iv) Paragraph Writing
v) Letter Writing
vi) Memo Writing

UNIT-IV : Prose 2

1. The Cuddalore Experience by Anu George
2. The Odds Against Us by Satyajit Ray

UNIT-V : Advanced Writing

1. Comparison and Contrast Pattern
2. Cause and Effect Pattern
3. Classification
4. Analogy
5. Problem-Solution Pattern

Prescribed Text Books

1. **Enjoying Everyday English** by A. Ramakrishna Rao
2. **Effective Technical Communication** by Ashraf Rizvi
3. **Technical Writing Process and Product** by Gerson Sharon J. and Steven Gerson. 3rd edition, New Jersey: Prentice Hall 1999

REFERENCE BOOKS

1. M. Raman and S. Sharma, 2004; Technical Communication : Principles and Practices, OUP, (Indian Edition)
2. Blanton, L.L. 1993; Composition Practice, Book 4 ,Second Edition, Heinle & Heinle Publishers, pp. 54
3. Georges, T.M. 1996; A course in Analytical Writing for Science and Technology, http://www.mspiggy.etl.noaa.gov/write/
4. Neufeld, J.K. 1987; A Handbook for Technical Communication, Prentice-Hall, Inc. pp.20,65-68

5. Yalden, J. 1987; Principles of Course Design for Language Teaching, Cambridge University Press
6. David F. Beer and David McMurrey**,** Guide to Writing as an Engineer, 2nd ed., Wiley, 2004, ISBN: 0471430749.
7. Greaney, G.L. 1997; Less is More: Summary Writing and Sentence Structure in the Advanced ESL Classroom, The Internet TESL Journal, Vol.III, No.9
http://iteslj.org/Techniques/Greaney-Writing.html

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I Year B. Tech CE - II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(CHE1101) ENGINEERING CHEMISTRY

Course Objectives: Student should be able to

- Understand electrochemistry which deals with the utilization of electrical energy of an external source for bringing about a physical or chemical change.
- Knowledge of "Corrosion engineering education" and Usage of polymers in modern world as an integral part of every human's life.
- Knowledge of purification techniques and various applications of soft water in industries.
- Usage of nanomaterials as emerging scientific components with amazing potential applications in various fields.

Course Outcomes: On successful completion of the course, it is expected that student should be able to

- Visualize the chemical applications of electricity.
- Prevention of corrosion of metals and applications of polymers from domestic articles to sophisticated scientific and medical instruments.
- Benefits of treated water as source in steam generation and other fields like production of steel, paper, textiles, atomic energy etc.
- The applicability and greater efficiency of using a material at nanoscale in different engineering fields**.**

UNIT-I

Electrochemical cells and batteries

Conductance-factors effecting conductance, conductometric titrations; cells: types of cells, cell representation, electrode potential; Standard electrode potential; Electrochemical series; Nernst equation; Reference electrodes – hydrogen, calomel electrode; Ion selective electrodes (glass electrode & flouride electrode); Numerical problems.

Batteries

Primary and secondary cells (lead-acid cell; Ni-Cd cell; lithium cells); Applications of batteries; Fuel cells – methanol – oxygen fuel cells, advantages of fuel cells; Solar cells - principle, and applications.

UNIT II

Corrosion and its control

Introduction; Causes and effects of corrosion; Different types of corrosion; Theories of corrosion – chemical, electrochemical corrosion (reactions); Factors affecting corrosion – nature of metal (galvanic series; over voltage; purity of metal; nature of oxide film; nature of corrosion product), and nature of environment (effect of temperature; effect of pH; humidity; effect of oxidant).

Corrosion control methods – cathodic protection, sacrificial anode, and impressed current cathode;

Surface coatings – methods of application on metals (hot dipping; galvanizing; tinning; cladding; electroplating), and organic surface coatings (paints - constituents and functions).

UNIT III

Polymers

Introduction**;** Types of polymerization; Plastics - thermoplastic resins, and thermoset resins; Compounding & fabrication of plastics; Preparation, properties, and engineering applications of polyethylene, PVC, PS, Teflon, bakelite, nylon.

Rubber

Natural rubber- processing, vulcanization; Elastomers (Buna-s; Butyl rubber; Thiokol rubbers); Fiber reinforced plastics (FRP) and their applications.

UNIT IV

Water

Introduction; Hardness - causes, expression of hardness, units, types of hardness, estimation of temporary & permanent hardness of water, and numerical problems; Boiler troubles – scale & sludge formation, caustic embrittlement, corrosion, priming & foaming; Softening of water (Internal & external treatment - lime soda, zeolite, ion exchange process, and numerical problems); Reverse osmosis and Electro dialysis (desalination processes).

UNIT V

Nanomaterials

Introduction; Preparation and applications of nanomaterials with special reference to carbon nanotubes.

Insulators

Classification of insulators; characteristics of thermal & electrical insulators and their applications; Superconductors - Nb-Sn alloy, $YBa_2\ Cu_3\ O_{7-x}$; Applications of superconductors.

TEXT BOOKS

1. Text Book of Engineering Chemistry by Y.Bharathi Kumari, Jyotsna Cherukuri; Publisher: VGS Book Links.
2. Engineering Chemistry by P.C.Jain & Monica Jain, Publisher: Dhanpatrai Publishing Company.

REFERENCE BOOKS

1. Text Book of Engineering Chemistry by S.S. Dhara & Mukkanti; Publisher: S.Chand & Co.
2. Engineering Chemistry by O G Palanna
3. Text Book of Engineering Chemistry by R.Gopalan, D.Venkappayya, Sulochana Nagarajan; Publisher: Vikas Publishers.
4. Engineering Chemistry by R.P.Mani, S.N. Mishra, B.Rama Devi ,Cengage Learning Publications.

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B. Tech CE - II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1103) ENGINEERING MECHANICS - II

Course Objectives: Student will be able to

- Know the various assumptions in the analysis of trusses and types of trusses.
- Understand the principle of virtual work and its applications.
- Distinguish between statics and dynamics & kinematics and kinetics
- Understand the work-energy principle and impulse-momentum principle.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Find the member forces in trusses using method of joints and method of sections.
- Find the reactions in beams and frames using the virtual work principle.
- Solve the kinematics of particles and kinematics of rigid body problems.
- Solve the kinetics of particles and kinetics of rigid body problems

UNIT – I

Trusses

Types of frames – Assumptions for forces in members of a perfect frame, Method of Joints, Method of Sections, Force table, Cantilever Trusses, Trusses with one end hinged and the other freely supported on rollers carrying horizontal or inclined loads.

UNIT – II

Virtual work

Concept of virtual work, Principle of virtual work, Application of principle of virtual work to beams, ladders, framed structures.

UNIT – III

Kinematics

Kinematics of particles - Rectilinear and Curvilinear motions, Projectiles

Kinetics

Kinetics of particles – Newton's Second Law, D'Alembert's Principle

UNIT – IV

Work–Energy, Impulse–Momentum method

Work of a force, Principle of Work and Energy, Application of principle of Work-Energy, Impulse-Momentum Principle, Application of Impulse-Momentum principle to connected bodies, Kinematics of rigid bodies, Kinetics of rigid bodies.

UNIT – V

Mechanical Vibrations

Definitions, Concepts, Simple harmonic motion, Free vibrations without damping, Simple pendulum, Free vibrations with damping.

TEXT BOOKS

1. Engineering Mechanics by Timoshenko & Young
2. Engineering Mechanics by S.S. Bhavikatti
3. Engineering Mechanics by R.K. Bansal

REFERENCE BOOKS

1. Singer's Engineering Mechanics by K. Vijaya Kumar Reddy
2. Engineering Mechanics (Dynamics) by Meriam & Kraige
3. Engineering Mechanics by Tayal
4. Engineering Mechanics by R.K. Rajput
5. Engineering Mechanics by R.S. Khurmi
6. Engineering Mechanics by K.L. Kumar

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I Year B. Tech CE - II Sem	**L**	**T/P/D**	**C**
	2	**3**	**2**

(CED1104) ENGINEERING GRAPHICS - II

Course Objectives: Student will be able to

- Learn Sections and Sectional views of prisms, pyramids, cylinders and cones.
- Learn development of surfaces of regular solids prisms, pyramids, cylinders and cones.
- Learn Isometric projections.
- Learn Transformation of Projections & Perspective Projections

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Draw Sections and Sectional views of prisms, pyramids, cylinders and cones.
- Draw development of surfaces of solids prisms, pyramids, cylinders and cones.
- Draw Isometric projections.
- Draw Transformation of Projections & Perspective Projections.

UNIT-I

Sections and Sectional Views:

Sections of right regular solids-prisms, pyramids, cylinders and cones – auxiliary views

Development of Surfaces

Development of surfaces of right regular solids prisms, pyramids, cylinders and cones.

UNIT-II

Isometric Projections:

Principles of isometric projections, Isometric scale, isometric views, conventions, isometric views of lines, planes, simple solids.

UNIT-III

Tranformation Of Projections:

Conversion of isometric views to orthographic views-conventions and vice versa.

UNIT-IV

Perspective Projections:

Perspective view of points, lines, plane figures and simple solids, vanishing point method & visual ray method

UNIT-V

Introduction To Auto Cad

Classic screen layout of Auto CAD , function keys, drawing entities. Drafting Aids, editing of a drawing (Modify commands), symbol library.

TEXT BOOKS :

1. Elementary engineering drawing by N.D.Bhat, Charotar Publishing House Pvt.Limited
2. Engineering drawing and graphics by Narayana & Kannaiah, Scitech publishers
3. Engineering graphics for degree by K.C.John, PHI learning Publishers

REFERENCE BOOKS

1. Engineering Drawing by M. B. Shah, Pearson Education India
2. Engineering Drawing and Graphics by K Venugopal, New Age International
3. Engineering Drawing by Guptha,IK International Pvt.Limited

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B. Tech CE - II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(MED1202) WORK SHOP PRACTICE

Course Prerequisites: Student should be able to

- study/demonstrate the concepts of computer
- conduct the experiments related to production engineering technology.
- demonstrate the usage of power tools, CNC lathe and machine shop for different exercises

Course Outcomes: On successful completion of the course, it is expected that student should be able to

- Identify, assemble, dissemble, install and write commands for a given configuration of a computer.
- Develop the own components using the techniques of carpentry, tin smithy, forging, etc. listed in trades for exercises.
- Work out the given models in machine shop and CNC lathe.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

1. Carpentry
2. Fitting
3. Tin-Smithy
4. Black Smithy
5. House-wiring
6. Plumbing

2. TRADES FOR DEMONSTRATION & EXPOSURE:

1. Power tools in construction, wood working.
2. Machine Shop, Foundry, Welding
3. IT WorkShop-1:

Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, Simple diagnostic exercises.

IT workshop-II: Installation of Operating system windows and Linux simple diagnostic exercises.

TEXT BOOK:

1. Work shop Manual - P.Kannaiah/ K.L.Narayana/ Scitech Publishers.
2. Workshop Manual by Venkat Reddy.
3. Engineering Workshop Practice – V Ramesh Babu, VRB Publishers Pvt. Ltd.

VNR Vignana Jyothi Institute of Engineering & Technology

I Year B.Tech CE – II sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

The English language Communication Skills Lab aims to provide practice in all the four skills of LSRW, with a special emphasis on listening and speaking skills.

Course Objectives:

- Provide ample practice in LSRW skills.
- Provide practice in grammatical construction, structural patterns, word usage and improve comprehension abilities in the students.
- Train students to use neutral pronunciation through phonetic sounds, symbols, stress and intonation.
- Enable students to transfer information from verbal to graphic representation and vice versa.
- Train students to use effective language for oral presentations, public speaking, role play and situational dialogue.

Course Outcomes:

- Comprehend spoken and written discourse.
- Speak fluently with neutral pronunciation and exhibit interpersonal skills.
- Write accurately, coherently and lucidly making appropriate use of words depending on context and present data clearly.
- Introduce one self to people and be able to speak extempore.

(ENG1203) ENGLISH LANGUAGE COMMUNICATION SKILLS LABORATORY

Syllabus for Lab Sessions

Unit-1:Multimedia Lab

1. Grammar : Nouns and Pronouns; Articles; The Present Tense
2. Vocabulary Lesson 1
3. Listening Comprehension

Communication Skills Lab: Introduction of Self and others

Unit 2: Multimedia Lab

1. Grammar : Concord; Adjectives; The Past Tense
2. Vocabulary Lesson 2
3. Listening Skills

Communication Skills Lab: Seeking and Giving Information, Giving and Taking Instructions

Unit-3: Multimedia Lab

1. Grammar --- adverbs, conjunctions, Prepositions; The Future Tense
2. Vocabulary Lesson 3
3. Telephoning Skills

Communication Skills Lab: Role Play/ Situational Dialogues

Unit-4: Multimedia Lab

1. Grammar ---- Active and Passive Voice; Language Analysis

2. Vocabulary : Lesson 4
3. Listening Comprehension

Communication Skills Lab: **i)** JAM/ Short Talk ii) Information Transfer
a) Data Analysis

b) Interpretation of Graph

Unit-5: Multimedia Lab :

1. **Introduction to Technical Writing**

A. Definition of a Technical Term
B. Description of a Mechanism
C. Description of a Technical Process

2. Vocabulary : Lesson 5

Communication Skills Lab : Presentation Skills : Oral Presentation

Multimedia Lab Requirements

The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

iv) **P – IV Processor**

a) Speed – 2.8 GHZ
b) RAM – 512 MB Minimum
c) Hard Disk – 80 GB
v) Headphones of High quality

5. **Suggested Software:**

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- **Clarity Pronunciation Power** – part II
- **Oxford Advanced Learner's Compass**, 7th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech

- **TOEFL & GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

Multimedia Lab Requirements

Minimum Requirement:

The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

iv) P – IV Processor

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

v) Headphones of High quality

5. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

- **Clarity Pronunciation Power** – part II
- **Oxford Advanced Learner's Compass**, 7th Edition
- **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
- **Lingua TOEFL CBT Insider**, by Dreamtech
- **TOEFL & GRE** (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

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II Year B. Tech CE - I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(CED1105) ENVIRONMENTAL STUDIES

Course Objectives: Student will be able to

- Develop an understanding of the necessity of protection of environment
- Develop an understanding of Natural resources
- Develop an understanding of Biodiversity
- Develop an understanding of Global Environmental problems

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge on environment
- Acquire the knowledge of various Natural Resources
- Develop skills in understanding of various environmental problems
- Develop skills to protect the Environment

UNIT-I

Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems. Bio geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources :classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation.

Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water. Energy resources, Energy resources.

UNIT III

Bio-diversity and its conservation, Value of bio-diversity -consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity – Insitu and Ex-situ conservation.

UNIT IV

Environmental Pollution –Local and Global Issues,Nature of thermal pollution and nuclear hazards, Global warming, Acid rain,Ozone depletion., Environmental case studies:.

UNIT-V

Environmental Problems in India,Drinking water, sanitation and public health,Effects of the activities on the quality of environment, Water scarcity and groundwater

depletion,Controversies on major dams – resettlement and rehabilitation of people: problems and concerns,Rain water harvesting, cloud seeding and watershed management. Economy and Environment,The economy and environment interaction,Economics of development, preservation and conservation, Sustainability: theory and practices,Limits to growth,Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

TEXT BOOKS

1. Environmental studies-A.Y.Anjaneyulu
2. Environmental studies-Deeksha dave
3. Environmental sciences and management-Venugopal

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	3	**1**	**3**

(CED1106) BUILDING MATERIALS, CONSTRUCTION & PLANNING

Course Objectives: Student will be able to

- Will list the construction material.
- know about the construction techniques
- understands the building bye-laws
- Know insights in to smart building materials

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Understand the Basic terminology that is used in the industry
- Understand different building materials ,properties and their uses
- Understands the Prevention of damage measures and good workmanship
- Understands the properties of building materials and services

UNIT – I

Stones and Bricks, Tiles

Building stones – classification and quarrying – properties – structural requirements – dressing. Bricks – composition of Brick earth – manufacture and structural requirements.

UNIT – II

Cement & admixtures, wood, aluminium, steel, building components

Ingredients of cement – manufacture – field & lab tests ;Admixtures – mineral & chemical admixtures – uses, Wood – structure – types and properties – seasoning – defects; steel & aluminum, Lintels, Arches, walls, stair cases – types of floors, types of roofs – flat, curved, trussed; foundations – types; Damp Proof Course; Joinery – doors – windows

UNIT – III

Masonry and finishings, formwork

Brick masonry – types – bonds; Stone masonry – types; Composite masonry – brick – stone masonry; concrete, reinforced brick.;Finishes – Plastering, pointing, painting, claddings – types – tiles- ACP, Requirements – Standards – Scaffolding – Design; Shoring, Underpinning.

UNIT – IV

Building services

Plumbing Services, Water Distribution, Sanitary – Lines & Fittings; Ventilators: Functional requirements systems of ventilators. Air conditioning – Essentials and Types; Acoustics – characteristic – absorption – Acoustic design; Fire protection – Fire hazards

UNIT – V

Building planning

Principles of Building Planning, classification of buildings and Building by laws.

TEXT BOOKS

1. Building Materials and Construction-Arora & Bindra, Dhanpat Roy Publications
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kuma Jain-Laxmi Publications(P) ltd, New Delhi.
3. Elements of Civil Engineering Anurag Kandya Charotar publishing house

REFERENCE BOOKS

1. Building Materials by Duggal , New Age International
2. Building Construction by PC Verghese PHI
3. Construction Technology – Vol- I & II by R.Chuddy, Longman UK
4. Building by laws by State and Central governments and Municipal corporations

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	4	**1**	**4**

(CED1107) STRENGTH OF MATERIALS - I

Course Objectives: Student will be able to

- The student will understand various forces, various supports, deformation of the structures or member, combination of various loads.

- The Student will be able to visualize the difference in strengthening a member by increasing the cross sectional dimensions or making it unnecessarily large and uneconomical. He will be able to realize that providing larger dimensions than optimum will make the members costly and inefficient too.

- The student will be able to predict the displacements or deformations due to various Loads and Load combinations.

- The student will be able to realize and appreciate that an available section can be strengthened by pruning (cutting) it in an appropriate manner modifying certain characteristics of the cross section.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- The student will be able to know the important characteristic strengths of various materials used in construction and fabrication of various members to check the adoptability for use in a particular situation.
- To understand what type of straining actions will be generated under the action of various forces and how to articulate the geometry of the structure to avoid development of undesirable straining actions against which the material is weak, leading to failure of the member or the whole structure itself.
- For given shape and given loads, how to economize the structure by proper modification like making it composite member or pre-stressing it to introduce stresses of opposite nature.
- Predicting the displacements of a given member under given conditions and to strengthen the member suitably to contain the undesirable displacements thus avoiding catastrophy.

UNIT – I

Simple Stresses and Strains

Elasticity and Plasticity, Types of Stresses and Strains – Hooke's law - Stress-Strain diagram for mild steel – Comparison of stress-strain curves for ductile and

brittle materials-various types of steels-Working stress- Factor of safety - Lateral strain , Poisson's Ratio and volumetric strain - Elastic moduli and the relationship between them - Bars of varying section - Composite bars - Temperature Stresses.

UNIT – II

Shear Force and Bending Moment

Types of supports, loads, beams – Concept of shear force and bending moment – Relation between SF,BM and Rate of loading-SF and BM diagrams for Cantilever, Simply supported and Over hanging beams subjected to point load, udl, uniformly varying loads and combination of loads.Point of Contraflexure

UNIT – III

Flexural & Shear Stresses

Theory of Simple bending –Assumptions - Derivation of flexure formula, Neutral axis –Bending stresses - Section modulus for various sections, Design of simple beam sections. Derivation of Shear stress formula - Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T, and angle sections.

UNIT - IV

Deflection of beams

Slope, Deflection and Radius of curvature - Differential equation for the elastic line of a beam –Double Integration and Macaulay's method – Determination of slope and defection for Cantilever,Simply supported and overhanging beams subjected to point loads, udl, uniformly varying loads

UINT – V

Thin & Thick Cylinders

Thin seamless cylindrical shells - Derivation of formula for longitudinal and circumferential stresses - hoop, longitudinal and volumetric strains – changes in diameter, length and volume of thin cylinders – wire wound thin cylinders-Thin spherical shells.

Introduction to Thick Cylinders - Lame's Theory for thick cylinders – Derivation of Lame's equations- Distribution of hoop and radial stresses across the thickness – Radial deflection-Compound cylinders.

TEXT BOOKS

1. A Text book of Strength of materials by R.K. Bansal – Laxmi Punlications (P) ltd. New Delhi.
2. Introduction to Strength of Materials by U.C. Jindal, Galgotia Publications
3. Strength of Materials by B.C.Punmia

REFERENCE BOOKS

1. Mechanics of Solids by Ferdinand#PBeer and others – Tata Mc. Grawhill Publications 2000
2. Strength of Materials by Schaum's out line series – Mc. Graw Hill International

Editions
3. Strength of Materials by S.Rama Krishna and R.Narayan – Dhanpat Rai Publications
4. Strength of Materials by A.R.Basu, Dhanpat Rai & Co. Nai Sarak, New Delhi
5. Strength of Materials by L.S.Srinath et. Al., Macmillian India Ltd. Delhi.
6. Mechanics of Structures, by S.B.Junnarkar, Charotar Publishing House Anand, Gujrat.

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	3	**1**	**3**

(CED1108) SURVEYING

Course Objectives: Student will be able to

- learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
- learn and understand various instrument used in surveying.
- learn and understand how to calculate Area of plot and Ground.
- learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- prepare Map and Plan for required site with suitable scale.
- prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
- judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
- judge the profile of ground by observing the available existing contour map.

UNIT – 1

Surveying & measurements

Surveying – History; Definition; Classification; Principles of surveying; Plan and map; Measurements – Basic Measurements and methods; Errors in surveying: Types of errors

Linear measurements

Different methods; Ranging out; Chaining a line on a flat and on uneven ground; Principles of chain surveying; Basic definitions; Equipment used for chain survey; Field work; Offsets; Obstacles in chain survey; Chain & Tape corrections; Degree of accuracy.

UNIT – II

Compass surveying

Prismatic compass; Local attraction; angular measurements Bearings: Azimuths; deflection angles;

Plane table and its accessories; setting up; Plane tabling methods, Resection by trial and error method. Errors in plane tabling;

Areas & volumes

Introduction; Simpson's rule; Boundaries with offsets at irregular intervals; Coordinate method; Planimeter. Area of cross sections; two & multi level section; Trapezoidal rule; Prismoidal formula; Volume from spot levels- volume from contour plan; Capacity of a reservoir.

UNIT – III

Simple levelling

Basic definitions; Curvature and Refraction; classification of methods of leveling; Sources of errors in leveling. Contour; contour interval; Characteristics of contours; Methods of plotting of contours –Uses of contour maps.

Theodolite & theodolite traverse

Vernier thedolite – basic definitions, fundamental lines, Measurement of a horizontal angle; repetition and reiteration methods of horizontal angle measurement. Measurement of vertical angle

UNIT – IV

Tacheometric surveying

Basic systems of tacheometric measurements; Inclined sight with staff vertical; inclined sight with staff normal to the line of sight. Trigonometric Levelling.

Circular curves

Basic definitions; Designation of a curve; Relationship between radius and degree of curve; Elements of a simple circular curve; Methods of setting out.

UNIT – V

Electronic distance measurements

Basic concepts, principle of Electronic Distance Measurement

Modern surveying

Introduction to Geodetic surveying, Total station and Global positioning system, Introduction to Geographic Information System(GIS).

TEXT BOOKS

1. Surveying Vol I & II by K R Arora, Standard Book house.
2. Fundamentals of Surveying by S K Roy, Prentice- Hall of India Private Ltd.
3. Plane Surveying by AM Chandra, New Age International (P) Ltd.

REFERENCE BOOKS

1. Elements of Plane Surveying by Arthur R Benton and Philip J Taety, Mc. Graw Hill – 2000
2. Surveying & Levelling by R. Subramanian, Oxford University Press, New Delhi

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II Year B. Tech CE - I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1109) FLUID MECHANICS

Course Objectives: Student will be able to

- Identify and obtain values off liquid properties and relationship between them.
- Understand the principles of continuity, momentum, and energy as applied to fluid motions.
- Recognize these principles written in form of mathematical equations.
- Apply these equations to analyze problems by making good assumptions and learn systematic engineering method to solve practical fluid mechanics problems.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Apply fundamental knowledge of mathematics to modeling and analysis of fluid flow problems in civil and environmental engineering.
- Conduct experiments (in teams) in pipe flows and open-channel flows and interpreting data from model studies to prototype cases, as well as documenting them in engineering reports.
- Understand or become aware of disasters caused by an incorrect analysis in hydraulic engineering system.
- Apply fundamental principles of fluid mechanics for the solution of practical civil engineering problems of water conveyance in pipes, orifices, mouth pieces, notches and weirs.

UNIT – I

Properties of Fluid

Introduction; Properties of Fluid, Units of measurement, Fluid Continuum, Newtonian and Non-Newtonian fluids, Vapour pressure.

Fluid Statics

Variation of static pressure, Absolute and gauge pressure, Pressure measurement by mechanical gauges and manometers, Pressure on plane surfaces and curved surfaces.

UNIT - II

Kinematics of Fluid Motion

Methods of describing fluid motion, Classification of flow, Steady, unsteady, uniform and non-uniform flows, Laminar and turbulent flows, Three, two and one dimensional flows, Irrotational and rotational flows, Streamline Pathline, Streakline, Equation for acceleration, Convective acceleration, Continuity equation, Velocity potential and stream function, Flownet, Vortex flow – free vortex and forced vertex flow,

Dynamics of Fluid Flow

Euler's equation of motion, Bernoulli's equation, Energy correction factor, Momentum principle, Applications of momentum equation, Force exerted on a pipe bend.

UNIT - III

Flow Measurements in Pipes

Discharge through venture meter, Discharge through office meter, Discharge through flow nozzle, Measurement of velocity by Pilot tube.

Flow through Orifices and Mouthpieces

Flow through orifices, Determination of coefficients for an orifice, Flow through large rectangular orifice, Flow through submerged orifice, Classification of mouthpieces, Flow through external and internal cylindrical mouthpiece.

UNIT - IV

Flow Over Notches & Weirs

Flow through rectangular, triangular and trapezoidal notches and weirs, End contractions, Velocity of approach. Broad crested weir.

UNIT - V

Analysis of Pipe Flow

Energy losses in pipelines, Darcy – weisbach equation, Minor losses in pipelines,Concept o equivalent length, Hydraulic power transmission through a pipe, Siphon' Pipes in series, parallel & branched pipes, water hammer.

Laminar Flow

Reynold's experiment, Critical velocity, steady laminar flow through a circular pipes.

TEXT BOOKS

1. Fluid Mechanics by Modi and Seth (Standard Book House).
2. Fluid Mechanics by A.K.Jain (Khanna Publishers).
3. Introduction to Fluid Mechanics by S.K. Som & G. Biswas (Tata Mc.Grawhill Pvt. Ltd.)

REFERENCE BOOKS

1. Fluid Mechanics by Douglas, J.M. Gaserek and J.A.Swaffirld (Longman Publishers)
2. Fluid Mechanics by Frank.M.White (Tata Mc.Grawhill Pvt. Ltd.)
3. Fluid Mechanics by A.K.Mohanty, (Prentice Hall of India Pvt. Ltd., New Delhi)

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II Year B. Tech CE - I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(CMS1101) BUSINESS ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives: Student will be able to

- To explain different forms of organizing private and public sector business enterprises and to analyze the significance of Business Economics in solving the problems of business enterprise. Also to define and analyze the concepts of Demand, Elasticity of Demand and Demand Forecasting Methods.
- To analyze the various types of costs and to determine the level of output at which there is neither profit nor loss. To estimate capital requirements and to describe various sources of mobilizing funds. Also to identify least cost combinations of inputs produce desired quantity of output.
- To describe the features of different market structure and pricing strategies.
- To explain the basic accounting concepts and conventions. To elaborate the importance of finance function for evaluating the economic status of a business unit.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Select the suitable form of business organization which meets the requirement of selected business also perform decision – making function effectively in an uncertain frame work by applying concepts of Managerial Economics. Meet and manipulate the demand efficiently and plan the future course of action.
- Apply right kind cost to reduce cost by paying attention towards the costs which can be reduced. Take decision whether to buy or produce? Reduce the cost of capital by selecting best source of fund mobilization and select best investment opportunity which yields higher rate of return.
- Fix the right price which can best meets the predetermined objectives of the business firm under different market conditions. Able to select best combination of inputs to produce required quantity of output.
- Prepare books of accounts and know over all financial position of the business enterprise which enables the concerned to take appropriate measures to improve the situation. Also interpret the financial position from difference angles and initiates the measures/ efforts in that direction.

UNIT-I

Business & New–Economic environment:

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

UNIT II

Introduction to business economics, and demand analysis, Elasticity of demand and demand forecasting

Definition; Nature and scope of managerial economics - demand analysis determinants; Law of demand and its exceptions.

Elasticity of demand and demand forecasting

Definition; Types; Measurement and significance of elasticity of demand; Demand forecasting; Factors governing demand forecasting; Methods of demand forecasting - survey methods, statistical methods, expert opinion method, test marketing, controlled experiments, and judgmental approach to demand forecasting.

UNIT III

Cost analysis: Theory of production and market structures.

Cost analysis:

Cost concepts - opportunity cost, fixed vs. variable costs, explicit costs vs. implicit costs, and out of pocket costs vs. imputed costs; Break-even analysis (BEA) - determination of break-even point (simple problems), managerial significance, and limitations of BEA.

Capital and capital budgeting

Capital and its significance; Types of capital; Estimation of fixed and working capital requirements; Methods and sources of raising finance.

Nature and scope of capital budgeting; Features of capital budgeting proposals; Methods of capital budgeting - payback method, accounting rate of return (ARR), and net present value method (simple problems)

UNIT-IV

Theory of production

Production function - isoquants and isocosts, least cost combination of inputs, and laws of returns; Internal and external economics of scale.

Market structures

Types of competition; Features of perfect competition, monopoly, and monopolistic competition; Price-output determination in case of perfect competition and monopoly.

Pricing policies and methods

Cost plus pricing; Marginal cost pricing; Sealed bid pricing; Going rate pricing, Limit pricing, Market skimming pricing, Penetration pricing, Two-part pricing, Block pricing, Bundling pricing, Peak load pricing, Cross subsidization.

UNIT V

Introduction to financial accounting

Double-entry book keeping; Journal; Ledger; Trial balance; Final accounts - trading account, profit and loss account, and balance sheet with simple adjustments.

Financial analysis through ratios

Computation; Analysis and interpretation of liquidity ratios - current ratio, and quick ratio; Activity ratios - inventory turnover ratio, and debtor turnover ratio; Capital

structure ratios – debt-equity ratio, and interest coverage ratio; Profitability ratios - gross profit ratio, net profit ratio, operating ratio, P/E ratio, and EPs.

TEXT BOOKS

1) Varshney & Maheswari: Managerial Economics , Sultan Chand, 2009.
2) Aryasri: Managerial; Economics and Financial Analysis, TMH, 2009.

REFERENCE BOOKS

1) Ambriah Gupta, Financial Accou8nting for Management, Pearson Education, New Delhi, 2010.
2) H.Craig Peterson & W. Cris Lewis, Managerial Economics PHI, 2010.

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II Year B. Tech CE - I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1201) FLUID MECHANICS LAB

Course Objectives: Student will be able to

- To understand and evaluate standard properties of fluids and their applications.
- To learn the procedure to determine discharge and flow properties of fluids using venture meter and orifice meter.
- To differentiate coefficient of discharge determined using small orifice and external mouth piece.
- To measure minor losses and major losses.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Apply Bernoulli's principle in various real life fluid mechanics problems.
- Identify different types of flows based on Reynolds number.
- Understand basic measurement techniques of fluid mechanics and its appropriate application depending on the requirement.
- Evaluate the Minor and friction losses in pipe flows.

1. Determination of Metacentric Height of a ship.
2. Verification of Bernoulli's equation
3. Determination of Coefficient of discharge for a small orifice by a constant head method
4. Calibration of Venturimeter
5. Calibration of Orifice meter
6. Determination of Coefficient of discharge for an external mouth piece
7. Study of laminar flow using Reynolds apparatus
8. Calibration of Trapezoidal Notch
9. Study of minor losses in pipe flow
10. Determination of Friction factor for a pipe line

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II Year B. Tech CE - I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1202) SURVERYING FIELD WORK

Course Objectives: Student will be able to

- Student will be able to learn and understand the various basic concept and principles used in surveying like Chain Surveying, Compass Surveying, Plane Table Surveying, and Levelling Surveying.
- Student will be able to learn and understand various instrument used in surveying.
- Student will learn and understand how to calculate Area of plot and Ground.
- Student will be learn and understand about Horizontal Angle, Vertical Angle, Horizontal distance and Vertical distance to study the ground profile.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Student will be able to prepare Map and Plan for required site with suitable scale.
- Student will be able to prepare contour Map and Estimate the Quantity of earthwork required for formation level for Road and Railway Alignment.
- Student will be able to judge which type of instrument to be used for carrying out survey for a Particular Area and estimate the area.
- Student will be able to judge the profile of ground by observing the available existing contour map.

Chain surveying

1. Chaining of a line, measurements of area by cross staff survey.

Compass survey

2. Traversing by compass - graphical adjustments.

Plane Table

3. Plane Table methods - Radiation & Intersection method.

Leveling

4. Measurement of elevation of various given points.
5. Fly Leveling, Longitudinal leveling, Cross section leveling & Contouring.

Theodolite surveying

Measurement of horizontal angles

6. Distance between two inaccessible points using the principles of trigonometry and tachometric surveying.

Total Station

8. Area Measurement & Stake Out
9. Remote Elevation Measurement & Missing Line Measurement
10. Plotting of a Contour map
11. Laying a Simple Curve

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II Year B. Tech CE - I Sem	**L**	**T/P/D**	**C**
	2	**0**	**0**

(NCC1101) Human Values and Professional Ethics

Course Description

Objectives

- To develop the ability to distinguish between what is of value and what is superficial in life.
- To develop the ability to face difficult situations in life boldly and resolve them confidently.
- To enable students to progress from discrimination to commitment.
- To Encourage the students to understand values in life.

Syllabus

1. Self-confidence
2. Peer Pressure-Irregular life style
3. The Power of Self- determination
4. Human relationship—trust and respect- resolving conflict
5. Anger-A sign of helplessness
6. Interaction and ragging
7. Right Utilization of physical facilities
8. Unhappiness -Unfulfilled expectations
9. Setting goals- long term and short term goals-handling responsibilities
10. Dealing with people while coordinating work
11. Coping with stress-Identifying one's interests and strengths
12. Time Management-Planning and aligning with one's goals
13. Skills and Values
14. The role of values in Society

Course Book

The resource material that has been prepared by IIIT can be used apart from material that is available in the websites. Later text books can be identified for the facility of the students.

Evaluation

This course would only have a pass/ fail grade. Participation in discussions, submission of assignments and weekly reports and a final report will be used in evaluation.

Outcome

At the end of the course the students would become sensitive towards human values. They would understand commitment and responsibility. They would be able to bring harmony in the society they live.

TEXT BOOKS

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw -Hill, New York 1996.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, “Engineering Ethics”, Prentice Hall of India, New Delhi, 2004

REFERENCES

1. Charles D. Fleddermann, “Engineering Ethics”, Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint now available).
2. Charles E Harris, Michael S. Protchard and Michael J Rabins, “Engineering Ethics–Concepts and Cases”, Wadsworth Thompson Leatning, United States, 2000 (Indian Reprint now available)
3. John R Boatright, “Ethics and the Conduct of Business”, Pearson Education, New Delhi, 2003.
4. Edmund G Seebauer and Robert L Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, Oxford, 2001.
5. Naagarazan, R.S. ‘A Textbook on Professional Ethics and Human Values’ 2006.

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II Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(MTH1106) PROBABILITY & STATISTICS

Course Objectives: Student will be able to

- Understand the elementary ideas in basic probability.
- Understand the different types of probability distribution functions
- Understand the basic concepts in estimation theory and test of hypothesis
- Understand the basic concepts of time series.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Solve problems involving basic probability.
- Apply the knowledge of different probability distribution to Test of Hypothesis.
- Calculate correlation, regression coefficients.
- Use Least squares method to compute time series

UNIT I

PROBABILITY AND DISTRIBUTIONS

Sample space and events, Probability- The axioms of probability, some elementary theorems, conditional probability, Baye's theorem, Random variables - discrete and continuous. Distributions - Binomial, Poisson and Normal distributions–related properties.

UNIT II

SAMPLING DISTRIBUTIONS AND TESTING OF HYPOTHESIS

Sampling distributions, Sampling distribution of means (σ known and unknown), Point estimation, interval estimation, Tests of hypothesis - Null hypothesis, Alternate hypothesis, Type I, Type II errors, Critical region, Inferences concerning means and proportions- Large samples- Test of hypothesis for single mean and difference between the means, Test of hypothesis for the proportions- Single and difference between the proportions, Confidence interval for the mean and proportions.

UNIT III

TESTS OF SIGNIFICANCE- SMALL SAMPLES

Tests of significance - t distributions, Confidence interval for the t- distribution, F-distributions and Chi square distributions.

UNIT IV

CORRELATION AND REGRESSION

Coefficient of correlation, regression coefficient, the lines of regression, rank correlation, correlation for bivariate frequency distributions.

UNIT V

RELIABILITY THEORY AND TIME SERIES ANALYSIS

Basic concepts of reliability, Normal failure law, Exponential failure law, The Weibull failure law and reliability of systems, Time series- utility of time series analysis, Components of time series, Preliminary adjustments before analyzing time series, Measurement of trend by the method of least squares.

TEXT BOOKS:

1. Probability and Statistics for Engineers - Miller I.R. and Freund J.E, 5th Edition, Prentice-Hall, 1995.
2. Introductory Probability and Statistical Application – Meyer, 2nd edition, Oxford and Ibh, 1970.
3. Statistical Methods - S.P. Gupta, Sultan Chand and sons, 2011.

REFERENCES:

1. Reliability Engineering - Balagurusamy E, Tata McGraw Hill, 1984.
2. Elements of Applied Stochastic processes - Bhat U.N, Wiley Series in Probability and Mathematical Statistics, 1983.

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II Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1110) STRENGTH OF MATERIALS - II

Course Objectives: Student will be able to

- Students will be able to understand Principal Stresses and strains and different theories of failure, the concept of Pure torsion and different types of springs.
- Students will be able to understand Euler's formula, secant and straight line formula and their application to long and short columns.
- Students will be able to analyze the stresses for the combined action of direct load and Bending Moment, determination of stresses for masonry structures.
- Students will be able to analyze the stresses in beams subjected to unsymmetrical bending.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Student will be able to define Principal stresses and strains, Solve the problems on an inclined section of a bar under axial load, determine the Principal stresses by using the Mohr's stress circle method
- Student will be able to define pure torsion, torsion equation & assumptions, polar section modulus, and they will be able to derive the Torsional moment of resistance for shafts and equations for open and close coiled helical springs
- Student will be able to define Columns and struts, Analyze columns and struts with different end conditions by using different theories.
- Student will be able to determine stresses for different masonry structures

UNIT-I

Principal Stresses and Strains

Introduction - Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular stresses accompanied by a state of simple shear – Mohr's Circle of stresses –Principal stresses and strains –Analytical and graphical solutions.

Theories of Failures–Various Theories of failures like Maximum Principal stress theory -Maximum Principal strain theory –Maximum shear stress theory –Maximum strain energy theory –Maximum shear strain energy theory

UNIT-II

Torsion of Circular Shafts

Theory of pure torsion – Derivation of Torsion equation : $T/J = \tau/r = C\theta / L$ – Assumptions made in the theory of pure torsion –Torsional moment of resistance –

Polar moment of Inertia-Torsional section modulus –Power transmitted by shafts – Combined bending and torsion and end thrust –Design of shafts according to theories of failure

Springs-types of springs – Carriage or leaf springs-,Helical springs-deflection of close and open coiled springs under axial pull and axial couple –springs in series and parallel

UNIT -III

Columns and Struts

Introduction –Types of columns – Short , medium and long columns –Axially loaded compression members –Crushing load-points of Inflexion-Euler's theorem for long columns –assumptions –derivation of Euler's critical load formulae for various end conditions –Equivalent length of a column –slenderness ratio –Euler's critical stress-Limitations of Euler's theory –Rankine formula –Empirical formula –Rnkine-Gordon formula –Long columns subjected to eccentric loading –Secant–Straight line formula –Prof Perry's formula

UNIT -IV

Direct and Bending Stresses

Stresses under the combined action of direct axial loading and B.M ., core of a section –determination of stresses in the case of chimneys ,retaining walls and dams –conditions for stability –stresses due to direct loading and B.M about both axes

UNIT -V

Unsymmetrical Bending

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

TEXT BOOKS

1. A Text book of Strength of materials by R.K. Bansal – Laxmi Punlications (P) ltd. New Delhi.
2. Introduction to Strength of Materials by U.C. Jindal, Galgotia Publications
3. Strength of Materials by B.C.Punmia

REFERENCE BOOKS

1. Mechanics of Solids, by Ferdinand PBeer and others – Tata Mc. Grawhill Publications 2000
2. Strength of Materials by Schaum's out line series – Mc. Graw Hill International Editions
3. Strength of Materials by S.Rama Krishna and R.Narayan – Dhanpat Rai Publications
4. Strength of Materials by A.R.Basu, Dhanpat Rai & Co. Nai Sarak, New Delhi
5. Strength of Materials by L.S.Srinath et. Al., Macmillian India Ltd. Delhi.

6. Mechanics of Structures, by S.B.Junnarkar, Charotar Publishing House Anand, Gujrat.

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	4	**1**	**4**

(CED1111) HYDRAULICS & HYDRAULIC MACHINES

Course Objectives: Student will be able to

- Apply fundamental principles of fluid mechanics for the solution of practical Civil Engineering problems of water conveyance in open channels.
- Study, Analyze and Design of channels in uniform and Non-uniform flow conditions.
- Describe the operating characteristics of hydraulic machinery (pumps and turbines) and the factors affecting their operation and specifications, as well as their operation in a system.
- Study and Analyze different types of different types and elements of Hydro Electric Power plants.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Apply fundamental knowledge of fluid mechanics in solving problems and making design of open-channel hydraulics in Civil and Environmental Engineering.
- Describe and apply dimensional analysis and similarity to develop hydraulic models and testing.
- Understand the basics of hydraulic machinery and their operation design in water distribution systems.
- Select and design appropriate pumps, classification, identify and design of hydraulic turbines and their and their application in Hydro Electric Power plants.

UNIT-I

Open Channel Flow – I

Types of flows – Types 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.

UNIT II

Open Channel Flow – II

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 – derivation - energy dissipation applications.

UNIT III

Hydraulic Similitude

Dimensional analysis – Rayleigh's method and Buckingham's pi theorem – study of Hydraulic models – Geometric, Kinematic and Dynamic similarities – Dimensionless numbers – Model and Prototype relations.

Basics of Turbo Machinery

Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, Jet striking centrally and at tip, Velocity triangles at inlet and outlet, expressions for work done and efficiency – Angular momentum principle, applications to radial flow turbines.

UNIT IV

Hydraulic Turbines – I

Elements 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.

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.

UNIT V

Centrifugal Pumps

Pump installation details – classification – work done – Manometric head – minimum starting speed – losses and efficiencies – specific speed. Multistage pumps – pumps in parallel – performance of pumps – characteristic curves – NPSH – Cavitation.

Hydropower Engineering

Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.

TEXT BOOKS

1. Open Channel Flow by K.Subramanya (Tata Mc.Graqwhill Pvt. Ltd.).
2. Fluid Mechanic and Fluid Machines by Rajput (S.Chand & co).
3. Fluid Mechanic & Fluid Power Engineering by D.S.Kumar (Kataria & Sons Publications Pvt. Ltd.).

REFERENCE BOOKS

1. Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth (Standard Book House).
2. Open channel flow by V.T.Chow (Mc.Graw Hill Book Company).
3. Hydraulic Machines by Banga & Sharma (Khanna Publishers).

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II Year B. Tech CE - II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(CED1112) CONCRETE TECHNOLOGY

Course Objectives: Student will be able to

- Use different types of cement as per their properties for different field applications.
- Design economic concrete mix proportion for different exposure conditions and intended purposes.
- Supervise various concreting operations.
- Carry out field and laboratory tests on concrete in plastic and hardened stage.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Determine the properties of concrete ingredients i.e. cement, sand, coarse aggregate by conducting different tests. Recognize the effects of the rheology and early age properties of concrete on its long-term behavior.
- Use various chemical admixtures and mineral additives to design cement based materials with tailor-made properties
- Use advanced laboratory techniques to characterize cement-based materials.
- Understand the mix design and engineering properties of special concretes such as high-performance concrete, self-compacting concrete, fibre reinforced concrete, etc.

UNIT -I

Cements, Aggregates & Admixtures

Portland cement – chemical composition, hydration, setting of cement , structure of hydrated cement –Tests on physical properties – Different grades of cement – Classification of aggregates – Particle shape & texture – bond, strength & other Mechanical properties of aggregates – specific gravity, bulk density, porosity, adsorption & moisture content of aggregate– sieve analysis – fineness modulus - Grading curves - Grading of fine & coarse aggregates – gap graded aggregate – maximum aggregate size – alkali aggregate reaction – thermal properties - types of Admixtures – Mineral and chemical admixtures – properties – dosages – effects - usage.

UNIT –II

Fresh Concrete

Workability – Factors affecting workability – Measurement of workability by different tests - setting times of concrete - Effect of time and temperature on workability - Segregation & Bleeding - Mixing and vibration of concrete - Steps in the manufacture of concrete - Quality of mixing water.

UNIT –III

Hardened Concrete

Water/cement ratio - Abram's Law – Gel space ratio law- Maturity concept - strength in tension & compression - Factors affecting strength -Relation between compression & tensile strength

UNIT –IV

Testing of Hardened Concrete

Compression test -Tension Test - Flexure Test - Splitting Test- Factors affecting strength- Non-Destructing Testing methods – Codal provisions for NDT - Modulus of Elasticity – Static and Dynamic modulus of elasticity- Poisson's ratio - Creep of concrete - Factors influencing creep – Relation between creep & time – Nature of creep – effects of creep - Shrinkage- types of shrinkage.

UNIT-V

Mix design

Factors in the choice of mix proportions - Durability of concrete – quality control of concrete - Statistical methods – Acceptance criteria –Proportioning of concrete mixes - BIS method of mix design for ordinary and pumpable concrete

Special Concretes

Introduction to Light weight concrete – light weight aggregates – cellular concrete – No-fines concrete – fibre reinforced concrete – polymer concrete – High performance concrete – Self compacting concrete – Ready Mix concrete.

TEXT BOOKS

1. Concrete Technology by M.S.Shetty – S.Chand & Co. ; 2004
2. Properties of concrete by A.M.Neville – Low priced edition – 4th edition

REFERENCE BOOKS

1. Concrete Technology by M.L.Gambhir – Tata Mc.Graw Hill press, New Delhi
2. Concrete Technology by A.R.Santha Kumar, Oxford university press, New Delhi
3. Concrete: Micro Structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, Mc-Graw Hill Publishers.

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	4	**1**	**4**

(CED1113) STRUCTURAL ANALYSIS - I

Course Objectives: Student will be able to

- The student will learn how to analyze the statically indeterminate structures by applying the principles of equilibrium and compatibility in deformation pertaining to the structure.
- The student understands the difference between the flexibility and stiffness methods.
- The student will realize the necessity of help from the computer in analysis of structures of higher degree of indeterminacy.
- The student will learn to predict the elastic curve for better understanding of the behavior of the indeterminate structure.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- The student will be able to judge the number and type of supports appropriate for given conditions of loading and of topography with confidence.
- The student can understand the advantage of statically indeterminate structure over the statically determinate structure
- The student can confidently analyze the indeterminate structure of higher degree of indeterminacy through computer oriented methods of analysis.
- The student can superimpose the effects of weakness of supports or foundations such as allowing or imposing settlement or rotation of the ends over the results of normal and simple analysis.

UNIT-I

Propped Cantilevers

Analysis of propped cantilevers-shear force and bending moment diagrams-Deflection of propped cantilevers.

Fixed beams

Introduction to statically indeterminate beams with u.d.l., point loads, uniformly varying load, couple and combination of loads, shear force and bending moment diagrams-deflection of fixed beams, effect of sinking of support, effect of rotation of a support.

UNIT-II

Continuous beams

Introduction- Clapeyron's theorem of three moments-analysis of continuous beams of constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moments of inertia for different spans-

effects of sinking of supports-shear force and bending moment diagrams. Analysis of Fixed beams using Clapeyrons theorem.

UNIT-III

Slope-deflection method

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

UNIT IV

Energy theorems

Introduction-strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem – deflection of simple beam and pin jointed trusses.

Indeterminate Structural Analysis — solution of trusses with one degrees of internal or external indeterminacies – Castiglino's theorem

UNIT-V

Influence lines

Definition of influence line for SF, influence line for BM- load position for maximum SF at a section-load position for maximum BM at a section single point load, U.D load longer than the span U.D load shorter than the span-influence lines for forces in members of Pratt and Warren trusses.

Moving loads

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

TEXT BOOKS

1. Analysis of Structures – Voll & Col II by V.N.Vazirani & M.M. Ratwani, Khanna Publications, New Delhi.
2. Structural Analysis by V.D.Prasad Galgotia publications, 2nd Editions.
3. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.
4. Comprehensive Structural Analysis – Vol.1&2 by Dr. P.Vaidyanathan & Dr.P.Perumal – Laxmi Publications Pvt. Ltd. New Delhi.
5. Structural Analysis – A unified approach by Dr. DSP. Rao

REFERENCE BOOKS

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, gujrat
2. Theory of Structures by Gupta, Pandit & Gupta; Tat Mc. Graw – Hill Publishing Co. Ltd. New Delhi.
3. Theory of Structures by R.S.Khurmi , S.Chand Publishers
4. Strength of Materials and Mechanics of Structures – by B.C.Punmia, Khanna Publications, New Delhi.
5. Basic Structural Analysis by C.S.Reddy, Tata McGraw-Hill, New Delhi.

6. Basic Structural Analysis by K U Muthu, A. Ibrahim, M.Vijayanand and M. Janardhana, I K Intl. Publishers.

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II Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(CED1114) ENGINEERING HYDROLOGY

Course Objectives: Student will be able to

- To impart to the students the fundamentals of hydrology.
- To enable the students to understand the various formula used in Hydrology
- To enable the students to solve analytical problems
- To enable the students to apply the hydrology to real problems

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Compute the average precipitation using several methods
- Compute the evaporation, evapotranspiration and infiltration on a given field
- Construct Unit Hydrographs and determine design discharges for various structures.
- Understand the basics of Groundwater Hydrology and Well Hydraulics

UNIT-I

Introduction

Hydrology – Definition, surface water hydrology and groundwater hydrology, Hydrology cycle – Different forms, Global Water Budget.

Precipitation

Rain-gauge – Recording and non recording types, Mass rainfall curves – Characteristics mean rainfall on a basin – Arithmetic, Theissen and Isohyetal methods, Intensity – Duration Analysis, Intensity – Frequency – Duration analysis, Depth – Area – Duration curves, PMP, Missing Rainfall Data – Estimation, Consistency of Rainfall records, Double mass curve, Rain gauge network analysis.

UNIT II

Evaporation

Evaporation process, Factors affecting evaporation, Estimation of evaporation, Measurement of evaporation – Evaporation pans, Control of evaporation, Transpiration, Evapo-transpiration, PET, Consumptive use, Lysimeter, Formulae for estimation of PET.

Infiltration

Infiltration process, Factors affecting, Measurement of infiltration, Infiltrometer, Infiltration capacity curve, Horton's relation, Infiltration Indices, Φ-Index, W-Index and W_{min} Index.

UNIT III

Runoff

Components of Runoff, Factors affecting runoff, Estimation of runoff, Basin yield, Flow duration curves, Mass curve of runoff – Analysis, Estimation of safe yield from a reservoir of given capacity.

Hydrographs

Hydrograph – components, separation of hydrograph into base flow and DRO – Methods, Unit hydrograph – principles, derivation of UH of Isolated unit storms, UH for various durations – S-curve techniques, Estimation of runoff from UH, Average UH, limitations of UH theory, Synthetic UH, IUH.

UNIT IV

Groundwater Hydrology

Occurrence, movement and distribution of groundwater, aquifers – types, specific yield, permeability, storage coefficient, Transmissibility, Rock properties affecting groundwater.

UNIT V

Well Hydraulics

Steady radial flows into well confined and unconfined aquifers, Recuperation tests, Well interference, Well characteristics.

TEXT BOOKS

1. Introduction to Hydrology by Warren Viessman, Jr. and Gary L.Lewis (PHI Publishers)
2. Engineering Hydrology by Jaya Rami Reddy (Laxmi Publications)
3. Hydrology by Madan Mohan Das and Mimi Das Saikia (PHI Publishers)
4. Hydrology by K. Subramanya (Tata McGraw-Hill)

REFERENCE BOOKS

1. Elements of Engineering Hydrology by V.P. Singh (Tata McGraw-Hill)
2. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
3. Elements of water Resources Engineering by K.N.Duggal and J.P.Soni (New Age International)

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II Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1203) HYDRAULICS & HYDRAULIC MACHINES LAB

Course Objectives: Student will be able to

- understand the working principle of energy dissipaters using hydraulic jump.
- familiarize the students with the components and working principles of the Hydraulic machines- different types of Turbines.
- differentiate the working principle between centrifugal pump and reciprocating pump
- learn and practice writing technical reports and to work on small design projects

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Understand the loss energy and classification of hydraulic turbines
- Demonstrate the working principles of Hydraulic machines- (different types of Turbines/ Pumps) which are used in power generation.
- Apply the principle of impact of jet on vanes in turbines.
- Evaluate the maximum obtainable efficiency of the turbines/ pumps using plots.

1. Impact of jet on vanes
2. Determination of Critical slope
3. Study of Hydraulic jump
4. Determination of Chezzy's constant
5. Main characteristics of Pelton wheel turbine
6. Performance test on Francis turbine
7. Main characteristics of Centrifugal Pump
8. Operating characteristics of Centrifugal Pump
9. Main characteristics of Reciprocating Pump
10. Operating characteristics of Reciprocating Pump

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II Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1204) MATERIAL TESTING LAB

Course Objectives: Student will be able to

- The student will be able to study the uses of various types of testing machines and capacities.
- The student will be able to test the structural materials against various straining actions which the member is intended to bear during its service. The strength of materials against various straining actions can be determined by conducting the appropriate tests.
- The student will be able to identify, understand or design various implements for generating required straining forces using the machine or to augment the utility of the same machine.
- The student will be able to understand the principle of self- straining systems and to analyze the various elements of the machine and appreciate the capacity of the testing machine or the frame.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- The student clearly understands the concepts of deciding the shape or type of specimen for assessing the respective strengths against various straining actions.
- The student can design the specimens for assessing a particular property of the material with the available machines.
- The student can design the experiments making use of various techniques of load measuring or deformation measuring instruments.
- The student will be confident to decide the range of the machine and set the machine accordingly by suitable modifications, for results with a finer degree of accuracy.

1. Uni-axial Tension test on a Ductile Material
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test on a ductile material specimen
5. Hardness test (Brinell and Rockwell)
6. Compression and tensile tests on close coiled helical spring
7. Compression test on wood (Parallel & Perpendicular to grains) and/or concrete
8. Impact test-Izod and Charpy Impact Tests
9. Direct Shear test
10. Verification of Maxwell's Reciprocal theorem on beams
11. Deflection test on continuous beam with point load on one span

12. Deflection test on continuous beam with two point loads, one in each span

Additional Experiments:

- Use of electrical resistance strain gauges-Demonstration

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III Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1115) DESIGN OF REINFORCED CONCRETE STRUCTURES

Course Objectives: Student will be able to

- Know the salient features of Limit State Method of design of RC structures.
- Understand the various codal provisions given in IS. 456.
- Know the behaviour of RC beams under flexure, shear and compression.
- Understand the concepts of limit state of collapse and limit state of serviceability.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Design the singly reinforced, doubly reinforced and flanged sections.
- Design the axially loaded, uniaxial and biaxial bending columns.
- Design the isolated square, rectangular and circular footings
- Design the one-way and two-way slabs.

UNIT – I

Concepts of RC Design

Limit state design, Basic statistical principles, Characteristic loads, Characteristic strength, Partial load & safety factors, Representative stress- strain curves for cold worked deformed bars and mild steel bars, Assumptions in limit state design, Stress block parameters, I.S. 456 Codal provisions

Beams

Limit state design of Singly reinforced, Doubly reinforced, T and L beam sections.

UNIT – II

Shear, Torsion and Bond

Limit state design of beams for shear and torsion, Concept of bond, Anchorage & Development length, Design examples in simply supported and continuous beams, Detailing.

UNIT – III

Columns

Design of axially loaded columns of different cross sections, Design of columns under uni-axial bending and bi-axial bending using SP-16 charts

UNIT – IV

Footings

Different types of footings, Design of flat type and sloped type isolated square, rectangular and circular footings.

UNIT-V

Slabs

Design of one-way slabs, Design of continuous slabs using IS coefficients, Design of two-way simply supported and restrained slabs.

Limit state of serviceability for deflection and cracking.

TEXT BOOKS

1. Limit state design of reinforced concrete by P.C. Varghese, PHI, New Delhi.
2. Fundamentals of Reinforced concrete design by M.L.Gambhir, PHI, 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. Reinforced Concrete Design by S.Unnikrishna Pillai & Devdas Menon, TMH, New Delhi.
2. Reinforced Concrete Design by N.Krishna Raju and R.N.Pranesh, New age International Publishers, New Delhi.
3. Design of concrete structures–Arthus H.Nilson, David Darwin.TMH, New Delhi.

Note:

Question paper pattern for Final Examination:

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 for 25 marks. Part-B consists of Five questions on design out of which three are to be answered for 45 marks (15 x 3).

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III Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	3	**0**	**3**

(CED1116) ENGINEERING GEOLOGY

Course Objectives: Student will be able to

- Know geology from Civil Engineering point of view
- Understand Mineral and rock properties
- Understands the significance of structural geology
- Understand the concepts of Geophysical methods

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Define geology and its importance in Civil Engineering
- List different properties of Minerals
- Classify the rocks
- Aquire the knowledge of structural geology.

UNIT-I

Introduction

Definition of Geology, Engineering Geology. Importance of geology from Civil Engineering point of view. Importance of physical geology, petrology and structural geology. Case studies of failures of few civil engineering constructions .Weathering of rocks and its effect on the properties of rocks, importance of weathering with reference to dams, reservoirs and tunnels.

UNIT-II

Mineralogy

Definition of mineral, mineralogy, Importance of study of minerals: rock forming and ore forming minerals.Differnt methods of study minerals .Advantages of study of minerals by physical identification method. Physical Properties of minerals for identification of minerals. Physical properties of following minerals: Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of ore forming minerals such as Pyrite, Hematite, Magnetite, Amethyst, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite, Coral reefs.

UNIT-III

Petrology

Defintion of a rock, petrology.Classification of rocks-Geological classification of rocks. Rock Cycle.Cassification of igneous Forms, structures and textures of igneous rocks. Classification of sedimentary rocks, and its structures and textures. Classification metamorphic rocks, its structures and textures. Megascopic Study of Granite, Dolerite, Basalt, Pegmatite, Charnockite, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT-IV

Structural Geology

Out Crop, Study of geological structures associate with rocks such as folds, faults, joints, unconformities-their important types. Significance of Strike and dip in geological structures. Earthquakes, their causes and effects, shield areas and seismic belts, seismic waves Richter scale, Precautions to be taken for building construction in seismic areas. Land slides, their causes and effect, measure to be taken to prevent their occurrence. Ground Water, water table, common types of ground water, springs, geological controls of ground water movement, ground water exploration.

UNIT V

Importance of Geophysical investigations, Principles of geophysical methods. Importance of Electrical resistivity method and seismic refraction method from civil engineering point of view.

Geology of Dams, Reservoirs, Tunnels

Types of Dams, importance of geology in their site selection and geological considerations in the site selection of a dam, reservoir, tunnels. Histories of dams, geological factors affecting the water tightness and life of a reservoir. Purpose of tunneling, types of tunnels, out break, lining of tunnels.

TEXT BOOKS

1. Engineering Geology by N.Chennakesavulu, Mc-Millan, India Ltd.
2. Principals of Engineering Geology by K.V.G.K. Gokhale, B.S publications
3. Fundamentals of Engineering Geology by F.G Bell, Butterworth's publications, New Delhi.
4. Engineering Geology by Parbin Singh.

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III Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	3	**1**	**3**

(CED1117) IRRIGATION ENGINEERING

Course Objectives: Student will be able to

- To impart to the students the Irrigation Engineering.
- To enable the students to understand the details of water requirement of crops
- To enable the students to solve analytical problems
- To enable the students to design different components of a Irrigation System

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Compute the water requirement of various crops
- Calculate the reservoir capacity required for Irrigation
- Design various types of Diversion Head Works
- Design Irrigation Canals using different theories

UNIT – I

Introduction to Irrigation Engineering

Necessity and importance of irrigation, advantages and ill effects of irrigation, types of irrigation, methods of application of irrigation water, Indian agricultural soils, methods of improving soil fertility, preparation of land for irrigation, standards of quality for irrigation water.

Water Requirements of Crops

Soil-water-plant relationship, vertical distribution of soil moisture, soil moisture constants, soil moisture tension, consumptive use, estimation of consumptive use, Duty and delta, factors affecting duty, depth and frequency of Irrigation, irrigation efficiencies.

UNIT – II

Reservoir Planning

Factors governing selecting site for reservoirs, zones of storage of a reservoir, reservoir yield, estimation of capacity of reservoir using mass curve. Reservoir sedimentation-control.

Dams: Gravity Dams

Types of dams, factors affecting selection of type of dam, Forces acting on 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 – III

Earthen Dams

Types of Earth dams, causes of failure of earth dam, criteria for safe design of earth dam, seepage through earth dam-graphical method, measures for control of seepage.

Spillways

Types of spillways, design principles of Ogee spillways, types of spillway gates.

UNIT – IV

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.

Canal Falls

Types of falls and their location of Sarda type fall, trapezoidal notch fall and straight glacis fall.

UNIT – V

Irrigation Canals

Classification of canals, Silt Theories –Kennedy's Theory, design procedure of canals, Silt supporting capacity, drawbacks, Lacey's regime theory – design procedure of canals, comparison of Kennedy's and Lacey's regime theory.

Design of Irrigation Canals

Balancing depth of cutting – use of Garret's diagrams in canal design – use of Lacey's diagrams – canal design – water logging and canal lining, Cross drainage works – Types, selection of suitable types of CD works.

TEXT BOOKS

1. Irrigation Engineering and Hydraulic Structures by S.K. Garg (Khanna Publishers)
2. Irrigation Engineering by K.R. Arora (Standard Publishers)
3. Irrigation Engineering by R.K. Sharma and T.K. Sharma (S.Chand Publishers)

REFERENCE BOOKS

1. Irrigation and Water Resources Engineering by G.L.Asawa (New Age Publishers)
2. Concrete Dams by Varshney
3. Theory and Design of Hydraulic Structures by Varshney (Gupta & Gupta)

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III Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(CED1118) GEOTECHNICAL ENGINEERING - I

Course Objectives: Student will be able to

- To create an ability to apply knowledge of geotechnical engineering.
- To accentuate the understanding of the basic principles of soil mechanics and its application to solve problems related to geotechnical engineering.
- To improve the basic understanding of the index and engineering properties of soils
- To improve the concepts to understand the hydraulic behavior of the soils

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- An ability to identify, formulate and solve geotechnical engineering problems.
- Improvising techniques, skills, and modern engineering tools necessary for necessary understanding in geotechnical engineering practice.
- A complete awareness of the classical concept of soil mechanics and its necessity
- An awareness of the selection of soil based on the applicability and requirement conditions.

Unit - I

roperties of Soil

Historical development – Physical properties of Soil – Void ratio – Porosity, Degree of Saturation, Water content, Unit Weights, Specific Gravity – their relationships, Relative density. Consistency limits – determination and various indices – plasticity index Liquidity index – Significance and Importance, Activity. Classifications : Mechanical analysis – Sieve analysis, stoke's law, hydrometer Analysis Textural Classification, Structural Classification based on size – unified soil classification and modification by Bureau of Indian Standard. Clay minerals mineralogy

Unit - II

Permeability and Seepage

Soil water-types, Darcy's law-Factors affecting permeability, Determination of permeability by constant head and falling head method as per IS – 2720, field test as per IS – 5529 (part I)- pumping in test and pumping out test. Permeability of layered soils Seepage forces, General flow equation (Laplace equation). Flow net construction and applications, Anisotropic soil conditions, quick sand condition. Uplift pressure, exit gradient, failure due to piping, Criteria for design of filters.

Unit - III

Compaction:

Compaction-Factors affecting compaction. Dry density and moisture content relationship. Zero air voids line. Engineering behavior of compacted soils. Standard Proctor test and Modified Proctor test as per IS – 2720. Field compaction equipment, Field control of compaction.

Consolidation: primary compression and secondary compression determination of preconsolidation pressure. Normally consolidated, over consolidated and under consolidated clays. Oedometer Test, e-p and e-log p curves – compression index, coefficient of compressibility and coefficient of volume decrease. Terzaghi's one dimensional consolidation theory assumption, derivation and application, coefficient of consolidation time curve fitting methods, initial compression,

Unit - IV

Stress Distribution in Soils

Effective stress concept, Nature of effective stresses, Effect of water table fluctuations on effective stress, Effective stress in a soil mass under hydro static condition, capillarity effect on effective stress. Effective stress under steady seepage condition, failure of structures by piping. Boussinesq theory- point load, line load, strip load, circular and rectangular loaded areas. pressure distribution diagram on a horizontal and vertical plane, pressure bulb, Westergaard's theory, equivalent point load method, Newmark chart, Fadum chart, contact pressure, approximate stress distribution method.

Unit - V

Shear Strength of Soil

Stress strain curve, stress at a point-Mohr circle of stress, Mohr-coulomb failure criteria, pore pressure, total and effective stress. Peak and residual shear strength. Factors affecting shear strength. Laboratory measurement of shear strength by direct, unconfined, Vane shear test and triaxial tests under different drainage conditions. Shear strength characteristics of sands. Sensitivity and thixotropy of cohesive soils. shear strength of sands, critical void ratio and dilatancy, shear strength of clays, total stress analysis and effective stress analysis,

TEXT BOOKS

1. Basic and Applied Soil Mechanics by Gopal Rajan and A.S.R. Rao.
2. Soil Mechanics, Foundation Engineering by V.N.S. Murthy.
3. Soil Mechanics and Foundation Engineering by K.R. Arora.

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III Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1119) STRUCTURAL ANALYSIS – II

Course Objectives: Student will be able to

- Ability to idealize and analyze statically determinate and indeterminate structures
- To introduce Displacement methods of analysis for statically indeterminate structures.
- To Introduce the approximate methods of analysis for both gravity and Lateral loads.
- Familiarity with professional and contemporary issues

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Ability to analyze Two hinged and three hinged arch structures
- Ability to determine deflections of beams using classical methods
- Ability to solve statically indeterminate structures using classical methods
- Ability to solve statically indeterminate structures using Approximate methods

UNIT I

ARCHES : Three hinged arches

Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

Two hinged arches: Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT – II

Moment Area method-beams subjected to point loads,udl and couples

Conjugate Beam Method: Derivation of Theorems-Application to Beam deflections and slopes.

UNIT – III

Moment Distribution method – Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports Kani's Method : Analysis of continuous beams – including settlement of supports and single bay single storey portal frames with side sway .

UNIT-IV

Approximate method of structural analysis, application to building frames. (i) Portal method (ii) Cantilever method. (iii) Substitute frame analysis-two cycle.

UNIT – V

Determination of kinematic indeterminacy-Stiffness method: Introduction, application to continuous beams including support settlements.

TEXT BOOKS

1. Analysis of Structures – Vol. I & 2 by Bhavikathi, Vikas publications
2. Analysis of structures by Vazrani & Ratwani – Khanna Publications.
3. Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi
4. Structural Analysis by Devdasmenon and Pillai, Narosa publishers

REFERENCE BOOKS

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Theory of structures by Ramamuratam
3. Structural Analysis by C.S. Reddy, Tata Macgrawhill, New Delhi
4.Intermediate Structural Analysis by C.K.Wang –Mc Graw-Hill International Series

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III Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1205) ENGINEERING GEOLOGY LAB

Course Objectives: Student will be able to

- Identify the mineral name by studying the properties
- Identify the rocks
- Interpretation of geological maps
- Identify the presence of folds, faults, dip and strike in rocks

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Identify various Minerals
- Identify the rocks
- Interpret and draw the sections for geological maps showing horizontal beds, vertical beds, inclined b, folds, faults, unconformities.
- Behaviour of the minerals and their engineering applications

List of Experiments

1 .Study of physical properties and identification of minerals referred under theory. Feldspar, Quartz, Flint, Jasper, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Chlorite, Kyanite, Garnet, Talc, Calcite. Study of ore forming minerals such as Pyrite, Hematite, Magnetite, Amethyst, Galena, Pyrolusite, Graphite, Magnesite, and Bauxite, Coral reefs.

2. Megascopic description and identification of rocks referred under theory. Granite, Dolerite, Basalt, Pegmatite, Charnockite, Sandstone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

3. Interpretation and drawing of sections for geological maps showing horizontal beds, vertical beds, inclined beds, folds, faults, unconformities.

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III Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1206) COMPUTER AIDED DRAFTING OF BUILDING

Course Objectives: Student will be able to

- Use AutoCAD software. Use different commands to draw Building Drawings.
- Draw different components of Doors and Windows.
- Draw different types of Trusses.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Use different Autocad Commands to develop Plan, Section and elevation of single Storied and Multi Storied Buildings.
- Draw and detail different Components of different types of doors and windows.
- Develop Working Drawings of Residential Buildings.
- Prepare drawing with details of roof trusses.

1. Introduction to Computer Aided Drafting.
2. Software for CAD- Introduction to different software's.
3. Practice exercises on CAD software.
4. Drawing of plans of buildings using software a) single storied buildings b) multi storied buildings.
5. Developing sections and elevations for a) single storied buildings b) multi storied buildings.
6. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software.
7. Exercise on development of working drawings of buildings

TEXT BOOKS

1. Computer Aided Design Laboratory by M.N.Sesha Prakash & Dr. G.S.Servesh – Laxmi Publications
2. Engineering Graphics by P.J.Sha-S.Chand & Co.

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III Year B. Tech CE – I Sem

L	T/P/D	C
0	3	2

(CED1207) CONCRETE LAB
LIST OF EXCERCISES

Course Objectives: Student will be able to

- To Understand the test procedures to find Physical properties of Cement
- To understand the test procedures to find Specific Gravity, Bulking of Aggregates.
- To Understand the test procedures to find properties of Fresh Concrete
- To Understand the test procedures to find properties of Hardened Concrete

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Test Fineness, Specific Gravity, Setting Time, Soundness and Compressive Strength of Cement
- Test Specific Gravity of Coarse Aggregate and Fine Aggregate, Bulking of Fine Aggregate.
- Design Concrete Mix Proportioning by Using Indian Standard Method.
- Test Workability of Fresh Concrete and Compressive strength, Split Tensile Strength of Hardened Concrete.

Cycle -I

I. Tests on Cement:

a) Standard Consistency
b) Initial Setting Time & Final Setting Time
c) Specific Gravity
d) Fineness
e) Soundness
f) Compressive Strength

II. Tests on Aggregates:

a) Sieve Analysis and Gradation Charts of Fine Aggregate & Coarse Aggregate.
b) Specific Gravity of Fine Aggregate & Coarse Aggregate.
c) Bulking chart for Fine Aggregate.

Cycle –II

III. Tests on Fresh Concrete:

a) Slump Test
b) Compaction factor Test
c) Vee Bee Test

IV. Tests on Hardened Concrete:

a) Compression, Flexure and Split Tension Tests.
b) Modulus of Elasticity of Concrete.
c) Non Destructive Testing of concrete (for Demonstration)

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III Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	2	**0**	**0**

(NCC1102) Soft Skills and Personality Development

Introduction

In an era of Technological advances and competition in the job market, it is necessary for students to possess soft skills and effective personal skills in addition to technical skills. It is essential that students possess the ability to convey technical ideas in a sound and simple manner. Planning and execution are the two important activities required for them. It is the execution that requires the soft skills as it most of the times deals with people. This course on "Soft Skills and Personality Development" is aimed at enhancing students' career prospects.

This course uncovers the principles of soft skills and personality skills, the ways to integrate them in different phases of career that require personal and interpersonal skills. It focuses on transforming the way of one's thinking and reacting to the environment. It equips the students with self analysis and gain self- control through stress management and conflict management. It also helps students with study skills. It helps students overcome their barriers and achieve excellence in performance and succeed in their chosen field of work.

Objectives

enable students to convert the conceptual understanding of communication into everyday practice train students to ground concepts/ideas in their own experience enable students to exercise control over language use sensitise students to the nuances of the four basic communication skills – Listening, Speaking, Reading and Writing enable students to understand the concept and components of personality, so as to apply the acquired knowledge and march towards excellence in their academic careers. train students to become aware of their thinking styles and to enable them to convert thinking into performance prepare students to evolve mental models for intra-personal and inter-personal transactions make students reflect and improve their use of body language – posture, gesture, facial expression, tone sharpen memory skills and other study skills, which are vital for academic excellence. bring outthe creativity and latent talents of students through goal setting

train students for positive thinking to keep them in good stead at the time of crisis.

SYLLABUS

Unit I: Introduction to Personality Development

1. Definition and Basics of personality
   - Determinants of Personality- biological, psychological and socio- cultural factors
   - Need for personality Development

2. Analyzing strengths and Weaknesses
3. Corporate theories on Personality development
4. Increasing vocabulary
5. Body Language
6. Preparation of Self Introduction
7. Motivation
   - Self-analysis through SWOT
   - Techniques and strategies for self-motivation

Unit II : Techniques in Personality Development Stage I

1. Communication Skills
2. Listening
3. Communication Barriers
4. Overcoming these Barriers
5. Importance of Self Esteem -- Building Self-esteem& Self Confidence
6. Working on attitudes – aggressive, assertive and submissive
7. Goal Setting
8. Leadership and Team Building Skills
9. Group Discussion

Unit III: Techniques in Personality Development Stage II

1. Interpersonal relationships
   - Analysis of ego states, Transactions, Strokes and Life Positions
2. Stress Management
   - Concept, Nature and Dimensions of Stress
   - Causes, Impact and Managing Stress
   - Relaxation Techniques
3. The Power of positive thinking
   - Nurturing creativity, decision-making and problem solving
   - Goals and techniques for positive thinking
   - Enhancement of concentration through positive thinking
4. Projecting a Positive Social Image
   - Grooming & Social Etiquette
   - Voice Modulation
   - Public Speaking

Unit IV: Techniques in Personality Development Stage III

- Conflict Management
- Introduction to Conflict Management
- Levels of Conflict
- Managing Conflict
- Time Management
- Concept

- Importance and Need
- Steps towards better Time Management

Unit V:Memory and Study Skills

- Definition and importance of memory
- Causes of forgetting
- How to forget (thought stopping), how to remember (techniques for improving memory)
- The technique of passing exams-Management of examination fear.

PRACTICAL TRAINING

The course would include the following practical exercises.

- Ice- breaking. Brainstorming and simulation exercises. Thought stopping. Memory and study skills training
- Role play and record work

REFERENCES

1. Mile, D.J (2004). Power of positive thinking. Delhi: Rohan Book Company.
2. Pravesh Kumar (2005). All about self- Motivation. New Delhi: Goodwill Publishing House.
3. Dudley, G.A. (2004). Double your learning power. Delhi: Konark Press. Thomas Publishing Group Ltd.
4. Lorayne, H. (2004). How to develop a super power memory. Delhi: Konark Press. Thomas Publishing Group Ltd.
5. Hurlock, E.B (2006). Personality Development, 28th Reprint. New Delhi: Tata Mc Graw Hill.
6. Windshuttle, Keith and Elizabeth Elliot.1999. Writing, Researching and Communicating: Communication Skills for the Information Age. 3rd Reprint. Tata McGraw-Hill. Australia
7. Dignen, Flinders and Sweeney. English 365. Cambridge University Press
8. Goleman, Daniel. 1998. Working with Emotional Intelligence. Bantam Books. New York
9. Jones, Leo and Richard Alexander. 2003. New International Business English. Cambridge University Press
10. Lucas, Stephen.2001. Art of Public Speaking. Mc-Graw Hill.
11. Tamblyn, Doni and Sharyn Weiss. 2000. The Big Book OF Humorous Training Games. 2004 Edition. Tata McGraw-Hill. New Delhi
12. Personality Development by Rajiv K. Mishra. Rupa & Co.
13. Powell. In Company. Macmillan
14. Cotton, et al. Market Leader. Longman
15. Pease, Allan. 1998. Body Language: How to Read Others Thoughts by their Gestures. Sudha Publications. New Delhi

16. Gardner, Howard. 1993. Multiple Intelligences: The Theory in Practice: A Reader. Basic Books. New York
17. De Bono, Edward. 2000. Six Thinking Hats. 2nd Edition. Penguin Books.
18. De Bono, Edward. 1993. Serious Creativity. Reprint. Harper Business.
19. Mohan, Krishna and Meera Bannerji, 2001, Developing Communication Skills. Macmillan.
20. V. Syamala, 2002. Effective English Communication for you. Emerald Publishers, Chennai.

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III Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1120) DESIGN OF STEEL STRUCTURES

Course Objectives: Student will be able to

- Know about the manufacturing process of steel, types of steel and their properties
- Understand the salient features of Limit State Method of design of Steel structures.
- Understand the various codal provisions given in IS. 800.
- Know the behaviour of steel structures under tension, compression and flexure.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Design the tension members and compression members.
- Design the slab and gusset type column bases.
- Design the welded plate girder and various stiffeners.
- Design the various components of roof trusses.

UNIT-I

Materials-Manufacturing of iron and steel-types of structural steel-mechanical properties of steel-concepts of plasticity-yield strength-loads and combinations-local buckling behavior of steel-concept of limit state design-limit states-design strengths-deflection limits-serviceability-stability check

Bolted connections-IS:800-2007 specifications-Design strength-efficiency of joint-prying action-welded connections-Types of welded joints-specifications-design requirements-Eccentric connections

UNIT-II

Design of tension members-Design strength-Design procedure- splice-lug angles

Design of compression members - buckling - slenderness ratio – Load carrying capacity-laced columns-battened columns-splice-column base

Slab base-Gusseted base

UNIT-III

Design of beams-plastic moment-bending and shear strength/buckling- built up sections-laterally supported beams

UNIT-IV

Design of welded plate girder-elements-economical depth-design of main section-connections between web and flange-design of bearing stiffener-intermediate stiffeners-design of web splice and flange splice

UNIT-V:

Design of Roof Trusses –Types of roof trusses - loads on roof trusses – purlin design - Analysis and design Roof trusses – Design of connections

TEXT BOOKS

1. Limit state Design of Steel Structures by S K Duggal, TMH, and New Delhi.
2. Design of Steel Structures by N Subramanian, Oxford University Press

REFERENCE BOOKS

1. Design of Steel Structures by S.S. Bhavikatti (By limit state method), IK international Publishing House Pvt. Limited.
2. Limit state Design of steel structures by Dr.V L Shaw, Structures Publications, Pune

I.S.Codes:

1. IS 800: 2007
2. IS: 875 (Part III)
3. Steel Tables.

Note:

Question paper pattern for Final Examination :

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 for 25 marks. Part-B consists of Five questions on design out of which three are to be answered for 45 marks(15 x 3).

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III Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(CED1121) ENVIRONMENTAL ENGINEERING

Course Objectives: Student will be able to

- Identify the sources of water supply and water quality standards
- Define the terms of water supply engineering and Describe the water treatment process and distribution networks
- Define the terms of wastewater engineering and Design the sewers
- Describe and design waste water treatment process

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge of the water borne diseases and water sources
- Develop skills in designing the water treatment plant.
- Acquire the knowledge of the estimation of sewage and storm water
- Develop skills in design of sewers, waste water treatment units

UNIT – I

Introduction

Importance and Necessity of Protected Water Supply systems, Objectives of Protected water supply system, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities. Water Demand and Quantity studies : Estimation of water demand for a town or city, Types of water demands, Per capita Demand, Factors affecting the Per Capita Demand, Variations in the Demand, Design Period, Factors affecting the Design period, Population Studies, Population Forecasting Studies. Quality and Analysis of Water: Characteristics of water, Impurities in water, Water borne diseases. Drinking water quality standards.

UNIT - II

Sources of water, Capacity of storage reservoirs, Infiltration galleries, Intakes-Types , Conveyance of Water , Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, Laying of pipe lines.

UNIT - III

Treatment of Water

Flowchart of water treatment plant, Treatment methods (Theory and Design) - Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration, Chlorination and other Disinfection methods Distribution system-Components, methods, Layout. Requirement of good system

UNIT-IV

Introduction to Sewage

Sewage characteristics – Physical, Chemical and Biological Examination– decomposition- cycles of decomposition-– Sampling and analysis of wastewater – BOD-COD-Treatment of sewage –Primary treatment

UNIT–V

Secondary treatment

Aerobic and anaerobic treatment process-Activated Sludge Process, Trickling Filters – mechanism of impurities removal- classification–sewage disposal methods-sludge drying beds, dewatering, oxidation ditch. Anaerobic Processes: Septic Tanks and Imhoff tanks-Principles and Design-sludge treatment, digestion, drying and sludge disposal

TEXT BOOKS

1. Environmental Engineering – Peavy, Rowe, Tchenobolus
2. Elements of Environmental Engineering – K.N. Duggal
3. Water Supply and Sanitary Engineering – G.S.Birdie and J.S.Birdie
4. Water Supply Engineering and Waste water Engineering – Dr. P.N.Modi

REFERENCE BOOKS

1. Wastewater Engineering Treatment and Reuse by Metcalf & Eddy, Tata McGraw-Hill edition.
2. Environmental Engineering –I : Water supply Engineering, by Garg , S.K. Khanna Publishers
3. Environmental Engineering –II : Sewage disposal and Air Pollution Engineering, by Garg, S.K. Khanna Publishers.

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III Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(CED1122) GEOTECHNICAL ENGINEERING – II

Course Objectives: Student will be able to

- To create ability to solve foundation engineering problems.
- Develop an understanding of sampling techniques in soils.
- Understanding the impact of engineering solutions related to the ground stability.
- To create an understanding to design shallow and deep foundations.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Develop an ability to apply knowledge of foundation engineering to improve stability of the slopes.
- An ability to design an effective foundation system for economic and safe aspects.
- An understanding of the various problems related to the different types of foundations and their adoption to site conditions.
- An awareness on the available foundation systems and ability to select the best suited to the soil condition

UNIT – I

Subsoil Exploration

Methods of subsoil exploration Direct, semi direct and indirect methods, Soundings by Standard, Dynamic cone and static cone penetration tests, Types of Boring, Types of samples, Criteria for undisturbed samples, Transport and preservation of samples, Borelogs, planning of exploration programmes, report writing.

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, standard method of slices, Bishop's Simplified method– Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

UNIT – III

Earth Pressure

Types of Earth pressure. Rankines Active and passive earth pressure, Smooth Vertical wall with horizontal backfill. Extension to Soil Coloumbs wedge theory, Culmans and Rebhanns graphical method for active earth pressure. RETAINING WALLS: Types of retaining walls - Stability of retaining walls.

UNIT – IV

Bearing Capacity

Safe bearing capacity and allowable bearing pressure, Terzaghi's bearing capacity equations its modifications for square, rectangular and circular foundation, General and local shear failure conditions. Factors affecting bearing capacity of Soil. Allowable bearing pressure based on N-values. Bearing capacity from plate load tests. Shallow Foundations : Factors effecting locations of foundation and design considerations of shallow foundations, choice of type of foundations. Foundations on expansive soils.

Settlement analysis

Causes of settlement, Computation of settlement, allowable settlement. Measures to reduce settlement.

UNIT – V

Pile Foundations

Types, Construction, load carrying capacity of single pile – Dynamic Formula, Static formula, Pile load tests, Load carrying capacity of pile groups, settlement of pile groups, Negative skin friction.

TEXT BOOKS :

1. Analysis, Design of foundations and Earth retaining structures by Shamsher Prakash, Gopal Ranjan and Swami Saran, IBH Publishers
2. Foundation Analysis and Design by J. E. Bowles.,Tata Mc-Graw Hill Publishers
3. Soil Mechanics and Foundation Engineering by K.R. Arora,Standard Publishers

REFERENCE BOOKS

1. Foundation Design By W.C Teng, Prentice Hall Publishers
2. Geotechnical Engineering by VNS Murthy, CBS Publishers
3. Geotechnical Engineering by S.K.Gulhati & Manoj Datta

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III Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1123)TRANSPORTATION ENGINEERING

Course Objectives: Student will be able to

- learn on test on aggregates materials used road constructions along with its specifications for testing.
- learn on Bitumen grading used for pavement constructions
- learn on tests on Bitumen materials along with its specifications.
- learn on test are performed for Bitumen mixes.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- identify aggregate used in pavements along with its suitability
- identify and select the various Design strategies of pavement using Lab Equipment.
- evaluate on bitumen grades.
- valuate stability and tensile strength parameters for bitumen mixes.

UNIT – I

Highway development & planning

Brief Introduction; Jayakar Committee recommendations; Classification of roads; Highway planning in India. Factors controlling alignment; Engineering surveys, Drawing & report.

UNIT – II

Highway geometric design

Highway cross-section elements; Sight distance; Design of horizontal alignment; Design of vertical alignment.

Pavement materials and characterisation

IS Soil Classification; CBR Tests; Plate bearing tests; Stone aggregates; Bitumen materials; Paving mixes.

UNIT – III

Railway engineering

Role of railways in transportation; Comparison of railway and highway transportation; railway track Alignment of railway track; Requirement of Good track, Alignment, Gauges in Railway track, Railway track cross – sections; Coning of wheels Rails & Rail Joints- Functions of rails; Requirements of rails; Types of rails sections; Standard rail sections; Length of rails; Rail failures; Wear on rails, Creep of rails. Requirements of an ideal joint; Types of rail joints; Welding of rails

Sleepers & ballast

Functions of sleepers; Requirements of sleepers; Classification of Sleepers – Timber sleepers, Metal sleepers & Concrete sleepers; Comparison of different types of sleepers. Ballast- Functions and requirements of ballast; Types of ballast; Renewal

of ballast.

UNIT - IV

Geometric design of track

Necessity; Gradients & Gradient Compensation; Elements of horizontal alignment; Super elevation; Cant deficiency and cant excess; Negative Super elevation; Length of Transition Curve, Length of vertical curve. Points and crossing- function – left and right hand turn out

Signalling

Objects of signaling; Classification of signals; Essentials of inter – locking; Methods of interlocking. Standards of inter locking

UNIT – V

Airport planning and design

Development of air transportation system with particular reference to India; Aeroplane components; Air–craft characteristics, Selection of site; Apron; Hanger; Typical airport layouts; Airport marking; Airport lighting; Drainage systems. Airport obstruction - Zoning laws; Classification of obstructions; Imaginary surfaces; Approach zone; Turning zone**.**

Runway design

Runway orientation; Basic runway length; Corrections for elevation; Temperature and gradient; Runway geometric design.

TEXT BOOKS

1. Highway Engineering by S. K. Khanna & C. E. G. Justo; Nemchand & Brothers, Roorkee.
2. Railway engineering by S.C. Saxena and S. Arora; Dhanpat Rai & Sons; Delhi.
3. Airport planning and Design by S.K. Khanna & M.G Arora; Nemchand & Bros, Roorkee.

REFERENCE BOOKS

1. Principles of Transportation Engineering by Partha Chakroborty & Aminesh Das; Prentice Hall of India, New Delhi.
2. Transport planning and Traffic Engineering by Dr. L. R. Kadiyali
3. Highway Engineering by B.L.Gupta

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III Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	4	**1**	**4**

(CED1124) ESTIMATING AND COSTING

Course Objectives: Student will be able to

- Understands the terms of estimation.
- calculate detailed estimate of buildings
- do rate analysis of quantities
- understand the types of valuating the property

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Evaluate the detailed estimate of RC building
- Evaluate the detailed estimate of roads, doors, irrigation works
- Understands the importance of valuation
- Understands what type of contract is used for a specific Work

UNIT-I

Estimate - explanation of terms - contingencies - work charged establishments - provisional sum - lumpsum item - centage charge - types of estimate - revised estimate - supplementary estimate - maintenance estimate - approximate estimate - plinth area method - cubic rate method - unit rate method - bay method - approximate quantity from bill method - comparison method - cost from materials and labour. - preparation of detailed estimate for R.C building - centre line method and long wall - short wall method - methods of measurements of different items of work.

UNIT-II

Preparation of detailed estimate for sanitary and water supply works - roads - irrigation works - doors and windows - detailed specifications for common building materials and items of work as per I.S specifications - calculation of quantities of materials for items of work.

UNIT-III

Preparation of conveyance statement - analysis of rate for items of works required for civil engineering works - preparation of abstract of estimate of civil engineering works. Preparation of bar bending schedule for some typical RCC elements.

UNIT-IV

Competitive bidding- Local competitive bidding, global bidding, item rate contract percentage rate contract and Lumpsum contract. Preparing tender papers- Invitation of tenders, tender notice, tender documents, (various terms and conditions to contracts) submission. Scrutiny and acceptance. Award of jobs. Rights and responsibilities of parties to contracts. Negotiated contracts. Cost plus percentage. Cost plus fixed fees. Cost plus sliding scale of fees. Target cost as based on sharing risk and profits. Turnkey contracts. More than two party contracts.

UNIT-V

Valuation - explanation of items - types of values - sinking fund - years purchase - depreciation - straight line method - constant percentage method - S.F method - obsolescence - valuation tables - valuation of real property - rental method - profit based method - depreciation method - valuation of land - belting method - development method - hypothecated building scheme method - rent calculation - lease and lease hold property.

Text Books :

1. Estimating and Costing by B.N.Dutta, UBS Publishers, 2000
2. Estimating and Costing by G.S.Birdie

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III Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1208) GEOTECHNICAL ENGINEERING LAB

Course Objectives: Student will be able to

- To introduce traditional program consisting mostly of practical courses related to geotechnical engineering.
- To apply the knowledge of science, mathematics and engineering with the context of applications in geotechnical engineering.
- To design and conduct experiments, analyze and interpret data related to the various laboratory tests studied in geotechnical engineering.
- To classify the soils based on the properties

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- An opportunity to work in groups
- An ability to identify, formulate and practice the various soil identification and classification tests.
- An ability to select, formulate or enhance the testing facilitates to cater the requirement of selection of proper soil type as per the requirement.

LIST OF EXPERIMENTS

1. Determination Of Moisture Content
2. Determination Of Specific Gravity
3. Field Density Test
4. Grain Size Analysis
   A. Sieve Analysis

B. Hydrometer Analysis

5. Determination Of Consistency Limits
6. Permeability Test
   A. Constant Head Method
   B. Falling Head Method
7. CBR Test
8. Proctor Light And Heavy Compaction Test
9. Vane Shear Test
10. Direct Shear Test
11. Unconfined Compression Test
12. Unconsolidated and Undrained Triaxial Test

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III Year B. Tech CE – II SEM	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1209) TRANSPORTATION ENGINEERING LAB

Course Objectives: Student will be able to

- learn on test on aggregates materials used road constructions along with its specifications for testing.
- learn on Bitumen grading used for pavement constructions
- learn on tests on Bitumen materials along with its specifications.
- learn on test are performed for Bitumen mixes.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- identify aggregate used in pavements along with its suitability
- identify and select the various Design strategies of pavement using Lab Equipment.
- evaluate on bitumen grades.
- valuate stability and tensile strength parameters for bitumen mixes.

Test on Road Aggregates

1. Aggregate Crushing Value
2. Aggregate Impact Value
3. Los Angeles Abrasion Test.
4. Shape Tests a) Elongation Index, b) Flakiness Index, c) Angularity Number.

Test on Bitumen

1. Penetration Test
2. Softening Point test
3. Ductility Test
4. Viscosity grading
5. Bitumen Extraction Tests

Test on Bituminous Mixes

1. Marshal Stability Test
2. In-direct Tensile Test

***Note: Bituminous Mix design is carried as per MORT&H & IRC specifications.**

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III Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(ENG1204) ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY

Introduction: This course aims to offer students a practical approach to Technical Writing, and provide a relevant, contemporary and authoritative introduction to the dynamic field of technical communication that prepares them for Workplace Communication. Each unit in the syllabus is devised so as to include a writing component as well as an oral component.

The objectives of this course are to

i) expose students to workplace writing
ii) initiate them into the Process of Technical Communication
iii) enable the students to create clear, accurate, and succinct content
iv) enable students to produce documents reflecting different types of technical communication such as Abstracts, Proposals and Technical Reports through ample practice
v) enable students to adjust technical content to meet the needs of a specific target audience
vi) groom students in behavioral skills

Methodology

Written Communication Component

A Process- Genre methodology will be used in teaching the technical genres. This method would enable students to understand the use of particular lexico-grammatical patterns required of in the context of technical writing. They would learn to use language to express the particular communicative intent that is required of in the context of writing these genres.

Objectives of Writing Component

i) enable students to write clearly and succintly
ii) equip students with the ability to write technical genres
iii) Oral Communication Component

The objective of including Oral Communication is to impart behavioral skills and prepare students to speak to a large group or team, keeping in mind the audience, context and purpose of communication. This Oral Communication component must enable students to speak in an organized and mature way, without any inhibitions. They will be groomed to relate their speech to their audience.

Objectives of Oral Communication Component

i) equip students with Behavioral skills
ii) prepare them for Oral presentations, and Group Discussions
iii) equip them with Interview skills

Syllabus Outline

Unit I

Writing Skills 1

1. Applications and Covering letters
2. Resume Writing
3. Verbal Ability
4. **Oral Communication** :Talking About Yourself

Unit II

1. Writing an SOP
2. Summarizing and Synthesizing Information
3. Oral Communication: Making Presentations

Unit III

1. Writing Project Proposals
2. Oral Communication: Group Discussions

Unit IV

1. Writing Project Reports
2. Oral Communication: Interview Skills

Unit V.

Behavioral Skills and Personality Development

1. Building a positive attitude, building a positive personality, Motivation, goal setting & values & vision
2. Problem Solving and Decision Making; Negotiation Skills through Role Play
3. Team Building and Leadership Abilities
4. Social Etiquette

REQUIRED TEXT AND MATERIALS

1. Ashraf Rizvi, M (2005). Effective Technical Communication, Tata Mc Graw Hill Publishing Company Limited, New Delhi.
2. Anderson, Paul V. (2003). Reports. In Paul V. Anderson's Technical Communication: A Reader-Centered Approach (5th ed..) (pp. 457-473). Boston: Heinle.
3. William S. Pfeiffer, (2010) Technical Communication: A Practical Approach (7th ed.). Prentice Hall

References

1. Burnett, Rebecca. Technical Communication. 5th Ed., Heinle, 2001
2. Bolter, Jay David. (2001). The late age of print. In Robert P. Yagelski's (Ed.) Literacies and Technologies: A Reader for Contemporary Writers (135-145). New York: Longman.

3. Brandt, Deborah. (1998). Sponsors of literacy. College Composition and Communication 49.2, 165-185.
4. Gerson Sharon J. and Steven Gerson : Technical Writing Process and Product. 3rd edition, New Jersey: Prentice Hall 1999
5. Johnson-Sheehan, Richard. (2007). Starting Your Career. In Richard Johnson-Sheehan's Technical Communication Today (2nd ed.) (pp. 388-402). New York: Longman.
6. Markel, Mike**.** Technical Communication: Situations and Strategies (8th EDITION (2006-2007)
7. R. C. Sharma and K. Mohan, Business Correspondence and Report Writing, Third Edition, TMH, 2002. (Indian Edition)
8. M. Raman and S. Sharma, Technical Communication : Principles and Practices, OUP, 2004. (Indian Edition)

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(CED1125) FINITE ELEMENT METHODS

Course Objectives: Student will be able to

- Understand the general steps of finite element methods.
- Understand the basic finite element formulation techniques.
- Equip the students with the Finite Element Analysis fundamentals.
- Enable the students to perform engineering simulations using Finite Element Analysis software (ANSYS)

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- An ability to solve multi-disciplinary problems
- Ability to derive equations in finite element methods for 1Dand 2D problems.
- Ability to formulate and solve basic problems in structural mechanics using different elements.
- Ability to apply knowledge of mathematics and Engineering

UNIT -I

Introduction

Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization.

Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT -II

One Dimensional FEM

Stiffness matrix for bar element, beam element, plane truss - shape functions for one dimensional elements – one dimensional problems.

UNIT –III

Two Dimensional FEM

Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural
coordinate system – area and volume coordinates

UNIT –IV

Isoparametric formulation

Concepts of, isoparametric elements for 2D analysis -formulation of CST element, 4 –noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

UNIT-V

Solution Techniques

Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOKS

1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatla and Ashok
   D. Belegundu - Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers
3. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi

REFERENCE BOOKS

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David
   S. Malkus and Michael E.Plesha. Jhon Wiley & Sons.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy-Tata Mc.Graw Hill Publishers.
3. Text book of Finite Element analysis by P.Seshu – Prentice Hall of India

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(CED1126) ELEMENTS OF RS & GIS

Course Objectives: Student will be able to

- The remote sensing serves the purpose of accurate mapping of all features under different spatial and temporal scales of all kinds of terrain and land under water bodies.
- The remote sensing is advantageous comparatively to traditional surveying techniques in terms of time, accuracy and output.
- Remote sensing serves the purpose of predictions of all scales.
- GIS is software which can be used for collecting, storing and analyzing of data which is useful for real world applications.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Based on the objective of study a student should have thorough knowledge to choose the remote sensing image from different sensors, resolutions, spatial and temporal scales.
- Remote sensing gives the provision of understanding and to comprehend large tracks of earth surface with less time and cost but more accuracy.
- In case of dam construction, for a civil engineer it is must to have knowledge of resource richness of an area, flow rates in stream, channel geometry with respect to time, magnitudes of movement in crust, habitations etc.
- By GIS the student can communicate to the common man his analysis of different problems developments, benefits by preparing different thematic maps.

UNIT – I

Introduction to Photogrammetry

Introduction to aerial photography and photogrammetry. Principle and types of aerial photographs, stereoscopy, Map Vs Stereoscopy, Map Vs Mosaic, ground control, Parallax measurements for height, determinations.

UNIT – II

Concepts of Remote Sensing

Basics of remote sensing- elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology & units, energy resources, energy interactions with earth surface features & atmosphere, atmospheric effects, satellite orbits, Sensor Resolution, types of sensors. Remote Sensing Platforms and Sensors, IRS satellites.

UNIT – III

Remote Sensing Data Interpretation

Visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of soil, water and vegetation. Concepts of Digital image processing, image enhancements, qualitative & quantitative analysis and pattern recognition, classification techniques and accuracy estimation.

UNIT – IV

Geographic Information System

Introduction, GIS definition & terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS, Data collection & input overview, data input & output, keyboard entry & co-ordinate geometry procedure, manual digitizing & scanning, Raster GIS, Vector GIS-File management, Spatial data- Layer based GIS, Feature based GIS mapping spatial analysis with raster and vector data. overview of GPS.

UNIT – V

Applications of Remote Sensing and GIS

Land Use Land Cover mapping, agricultural applications, oceanographic applications, urban and regional planning applications, water resources applications, environmental studies and disaster management applications.

TEXT BOOKS

1. Remote sensing and its applications by LRA Narayana University Press 1999
2. Principals of Geophysical Information Systems-Peter A.Burragh & Rachael A.Mc.Donnell, Oxford Publishers 2004.

REFERENCE BOOKS

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W.Young, Prentice Hall (India) Publications
2. Remote Sensing & Geographical Information systems by M.Anji Reddy JNTU Hyderabad 2001, B.S.Publications.
3. GIS by Kang-tsung chang, TMH Publications & Co.
4. Basics of Remote Sensing & GIS by S.Kumar, Laxmi Publications
5. Fundamentals of GIS by Mechanical designs John Wiley & Sons

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

(CED1127) ENVIRONMENTAL IMPACT ASSESSMENT

Course Objectives: Student will be able to

- Understand Environmental Impacts and the terminology
- Understands the environmental Impact assessment procedure
- Understands the EIA methodology
- Understand s environmental audits

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge of Environmental impacts
- Understand environmental clearances and guidelines
- Understands to prepare an audit report
- Understands environment laws and regulations

UNIT – I

Introduction to EIA, Definition of EIA and EIS. Preparation of EIS, Elements of EIA, Classification of Environmental parameter, Initial Environmental Examination, Preparation of Environmental Base map EIA procedure

UNIT – II

EIA methodology: Introduction, criteria for selection of EIA Methodology,
EIA methods, Adhoc method, Matrix method, Network method, Environmental media quality Index method, Overlays method, Cost benefit analysis method

UNIT – III

Environmental impacts, Identification measurement, Aggregation, Secondary and Cumulative Impacts, Environmental Guidelines and procedures, Environmental clearance, Environmental Appraisal Procedure, Single window Clearance, Time frame, Post project monitoring, Procedure for obtaining Environmental clearance for industries, Forest clearance, Consent to operate Industrial unit, Consent to handle hazardous chemicals in the Industrial unit

UNIT – IV

Assessment of Impact of developmental Activities on soil, ground water, surface water vegetation, air, vegetation, wild life, Noise, Socio Economic Environment, Environmental impact of Deforestation-Causes and effects of Deforestation

UNIT – V

Environmental Audit Types of environmental Audit ,Audit protocol, Stages of Environmental Audit onsite activities ,evaluation of audit data and preparation of Audit Report, Post Audit Activities, Case studies On EIA, Environmental laws and regulations-Air act, Water act, environmental protection act.

TEXT BOOKS

1. Environmental Impact Analysis – Urban & Jain.

2. Environmental Impact Analysis – Canter, Mc. Graw Hill Publishers
3. Environmental Impact Analysis -Y.Anjaneyulu

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
Elective-I	**4**	**0**	**4**

(CED1128) EARTHQUAKE RESISTANT DESIGN OF BUILDINGS

Course Objectives: Student will be able to

- Understand Engineering Seismology
- understand single degree of freedom systems subjected to free and forced vibrations
- understand the principles of earthquake resistant design
- understand the importance of ductile detailing of RC structures

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Understand the causes of earthquakes, magnitude & intensity of earthquakes
- Evaluate the displacement for free vibrations of SDOF systems
- Evaluate base shear using Seismic coefficient method and Response Spectrum methods
- Detail the reinforcement as per ductility requirements

UNIT-I

Engineering Seismology

Earthquake phenomenon-causes of earthquakes-Theories on earthquake causes-Plate tectonics-Seismic waves -Magnitude and Intensity of earthquake-Energy released-Earthquake measuring Instruments-Seismograph-Accelerograph-Seismic zones of India

UNIT-II

Theory of Vibrations

Elements of vibrating system-Degrees of freedom-Continuous system-Lumped mass idealization-Oscillatory motion-Free vibrations of Single degree of freedom system-undamped, damped and critical damping-logarithmic decrement-Forced vibrations of SDOF-Harmonic loading

UNIT-III

Conceptual Design

Introduction to functional planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and vertical members-Twisting of buildings-flexible buildings-framing systems-unconfined concrete and confined concrete-reinforcing steel-lateral load resisting systems- irregularities in buildings

UNIT-IV

Basic assumptions, principles in earthquake resistant designs-permissible stresses-Seismic methods of analysis based on IS:1893-Equivalent lateral force method-Dynamic analysis-Response spectrum method, Time history method

UNIT-V

Ductility considerations in earthquake resistant design of RC buildings-Impact of ductility-requirements for ductility-Assesment of ductility-Factors affecting ductility-Ductile detailing considerations as per IS:13920-Behaviour of beams, columns and joints in RC buildings during earthquake-Vulnerability of Open ground storey and short columns during earthquakes

TEXT BOOKS

1. Earthquake Resistant Design of Structures-S.K.Duggal,Oxford University Press
2. Earthquake Resistant Design of Structures-Pankaj Agarwal and Manish Shrikhande,Prentice Hall of India Pvt.Ltd.

REFERENCE BOOKS

1. Seismic Design of Reinforced Concrete and Masonry buildings-T.Paulay and M.J.N Pristly,John Wiley &Sons
2. Earthquake Tips-Learning Earthquake Design and Construction-C.V.R.Murthy

REFERENCE CODES

1. IS: 1893(Part-1)-2002, “Criteria for Earthquake Resistant Design of structures”, B.I.S.,New Delhi
2. IS: 13920-1993, “Ductile detailing of Concrete structures subjected to seismic force”-guidelines,B.I.S. New Delhi

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

Elective-I

(CED1129) ADVANCED STRUCTURAL ANALYSIS

Course Objectives: Student will be able to

- To apply the Displacement methods of analysis to frames with inclines legs and gable frames.
- To understand the effects of moving loads on indeterminate structures
- To understand the flexibility and stiffness methods of analysis of beams, frames and plane trusses
- To understand plastic analysis of beams and frames

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Ability to apply the displacement method to complex structural systems.
- Ability to understand the qualitative use of influence lines of indeterminate beams and Trusses to loading positions for maximum internal forces
- Appreciate the advantage of using the displacement methods over force methods for various structures.
- Understand the plastic analysis of structures and be able to determine collapse load and collapse for beams and frames

UNIT - I

Moment Distribution method: Application to the analysis of portal frames with inclined legs, gable frames

UNIT - II

Kani's method-symmetrical frames-Applications to 2-storey- two bay portal frames

UNIT - III

Influence lines for Indeterminate structures : Muller -Breslau principles for statically Indeterminate beams , Influence line diagrams for Reaction, Shearing force and Bending moment in case of Indeterminate beams and Influence line diagrams for member forces in statically Indeterminate trusses

UNIT – IV

Flexibility Method: Introduction to the structural analysis by flexibility concept using Matrix approach and application to continuous beams

Stiffness method: Introduction to the structural analysis by stiffness concept using Matrix approach and application to Plane frames and Plane Trusses.

UNIT – V

Plastic Analysis: Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous

beams.

TEXT BOOKS

1. Matrix methods of Structural Analysis by Pandit and Gupta – Tata Mc.Graw Hill
2. Analysis of structures Vol. I & II by Vazrani and Ratwani. Khanna publications.
3. Comprehensive Structural Analysis Vol.1 & 2 by Dr. Vaidyanathan and Dr. P.Perumal - by Laxmi, publications Pvt. Ltd., New Delhi

REFERENCE BOOKS

1. Structural Analysis by D.S.Prakash Rao - Sagar books
2. Structural Analysis Vol. I & II by Bhavi Katti Vikas Publications.
3. Matrix structural analysis by T.N.Gayl; Tata Mc.Graw Hill company

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

Elective-I

(CED1130) ADVANCED STRUCTURAL DESIGN

Course Objectives: Student will be able to

- To understand the basic concepts of design of combined footings and Retaining walls
- To Equip them to select the suitable types of water tanks
- To make them understand the design considerations of Concrete bridges under different loading classes.
- Familiarity with professional and contemporary design issues

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- design the Retaining walls
- Design the RCC water tanks and staircases
- appreciate the advantage of selecting the suitable bridges for certain applications.
- design gantry girders and steel bridges under different loading considerations

UNIT – I

Design of combined footings, Design of cantilever retaining wall, Design of counter fort retaining wall

UNIT – II

Design of staircases, Design of RCC water tanks - Circular and Rectangular types.

UNIT – III

Design of Concrete bridges - IRC loading, Design of slab bridge and T - beam bridge.

UNIT – IV

Design of Steel gantry girders

UNIT – V

Design of steel bridges – loadings – design of plate girder bridges.

TEXT BOOKS

1. Advanced Reinforced concrete structures by Varghese, PHI, New Delhi.
2. Design & Drawing of concrete and steel structures by N.Krishna Raju University Press
3. Reinforced concrete structures Vol-2 by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCE BOOKS

1. Essentials of Bridge Engineering by D.John son Victor, Oxford and IBM publication Co., Pvt. Ltd.

2. Reinforced concrete design by S.U,Pillai and D.Menon, TMH, New Delhi.

Note:

Question paper pattern for Final Examination:

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 for 25 marks. Part-B consists of Five questions on design out of which three are to be answered for 45 marks(15 x 3).

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IV Year B. Tech CE – I Sem **L T/P/D C**

Elective-I **4 0 4**

(CED1131) GROUND WATER DEVELOPMENT AND MANAGEMENT

Course Objectives: Student will be able to

- To impart to the students the concepts of Groundwater Development and Management.
- To enable the students to understand the basic equations used in Groundwater
- To enable the students to solve analytical problems
- To enable the students to do conduct basic ground water studies

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Use Darcy's law
- Derive differential equation governing groundwater flow in three dimensions
- Do analysis of pumping tests in steady and non steady flow cases
- Understand the saline water intrusion problem in groundwater

UNIT-I

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. Ground Water Movement-Permeability, Darcy's law, storage coefficient, Transmissivity, Differential equation governing ground water flow in three dimensions derivation, ground water flow equation in polar coordinate system, ground water flow contours and their applications.

UNIT-II

Analysis of Pumping Test Data-I

Steady flow ground water flow towards a well in confined and unconfined aquifers-Dupit's and Theism's equations, assumptions, formation constants, yield of an open well interface and well tests.

UNIT-III

Analysis of Pumping Test Data-II

Unsteady flow towards well-Non Equilibrium equations, Thesis solution, Jocob and Chow's simplifications, Leak aquifers.

UNIT-IV

Surface and sub-surface Investigation

surface methods of exploration-Electrical resistivity method and Seismic refraction methods. Subsurface methods geophysical logging and resistivity logging.Concept of artificial recharge of ground water ,recharge methods,Applications of GIS and RS in artificial recharge of ground water along with case studies.

UNIT-V

Saline water intrusion in aquifer

Occurrence of saline water intrusion, Ghyben-Herzberg relation, Shape of interface, control of water intrusion. Ground water basin management-case studies.

TEXT BOOKS

1. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
2. Ground water by H.M. Raghunath, Wiley Eastern Ltd.
3. Ground water by Bawvwr, John Wiley & Sons.
4. Applied Hydrogeology by c.W.Fetta, CBS Publishers & Distributors.

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

Elective-I

(CED1132) DESIGN AND DRAWING OF HYDRAULIC STRUCTURES

Course Objectives: Student will be able to

- The basic aim is to understand and control of flows in open channels and canals for the benefit of society.
- To get hand-on experience in drawing of irrigation and environmental engineering structures
- To learn about architecture and design of weirs
- To develop design and drawing skills of various energy dissipation structures

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Analyze and design different dams and select the proper dam for any practical problem he may encounter in his professional life.
- Analyze, design and draw different spillways and design and supervise the construction of water conveyance structures.
- Design and draw various canal protection structures.
- Design and draw of various energy dissipation structures.

Design and drawing of the following hydraulic structures.

1. Slopping glacis water
2. Tank sluice with tower head
3. Type III Syphon aqueduct
4. Surplus weir
5. Trapezoidal notch fall
6. Canal regulator

TEXT BOOKS

1. Design of minor irrigation and canal structures by C.Satyanarayana murthy, Wiley Eastern Ltd.
2. Irrigation engineering and Hydraulic Structures by S.K.Garg, Standard Book House.

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	4	**0**	**4**

Elective-I

(CED1133) TRAFFIC ENGINEERING

Course Objectives: Student will be able to

- Perform maintenance operations for traffic signals and signal systems under County jurisdiction.
- Perform essential operations to fabricate, install and maintain roadway signs and pavement marking.
- Conduct safety and traffic operations studies to reduce frequency and severity of crashes and improve mobility.
- Perform parking studies for carrying analysis and improvement of parking characteristics.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- To understand the human factors in traffic engineering design.
- To design the cross-section and alignment of highway
- To use an appropriate traffic flow theory for traffic characteristics
- To practice the traffic count methods for estimation of capacity at signalized intersection

UNIT-I

Traffic characteristics

Basic characteristics of Traffic- Volume, Speed and Density- Relationship among Traffic parameters.

Traffic measurement

Traffic Volume Studies-Objectives- Types of Volume Studies –Concept of PCU- Data Collection and Presentation – Speed Studies – Types of Speeds- Objectives of Speed Studies- Methods of Conducting speed studies- Data collection and Presentation- Statistical Methods for Analysis of Speed Data.

UNIT-II

Highway capacity

Definition of Capacity – Importance of capacity – Factors affecting Capacity-
Concept of Level of Service- Different Levels of Service- Concept of Service Volume- Peak Hour Factor**.**

UNIT – III

Parking Studies

Types of parking facilities – On-street and Off Street Parking Facilities- Parking Studies- Parking Inventory. Study – Parking Survey by Patrolling Method- Analysis of Parking Data and parking characteristics- Multi Story Car Parking Facility-Design standards.

UNIT –IV

Traffic control & regulation

Traffic Problems in Urban areas- Importance of Traffic Control and regulation- Traffic Regulatory Measures- Channelization- Traffic Signals- Saturation Flow - Signal Design by Webster Method – Signal Phasing and Timing Diagrams.

Traffic & environment

Detrimental effect of traffic on environment – Air Pollution – Pollutants due to Traffic – Measures to reduce Air Pollution due to Traffic- Noise Pollution – Measures to reduce Noise Pollution.

UNIT -V

Traffic signs and road markings

Types of Traffic Signs- cautionary,Regulatory and Informative Signs- Specifications- Pavement markings- Types of Markings – Lane markings and Object markings- Standards and Specifications for Road Markings.

Highway safety

Problem of Highway Safety – Types of Road accidents- Causes – Engineering Measures to reduce Accidents- Enforcement Measures – Educational Measures- Road Safety Audit- Principles of Road Safety Audit.

TEXT BOOKS

1. Traffic Engineering and Transportation planning – LK kadiyali – Khanna publishers.
2. Fundamentals of Transportation Engineering - C.S. Papacostas, Prentice Hall (India).

REFERENCE BOOKS

Transportation Engineering – An Introduction – C. J. Khisty, Prentice Hall of India

1. Principles of Transportation Engineering – Partha Chakroborthy, Animesh Das – Prentice Hall of India.
2. Highway Engineering and Traffic Analysis-Mannering and Kilareski, John wiley Publications**.**

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Elective-I **4 0 4**

(CED1134) AIRPORT PLANNING AND DESIGN

Course Objectives: Student will be able to

- Student will understand the classification of airports and related aircraft characteristics
- Student will understand the site selection for airport
- Student will explain the grading and drainage of airport
- Student will explain the air traffic control aids

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Design the runway length and estimate the corrected runway length
- Planning and designing the terminal area
- Marking runway and taxiway areas
- Structural design of airport pavements & visual aids

UNIT-I

Introduction & aircraft characteristics

General, Requirements of Aircraft Types, Field Length Regulations, Restrictions On Payload- Range Performance, Weight Components, Airplane Components Parts, Military And Civil Aircrafts, Civil Military Co-Ordination, Classification Of Flying Activity, Relation Of Aircraft To Landing Facility, Aircraft Characteristics, Future Trends In Aircraft Design

UNIT-II

Airport obstructions & runway design

Zoning Laws, Classification of Obstructions, Turning Zone, Runway Orientation, Basic Runway Length, Correction for Elevation, Temperature and Gradient, Airport Classification Runway Geometric Design

UNIT-III

Taxiway design & terminal area

Factors Controlling Taxiway Layout, Geometric Design Standards, Exit Taxiways, Fillets, Separation Clearance, Holding Apron, Turnaround or Bypass Taxiway

Building and Building Area, Vehicular Circulation and Parking Area, Apron, Hangar, Blast Considerations, Typical Airport Layouts

UNIT-IV

Airport planning: General, Airport Master Plan, Regional Planning, Data Required Before Site Selection,Airport Site Selection, Surveys For Site Selection, Drawings To Be Prepared, Estimation Of Future Air Traffic Needs

UNIT-V

Structural design of airport pavements & **visual aids**

Introduction, Various Design Factors, Design Methods For Flexible Pavements, Design Method For Air Field Rigid Pavements, Influence Chart For The Moment Mn In A Concrete Pavement Due To A Load In The Interior Of The Slab, LCN System Of Pavement Design, Joints In Cement Concrete Pavements, Special Consideration For Design Of Pavement Facilities For V/Stol Operations, Airport Marking, Airport Lighting.

TEXT BOOKS

1. Airport planning & Design - S. K. Khanna SS Arora MG Arora Jain Publications
2. Planning & Design of Airports – Robert M. Horonjeff, Francis X Mc Graw Hill Professional

REFERENCE BOOKS

Airport Engineering – Norman J Ashford Mc. Graw Hill Professional

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	4	**0**	**4**

Elective-I

(CED1135) ADVANCED FOUNDATION ENGINEERING

Course Objectives: Student will be able to

- Create ability to solve foundation engineering problems.
- Develop an understanding of sampling techniques in soils.
- Understanding the impact of engineering solutions related to the ground stability.
- To create an understanding to design shallow and deep foundations.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Develop an ability to apply knowledge of foundation engineering to improve stability of the slopes.
- An ability to design an effective foundation system for economic and safe aspects.
- An understanding of the various problems related to the different types of foundations and their adoption to site conditions.
- An awareness on the available foundation systems and ability to select the best suited to the soil condition

UNIT – 1

Soil Exploration & Soil Structure Interaction

Exploration Methods; Planning the Exploration Program; Boring and Sampling; In Situ Tests: Standard & Cone Penetration Tests, Field Vane & Borehole shear tests, Dilatometer, Pressure meter Rock Sampling, Core Recovery, Geophysical Exploration; Preparation of Soil Report, contact pressures and soil structure interaction for shallow foundations, concept of subgrade modulus, effects/parameters influencing subgrade modulus.

UNIT – 1I

Shallow Foundations: **Bearing Capacity:**- General Formulae; Effect of Water Table; Footings with Eccentric or Inclined Loads, footings on Layered Soils, on slope and on top of the slopes, on finite layer with a Rigid Base at Shallow Depth, effect of compressibility of soil, footings on soils with strength increasing with depth.

UNIT – III

Settlement: Components – Immediate, Consolidation & Creep, Stresses and Displacements in Homogeneous, Layered and Anisotropic Soils; Consolidation Settlement; One, Two & Three Dimensional Consolidation; Secondary Compression Settlement; Bearing Pressure using SPT, CPT, Dilatometer and Pressuremeter; Settlement of foundations on Sands-Schmertmann and Burland & Busbridge

methods; Structure Tolerance to Settlement and Differential Settlements, tilting of Tall Structures.

UNIT – IV

Pile Foundations: **Single Pile:** Vertically loaded piles, Static capacity-α, β and λ Methods, Dynamic formulae; Wave Equation Analyses; Point Bearing Resistance with SPT and CPT Results; Bearing Resistance of Piles on Rock; Settlement; Pile Load Test; Uplift Resistance; Laterally Loaded Piles –Ultimate Lateral Resistance; Negative Skin Friction; Batter Piles; Under Reamed Piles; Mini and Micro Piles, Buckling of Fully and Partially Embedded Piles

Pile groups

Ultimate Capacity of Pile Groups in Compression, Pullout & Lateral Load; Efficiency; Settlements of Pile Groups; Interaction of Axially & Laterally Loaded Pile Groups.

UNIT – V

Deep Foundations

Well foundations, open well foundations, pneumatic caissons, tilting, measures to avoid And rectify tilting of wells

TEXT BOOKS

1. Analysis, Design of foundations and Earth retaining structures by Shamsher Prakash, Gopal Ranjan and Swami Saran.
2. Foundation Analysis and Design – J. E. Bowles.
3. Soil Mechanics and Foundation Engineering – By K.R. Arora.

REFERENCE BOOKS

1. Single Piles and Pile Groups under Lateral Loading by Reese, L. C. & Van Impe,W.F.

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Elective-I

(CED1136) GROUND IMPROVEMENT TECHNIQUES

Course Objectives: Student will be able to

- learn and understand various ground improvement technique.
- learn various method of compaction for ground improvement in it strength.
- learn various physical and chemical modification for ground improvement
- learn the method to choose the foundation and or treatment method based on the site condition.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- select the ground improvement technique which is suitable and economical for soil strengthening.
- select different techniques based on the various types of soils in-situ.
- design reinforced earth structures.
- exposed to the knowledge on use of geosynthetic material

UNIT – I

In-situ densification methods in granular soils, Vibration at the ground surface, Impact at the Ground surface, Vibration at depth, Impact at depth. In-situ densification methods in Cohesive soils, Preloading, Dewatering, Drain wells, Sand drains, Sandwich geodrains, Stone columns, Lime columns, Thermal methods.

UNIT – II

Reinforced earth principles, Components of reinforced earth walls, Factors governing design of reinforced earth walls, Design principles of reinforced earth walls.

UNIT – III

Geotextiles: Introduction, Type of geotextiles, Function and their application, tests for geotextile materials, Geogrids, Functions of geogrids. Expansive soils, Problems in Expansive soils, Mechanisim of swelling, swell pressure, swell potential, Heave, Tests for identification, I. S. Test Methods of determination of swell pressure, Foundation techniques in Expansive soils.

UNIT – IV

Mechanical stabilization: Soil aggregate mixtures, Properties and proportioning techniques, soft aggregate stabilization, compaction, Field compaction control.

Cement stabilization: Mechanisim-Factors affecting and properties, Uses of additives, Design of soil-cement mixtures, Construction techniques.

UNIT – V

Lime and Bituminous stabilization: Types of admixtures, Mechanisim, Factors affecting, Design of mixtures, Construction methods.

TEXT BOOKS

1. Ground Improvement Techniques- Dr. G.V.R. Purshotham Raj
2. Designing with Geosynthetics- Robert M. Koerner
3. Foundations on Expansive soils by Chenn.
4. Soil Mechanics and Foundation Engineering by K.R. Arora; Standard Publishers, Nai Sarak, New Delhi.
5. Soil Mechanics and Foundation Engineering by B.C. Punmia; Laxmi Publications, New Delhi.
6. Soil Mechanics & Foundation Engineering Vol. II by V.N.S. Murthy, Saikripa
   Technical consultants, Bangalore.

REFERENCE BOOKS

1. Foundation Engineering by B.J. Kasmalkar, Pune Vidyarthi Griha Prakashan, Pune
2. Foundation Analysis and Design by Joseph E. Bowles; McGraw – Hill International Book Company
3. Basic and Applied Soil Mechanics by Gopal Ranjan, A.S.R. Rao, New age Publications.
4. Foundation Engineering by Braja M. Das.

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	4	**0**	**4**

Elective-I

(CED1137) SOLID WASTE MANAGEMENT

Course Objectives: Student will be able to

- Develop an understanding the necessity of solid waste management
- Develop an understanding of the collection of solid waste
- Develop an understanding of solid waste disposal methods
- Develop an understanding of bio medical waste management and e-waste management

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge of solid waste management
- Acquire the knowledge of solid waste disposal techniques
- Acquire the knowledge of Bio medical waste disposal techniques
- Acquire the knowledge of e- waste disposal techniques

UNIT – I

Introduction

Solid Waste problem, Meaning and definition of solid waste, concept and classification of municipal solid waste, Impacts of solid waste on environment, Solid waste management rules and regulations.

UNIT – II

Collection and Transfer of Municipal Solid Waste

Developing a solid waste collection and transfer system characterizing waste generation, determining public and private collection/transfer options.

UNIT – III

Solid Waste management techniques

Solid waste management Hierarchy, waste avoidance /waste prevention, Definition of source Reduction, waste reduction at source using 5R's Technique.

UNIT – IV

Waste Disposal Techniques

Introduction, composting, principles of composting, factors affecting composting, vermi composting, waste to energy techniques, Landfill technique, and design and operating procedure of landfill.

UNIT – V

Solid waste management of Biomedical Waste, plastic and E- Waste

Biomedical Waste – Sources and generation, biomedical waste management. Plastic – Dangers of plastic wastes, Recycling and disposal of plastic wastes. E-Wastes – Definition, Health hazards, E-Waste management and conclusion.

REFERENCE BOOKS

1. Solid waste management by K. Sasi Kumar & S. Gopi Krishna

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
Elective-I	**4**	**0**	**4**

(CED1138) AIR POLLUTION AND CONTROL

Course Objectives: Student will be able to

- Develop an understanding of Air pollution Concepts
- Develop an understanding of Effects of air pollution
- Develop an understanding of Air pollution Control devices
- Develop an understanding of Air quality monitoring devices

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge of Air pollution Concepts
- Acquire the knowledge of Effects of air pollution
- Acquire the knowledge of Air pollution Control devices
- Acquire the knowledge ofAir quality monitoring devices

UNIT – I

Air Pollution and its definition – Factors influencing air pollution – Classification of pollutants particulates – Gases-Sources of pollution – Air qualities standards – effects – Location of Industries.

UNIT – II

Meteorology – Wind roses – lapses rates – mixing depth atmospheric dispersion – plume behavior accumulation, estimation of pollutants – Effective stack height.

UNIT – III

Air Pollution effects on human beings, animals, plants and materials ,global conditions– Air Pollution Episodes in India and abroad.

UNIT – IV

Control of air pollution – Removal of pollutants – particulate and gaseous – Air pollution control equipments (units) such as setting chamber, cyclones, wet scrubbers/collectors, scrubbers, centrifugal scrubbers spary towers, packed beds, electrostatic precipitators, after burners-absorption – adsorption – Diffusion.

UNIT – V

Ambient air quality monitoring and stack monitoring. General methods of control of NO,SO emissions-in plant measures, wet and dry methods of removal and recycling.

TEXT BOOKS

1. Air Pollution Control Technology by T. Painter.
2. Elements of Air Pollution Control by Prof. T. Shivaji Rao.

REFERENCE BOOKS

1. Air Pollution Control by K.V.S.G. Murali Krishna.
2. Air Pollution Control by M.N.Rao.
3. Fundamentals of Air Pollution by Dr. B.S.N. Raju, Oxford & I.B.H.

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
Elective-I	**4**	**0**	**4**

(CED1139) INDUSTRIAL WASTE & WASTE WATER MANAGEMENT

Course Objectives: Student will be able to

- Develop an understanding the necessity of Industrial waste & waste water management
- Develop an understanding quality requirement of industrial waste water
- Develop an understanding treatment of Industrial waste water
- Develop an understanding of Common Effluent Treatment plant

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge of solid waste management
- Acquire the knowledge of solid waste disposal techniques
- Acquire the knowledge of Bio medical waste disposal techniques
- Acquire the knowledge of e- waste disposal techniques

UNIT-I

Quality requirements of boiler and cooling waters – quality requirements of process water for textiles – food processing and Brewery industries – boiler and cooling water treatment methods.

UNIT-II

Basic theories of industrial waste water management – volume reduction – strength reduction – neutralization – equalization and proportioning. Joint treatment of industrial waste and domestic sewage – consequent problems.

UNIT-III

Industrial waste water discharges into streams, lakes and oceans and problems. Recirculation of industrial wastes – use of municipal waste water in industries.

UNIT –IV

Manufacturing process and design origin of liquid waste from textiles, paper and pulp industries, thermal power plants tanneries, fertilizers, distillers, diary, sugar mills, steel plants, oil refineries, and pharmaceutical plants, special characteristics, effects and treatment methods.

UNIT –V

Common Effluent Treatment plants –Advantages and suitability, limitations, Effluent Disposal Methods

TEXT BOOKS

1. Waste water Treatment by M.N.Rao and Dutta, Oxford &IBH, New Delhi

REFERENCE BOOKS

1. Liquid waste of industry by Newmerow
2. Water and waste water technology by Mark J.Hammmerand mark J.Hammer (Jr)

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IV Year B.Tech CE – I sem	**L**	**T/P/D**	**C**
Open Elective	**3**	**0**	**3**

(MED1163) OPTIMIZATION TECHNIQUES

Course Objectives: Student will be able to

- To understand linear programming
- To understand optimization problem statement.
- To understand single variable and multi variable optimization problems with equality and inequality constraints
- To understand various optimization techniques.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Formulate mathematical statement of optimization problem
- Understand multivariable optimization
- Understand various methods of optimization techniques
- Understand the concept of genetic algorithm

UNIT I

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems, Use of optimization methods. Introduction to classical optimization techniques, motivation to the simplex method, simplex algorithm, sensitivity analysis.

UNIT II

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions. Search methods - Unrestricted search, exhaustive search, Fibonacci method, Golden section method, Direct search method, Random search methods, Univariate method, Pattern search method.

UNIT III

Descent methods, Gradient of function, steepest decent method, conjugate gradient method. Characteristics of constrained problem, Direct methods, The complex method, cutting plane method.

UNIT IV

Review of a global optimization techniques such as Monte Carlo method, Simulated annealing and Tunneling algorithm.

UNIT V

Generic algorithm - Selection process, Crossover, Mutation, Schema theorem, comparison between binary and floating point implementation.

TEXT BOOKS

1. SS Rao, “Optimization techniques”, PHI, 1989.
2. Zhigmiew Michelewicz, “Genetic algorithms + data structures = Evaluation programs”, Springer Verlog - 1992.
3. Merrium C. W., “Optimization theory and the design of feedback control systems”, McGraw Hill, 1964.
4. Weldo D.J., “Optimum seeking method”, PHI, 1964.
5. Introductory Operations Research” by H.S. Kasene & K.D. Kumar, Springer(India), Pvt .LTD.
6. Optimization Methods in Operations Research and systems Analysis” – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
7. Operations Research : An Introduction” – by H.A. Taha, PHI Pvt. Ltd., 6th edition
8. Linear Programming – by G. Hadley

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IV Year B.Tech CE – I Sem	**L**	**T/P/D**	**C**
Open Elective	**3**	**0**	**3**

(CSE1130) RELATIONAL DATA BASE MANAGEMENT SYSTEMS

Course Objectives: Student will be able to

- To present an introduction to database management systems (DBMS) and relational data model.
- To provide an emphasis on how to organize, maintain and retrieve information efficiently and effectivelyfrom a DBMS.
- To introduce the concepts of transactions and transaction processing
- To present the issues and techniques relating to concurrency in multi-user database environments

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- The students should be able to:
- Understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
- The students will be able to design and query databases, as well as understand the internals of databases.
- Define basic functions of DBMS & RDBMS.
- Describe database development process.
- Apply the Relational Database Model to understand the Logical and Physical aspects of the DBMS architecture.

UNIT-I

Introduction to Databases and Database Management System - Database system Applications - Advantages of DBMS over File System - Data Models – Instances and schema - View of Data - Database Languages -DDL-DML - Database Users and Administrator - Database System Structure.

UNIT-II

Database Design and ER diagrams – Attributes and Entity Sets – Relationships and Relationship Sets – Constraints - Keys - Design Issues - Entity-Relationship Diagram- Weak Entity Sets - Extended E-R Features - Database Design with ER model - Database Design for Banking Enterprise

UNIT – III

Introduction to the Relational Model – Structure of RDBMS - Integrity Constraints over Relations – Enforcing Integrity Constraints – Querying Relational Data - Relational Algebra and Calculus.

Introduction to SQL- Data Definition commands, Data Manipulation Commands, Basic Structure, Set operations Aggregate Operations - Join operations - Sub queries and correlated queries, SQL functions , views ,Triggers, Embedded SQL.

UNIT – IV

Functional Dependencies– Introduction , Basic Definitions, Trivial and Non trivial dependencies, closure of a set of dependencies, closure of attributes, irreducible set of dependencies- Schema Refinement in Database Design- Problems Caused by Redundancy – Decompositions – Problem Related to Decomposition –- Lossless Join Decomposition – Dependency Preserving Decomposition - FIRST, SECOND, THIRD Normal Forms – BCNF –– Multivalued Dependencies – Fourth Normal Form.

UNIT-V

Transaction concept- Transaction state- Implementation of atomicity and Durability- Concurrent executions – Serializability, Recoverability

Lock Based Protocols, Timestamp Based Protocols, Validation Based Protocols, Multiple Granularity, Dead Lock Handling – Failure Classification – Storage Structure - Recovery and Atomicity- Log Based recovery – Recovery with concurrent transactions – Checkpoints .

File Organization – Organization of records in file - Data Dictionary Storage – Indexing and Hashing – Basic Concepts , Ordered Indices,B^+Tree Index files, B- tree index files – Static Hashing – Dynamic Hashing – Comparision of Indexing with Hashing.

TEXTBOOKS.

1. Database System Concepts, Silberschatz, Korth , Fifth Edition, McGraw hill (1,2,3 and 5 Units)
2. Introduction to Database Systems, C.J.Date, Pearson Education (4^{th} Unit)

REFERENCE BOOKS

1. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
2. Database Management Systems, Raghuramakrishnan, Johannes Gehrke, TATA Mc Graw Hill(1,2,3 and 5 Units)
3. Data base Systems design, Implementation, and Management, Peter Rob and Carlos Coronel 7th Edition.
4. Data Base Systems using Oracle : A simplified guide to SQL and PL /SQL, Shah, PHI

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IV Year B.Tech CE – I Sem	**L**	**T/P/D**	**C**
Open Elective	**3**	**0**	**3**

(EEE1127) RENEWABLE ENERGY SOURCES

Course Objectives: Student will be able to

- To inculcate the awareness of energy conservation in students
- To understand the use of renewable energy sources for electrical power generation
- To know different energy storage methods
- To learn about environmental effects of energy conversion

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- To use different renewable energy sources to produce electrical power
- To minimize the use of conventional energy sources to produce electrical energy
- To identify the fact that the conventional energy resources are depleted
- To store energy and to avoid the environmental pollution

UNIT- I

PRINCIPLES OF SOLAR RADIATION

Role and Potential of New and Renewable source, the solar energy option, Environmental impact of solar power, Physics of the Sun, The solar constant, Extraterrestrial and Terrestrial solar radiation, Solar radiation on titled surface, Instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT- II

SOLAR ENERGY COLLECTION & APPLICATIONS

Flat Plate Collectors and Concentrating Collectors, Classification of concentrating collectors, Orientation and Thermal analysis, advanced collectors, Solar ponds, Solar Energy Applications - solar heating/cooling techniques, solar distillation and drying, Photovoltaic Energy Conversion.

UNIT- III

WIND ENERGY

Sources and potentials, Horizontal and Vertical axis wind mills - Types, Blade Design, Performance characteristics, Betz criteria, Induction Generators for Wind power Generation, MHD Generation.

UNIT - IV

BIO-MASS & DEC

Principles of Bio-Conversion, Anaerobic/aerobic digestion, Types of Bio-gas Digesters, gas yield, Combustion characteristics of bio-gas, Utilization for cooking, Economic aspects.

Direct Energy Conversion, Need for DEC, Principles of DEC, Carnot Cycle and Limitations.

UNIT - V

HARNESSING GEOTHERMAL ENERGY & OCEAN ENERGY

Resources of Geothermal Energy, Types of wells, Methods of harnessing the energy, potential in India, Ocean Thermal Energy Conversion, Principles, Utilization, Setting of OTEC plants, Thermodynamic cycles, Tidal and Wave energy: Potential and Conversion Techniques, Mini-Hydel Power plants.

TEXT BOOKS

1. Non-Conventional Energy Sources by G.D.Rai, Khanna Publishers.
2. Renewable Energy Resources by Twidell and Wier, CRC Press (Taylor and Francis).
3. Non- Conventional energy resources by B.H.Khan, Tata Mc Graw-Hill, 2006.

REFERENCE BOOKS

1. Renewable Energy Resources by Tiwari and Ghosal, Narosa.
2. Renewable Energy Technologies by Ramesh and Kumar, Narosa.
3. Non-Conventional Energy Systems by K Mittal, Wheeler Publishing House.
4. Renewable Energy Sources and Emerging Technologies by D.P.Kothari, K.C.Singhal, PHI.

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IV Year B.Tech CE – I Sem	**L**	**T/P/D**	**C**
Open Elective	**3**	**0**	**3**

(CED1147) DISASTER MANAGEMENT

Course Objectives: Student will be able to

- Understand the difference between a hazard and disaster
- Know about various disasters and their impacts
- Understand Different approaches of disaster risk reduction
- Understand Disaster risks in India

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge disaster Management
- Understand the vulnerability of ecosystem and infrastructure due to a disaster
- Acquire the knowledge of Disaster Management Phases
- Understand the hazard and vulnerability profile of India

UNIT-1

Introduction to disaster

Concepts and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks)

UNIT-II

Disasters: Classifications, Causes, Impacts (including social, economic, political, environment, health, psychosocial, etc.)

Differential impacts-in terms of caste, class, gender, age, location, disability Global trends in disasters. Urban disaster, pandemics, complex emergencies, Climate change

UNIT-III

Approaches to disaster Risk reduction

Disaster cycle-its analysis, phase, Culture of safety, prevention, mitigation and preparedness, community based DRR, Structural measures, roles and responsibilities of community. Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, center and other stake-holders.

UNIT-IV

Inter-relationship between Disaster and Development

Factors affecting Vulnerabilities, differential impacts, impact of development projects such as dams, embankments, change in land-use etc. Climate change Adaption. Relevance of indigenous knowledge, appropriate technology and local resources.

UNIT-V

Disaster Risk Management in India

Hazard and vulnerability profile of India, Components of Disaster relief: Water, food, sanitation, shelter, health, waste management, Institutional arrangements

(Mitigation, Response and Preparedness, DM Act Policy, Other related polices, plan, programmes and legislation)

Project Work :(Field Work, Case Studies)

The project/fieldwork is meant for students to understand vulnerabilities and to work on reducing disaster risks and to build a culture of safety. Projects must be conceived creatively based on the geographic location and hazard.

Suggested Reading list:

1. Alexander David, Introduction in 'Confronting Catastrophe', oxford University press, 2000
2. Andharia J. Vulnerability in disaster Discourse, JTCDM, Tata Institute of Social Sciences working paper no.8, 2008
3. Blaikie, P, Cannon T, Davis I, Wisner B 1997. At Risk Natural Hazards, Peoples' Vulnerability and Disaster, Rutledge.
4. Coppola P Damon, 2007. Introduction to International Disaster Management.
5. Carter, Nick 1991.Disaster Management: A Disaster Manager's Handbook. Asian Development Bank, Manila Philippines.
6. Cuny,F.1983. Development and Disasters, Oxford University Press
7. Govt.of India; Disaster Management Act 2005,Government of India, New Delhi.

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Open Elective	**3**	**0**	**3**

(CSE1121) CYBER SECURITY

Course Objectives: Student will be able to

- This course provides an overview of Information Security and Assurance over the Internet.
- Students will be exposed to the spectrum of security activities, methods, methodologies, and procedures with emphasis on practical aspects of Information Security
- In this course Service Processes, storage and security management, Cyber Forensics and standard, laws and Acts for Information Security will be learnt

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Understand security principles, threats and attack techniques
- Describe authentication and access control
- Describe reference monitors, and security models
- Understand Service Delivery and support process
- Understand network security and operating system security
- Understand storage and security management

UNIT I.

INTRODUCTION: Introduction and Overview of Cyber Crime, Nature and Scope of Cyber Crime, Types of Cyber Crime: Social Engineering, Categories of Cyber Crime, Property Cyber Crime. CYBER CRIME ISSUES: Unauthorized Access to Computers, Computer Intrusions, White collar Crimes, Viruses and Malicious Code, Internet Hacking and Cracking, Virus Attacks, Pornography, Software Piracy, Intellectual Property, Mail Bombs, Exploitation ,Stalking and Obscenity in Internet, Digital laws and legislation, Law Enforcement Roles and Responses. Security Policy Design, Designing Security Procedures, Risk Assessment Techniques, Security standards, Biba Model, Chinese wall, Bell La Pedula Model.

UNIT II:

SERVICE DELIVERY PROCESS- Service Delivery Process, Service Level Management, Financial Management, Service Management, Capacity Management, Availability Management.

SERVICE SUPPORT PROCESS- Service Support Process, Configuration Management, Incident Management, Problem Management, Change Management, Release Management.

UNIT III:

STORAGE MANAGEMENT- Backup & Storage, Archive & Retrieve, Disaster Recovery, Space Management, Database & Application Protection, Bare Machine

Recovery, Data Retention

SECURITY MANAGEMENT- Security, Computer and internet Security, Physical Security,Identity Management, Access Management. Intrusion Detection, Security Information Management.

UNIT IV:

Cyber Forensics- Introduction to Digital Forensics, Forensic Software and Hardware, Analysis and Advanced Tools, Forensic Technology and Practices, Forensic Ballistics and Photography, Face, Iris and Fingerprint Recognition, Audio Video Analysis, Windows System Forensics, Linux System Forensics, Network Forensics Evaluation of crime scene and evidence collection ,Usage of tools for disk imaging and recovery processes.

UNIT V

Introduction to Information Security Standards , Laws and Acts: Laws and Ethics, Digital Evidence Controls, Evidence Handling Procedures, Basics of Indian Evidence ACT IPC and CrPC , Electronic Communication Privacy ACT, Legal Policies,ISO 27001,PCI DSS,IT Act, Copy Right Act.

Textbooks:

1. Nelson Phillips and Enfinger Steuart, “Computer Forensics and Investigations”, Cengage Learning, New Delhi, 2009.
2. "Management of Information Security", M. E. Whitman, H. J. Mattord, Nelson Education / CENGAGE Learning, 2011, 3rd Edition.
3. "Guide to Computer Forensics and Investigations", B. Nelson, A. Phillips, F. Enfinger, C. Steuart, Nelson Education / CENGAGE Learning, 2010, 4th Edition.
4. Goel Ritendra, Computer Application in Management, New Age International Publishers, New Delhi.
5. Chowdhury G.G., Text Retrieval Systems in information Management, New Age International Publishers, New Delhi.

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Open Elective	**0**	**3**	**2**

(CED1210) CAD & GIS LAB

Course Objectives: Student will be able to

- Understand the GUI of the analysis package
- Understands the geometric modeling, pre and post processors& to interpret the results
- Understands Arial photograph interpretation
- Understand analog to digital conversions, data creation and editing& buffering techniques

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Able to model a geometry represent the physical model of s structural element/structure
- Able to design the structural elements
- Interpret Arial photographs
- Able to classify images and detect the changes from imageries, create database & interpret data

CAD :

1. Analysis of simple and continuous beams
2. 2-D RC frame analysis and Design
3. Steel Truss analysis and Design
4. 3-D RC frame analysis and Design
5. Comparison of seismic forces for a multi-storey building based on IS:1893
6. Analysis and Design of a simple tower

Software: STAAD. Pro or Equivalent

REMOTE SENSING:

1. Arial photograph interpretation
2. Visual interpretation of multispectral and panchromatic image
3. Image classification, supervised and unsupervised classifications
4. Change detection from multi-date imagery

GIS:

1. Analog to Digital Conversion – Scanning methods
2. Introduction to software
3. Digital database creation – Point features, Line features, Polygon features
4. Data Editing-Removal of errors – Overshoot & Undershoot, Snapping
5. Data Collection and Integration, Non-spatial data attachment working with tables
6. Dissolving and Merging
7. Clipping, Intersection and Union

8. Buffering techniques
9. Spatial and Attribute query and Analysis
10. DEM

Remote Sensing & GIS Software:

1. Arc GIS 9.0
2. ERDAS 8.7
3. Mapinfo 6.5

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IV Year B. Tech CE – I Sem	**L**	**T/P/D**	**C**
	0	**3**	**2**

(CED1211)ENVIRONMENTAL ENGINEERING LAB

Course Objectives: Student will be able to

- Understands the procedures determine water quality
- Understand procedures to determine waste water quality
- Understand procedures to determine the industrial water quality
- Understands the water sampling, waste water sampling &water quality standards

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- test water samples
- test waste water samples
- test Industrial waste water samples
- knows water quality & waste water standards

List of the Experiments

1. p^H & Conductivity. Determination of p^H and conductivity of water and waste water.
2. Turbidity & Jar Test . Determination of turbidity of water and wastewater by Nephelometry.
3. Hardness.
4. Acidity estimation. Determination of Acidity as $CACO_3$ by fitrimetric method
5. Alkalinity estimation.
6. Residual Chlorine.
7. Fluorides.
8. Optimum dosage of coagulant by jar test. Determination of optimum dosage of coagulars using Jar test(flocculation test)
9. Estimation of Total Solids : Settleable Solids : Suspended solids, dissolved solids.
10. D.O. Determination of D.O polarographic probe method
11. B. O. D.
12. C. O. D.
13. Chlorides. Determination of chloride by Mohr's aryentometric method

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IV Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
Elective- II	**4**	**0**	**4**

(CED1140) WATERSHED MANAGEMENT

Course Objectives: Student will be able to

- The primary objective of this course is to develop an understanding of the processes and fluxes of mass and energy within a watershed and how land use changes potentially affect these processes.
- To learn how science-based management principles may be applied to watershed systems.
- To develop/improve critical problem solving, quantitative and data analysis skills commonly used by natural resource managers.
- Understand potential environmental effects of various land and water uses and how these resources can benefit from integrated watershed management.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Comprehend the physical, biological and environmental aspects and their interrelations within a watershed; choose and apply available system tools for system intervention.
- Comprehend the participatory decision making processes; comprehend the interdependencies between natural resources and management at different locations in land and water management.
- Formulate a vision and design a sustainable watershed management plan that shows an integrated approach towards multiple use of land- and water resources and social equity and economic viability.
- Work in multidisciplinary and multicultural groups (with respect for different views, expertise and culture); reflect on own contribution to group work and on group processes

UNIT-I

Introduction

Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

UNIT-II

Characteristics of watershed

Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT-III

Principles and measures to control erosion

Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation. Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rockfill dams, brushwood dam, Gabion.

UNIT-IV

Water harvesting

Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, and percolation tanks.

UNIT-V

Land and ecosystem management

Land use and Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils. Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.

TEXT BOOKS

1. Watershed Management by JVS Murthy, - New Age International Publishers.
2. Water Resource Engineering by R.Awurbs and WP James, - Prentice Hall Publishers.

REFERENCE BOOKS

1. Land and Water Management by VVN Murthy, - Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Printice Hall of India

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IV Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
Elective- II	**4**	**0**	**4**

(CED1141)CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT

Course Objectives: Student will be able to

- Learn the fundamentals of construction law.
- Learn the fundamentals of construction safety.
- Understand various equipments used in construction.
- Learn Fundamentals of Project Planning.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Differentiate construction equipment.
- Prepare Plan and control resources of projects.
- Prepare Construction Schedule by using different methods.
- Know ISO 9000 Standards

UNIT-I :

Fundamentals of construction Technology – Construction activities – process – construction schedule – construction records – documents – quality – safety – codes and regulations.

UNIT-II :

Construction method – earthwork – piling – concrete and concreting – formwork – fabrication and erection - Mechanised construction – construction equipment – equipment economics – excavators – Rollers – Dozers – Scrapers – Handling equipment – concrete equipment – cranes – draglines and clamshalls

UNIT-III :

Quality control, Assurance and safety – ISO – 9000 – quality systems – principles on safety – personnel, fire and electrical safety – environment protection – concept of green building.

UNIT-IV :

Contract management – project estimation – types of estimation – contract document – classification – bidding – procurement process - Construction planning – project planning techniques – planning of manpower, material, equipment and finance.

UNIT-V :

Project scheduling – PERT – CPM, Resource leveling - Construction claims, Dispute and project closure – source of claim – claim management – Dispute Resolution – Arbitration – Construction Closure – Contract Closure – Documentation.

TEXT BOOK

1. Construction Technology by Subir K.Sarkar, Subhajit Saraswati / Oxford University Press

2. Construction Project Management – Theory and Practice, Niraj kumar jha, Pearson Education

REFERENCE BOOKS

1. Construction Planning Equipment and Methods by Peurifacy, Schexnayder, Sharpira TMH
2. Project Planning and Control with PERT and CPM – B.C. Punmia, K.K.Khandelwala – Laxmi Publication.

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IV Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
Elective- II	**4**	**0**	**4**

(CED1142) PRINCIPLES OF WATER QUALITY MANAGEMENT

Course Objectives: Student will be able to

- Develop an understanding water management Concepts
- Develop an understanding of water requirements for various uses
- Develop an understanding of treatment of water
- Develop an understanding of miscellaneous water treatment methods

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge of Quality of water
- Acquire the knowledge of Treatment of water
- Acquire the knowledge of Design of water Treatment Plant
- Acquire the knowledge of Miscellaneous treatment methods

UNIT – I

Introduction

Water Demand - Domestic, Institutional, Industrial & fire Fighting demand. Estimating per capita water demand. Quality of water and drinking water standards.

UNIT – II

Water Sources

Rainfall and runoff – Measurement of precipitation and runoff, Rainfall intensity-duration- frequency relationship. Groundwater – Formation of ground water, Infiltration galleries, yield of wells. Surface Sources – Catchment area, Reservoir sites, yield of surface sources.

UNIT –III

Qualities of water supplies

Impurities of water, Examination of water – Collection of samples, Standard tests, Classification of tests, Biological examination of water.

UNIT – IV

Treatment of water

layout of water treatment plant, Sedimentation – Sedimentation tank, sedimentation aided with coagulation. Filtration – Theory of filtration, types of filters, comparison of slow sand and rapid gravity filters. Disinfection – Theory of disinfection by chlorine, different chlorination methods.

UNIT – V

Miscellaneous treatment methods: Water softening, Aeration, Fluoridation, Desalting, Radio Isotope removal.

REFERENCE BOOKS

1.Water supply, Waste disposal & Environmental Engg by A.K. Chatterjee

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IV Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
Elective- II	**4**	**0**	**4**

(CED1143) GEOSPATIAL TECHNOLOGY & APPLICATIONS

Course Objectives: Student will be able to

- To enable the students to understand different types of datum's and coordinates systems.
- To enable the students to understand different types of applications like environment ,social and commercial applications
- GIS is software which can be used for collecting, storing and analyzing of data which is useful for real world applications.
- To enable the students to understand how GIS can be used to address the problems and develop solutions in everyday problems.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Use different types of projections and datum's for spatial data base generation.
- Student able to classify the different types of disasters so management of disasters is very easy.
- By Using GIS, the student can develop knowledge on using the analytical hierarchy process, which considers several factors for bringing out the best solution in a effective manner.
- By GIS the student can communicate to the common man his analysis of different problems developments, benefits by preparing different thematic maps.

UNIT -I

Introduction

Geospatial data, Spatial data infrastructure, three important geospatial technologies, Spatial elements. Datums &Geodetic Systems-Geodetic datums, Geodetic reference system

UNIT-II

Coordinates & coordinate systems

Coordinates and coordinate systems, Datums and geodetic systems, Coordinate transformations. Basic electromagnetic radiation.

UNIT-III

Overview of gst applications

GST for Environmental, Social, Local Government and Commercial applications.

UNIT-IV

Municipal & urban GIS

GST for Urban Environmental Monitoring. GST for Municipal Administration. Geomatics in Solid and Hazardous waste disposal site selection, Environmental

Information System Development for municipalities: Case studies GST for Traffic and Transportation planning Assessment

UNIT-V

Disaster management

Introduction and Overview- Natural and manmade hazards – Vulnerability assessment and Mapping on Disasters- Spatial Information for natural Hazard and risk assessment –Land slides- volcanoes- floods and famines- earth quakes- Drought hazard and risk assessment- Human Induced disasters- industrial disasters- dams- constructional and others.

TEXT BOOKS

1. Manual of Geospatial Science and Technology Edited By John. D. Bossler, Taylor And Francis, London
2. Fundamentals of GIS by MICHAEL N DEMERS. Published By john Wiley & Sons Inc.
3. Environmental Modeling with GIS, Michael F. Goodchild, Bradley O. Parks, Louis T. Stewart

REFERENCE BOOKS

1. Environmental Modeling with GIS, Michael F. Goodchild, Bradley O. Parks, Louis T. Stewart
2. Geographic Information Systems: A Management Perspective by Stan Arnoff.
3. Geographical Information Sysytems by Demmeers

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IV Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
Elective- II	**4**	**0**	**4**

(CED1144) PRESTRESSED CONCRETE

Course Objectives: Student will be able to

- Develop an understanding of the necessity of prestressed concrete structures.
- Develop an understanding of various techniques of prestressing.
- Develop an understanding of various losses of prestress.
- Develop an understanding of the analysis of prestressed concrete members.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Acquire the knowledge of evolution of process of prestressing.
- Acquire the knowledge of various prestressing techniques.
- Develop skills in analysis of prestressed concrete beams, and slabs.
- Develop skills to satisfy the serviceability and strength provisions of the Indian Standards (IS: 1343-1980).

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. I.S.Code provisions, Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – Udall System.

UNIT – II

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.

UNIT – III

Analysis of sections for flexure

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

UNIT – IV

Deflections of prestressed concrete beams

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

UNIT – V

Composite section

Introduction – Analysis of stress – Differential shrinkage – General designs considerations.

TEXT BOOKS

1. Prestressed Concrete by Krishna Raju; - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.

REFERENCE BOOKS

1. Prestressed Concrete by Ramamrutham; Dhanpatrai Publications.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
3.Codes: BIS code on prestressed concrete, IS 1343.

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IV Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
Elective- II	**4**	**0**	**4**

(CED1145) WATER RESOURCES PLANNING AND MANAGEMENT

Course Objectives: Student will be able to

- To impart to the students the concepts of Water Resource Planning and Management.
- To enable the students to understand different types of Optimization Techniques
- To enable the students to solve analytical problems
- To enable the students to do optimal allocation of water resources

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Do Linear and Dynamic Programming
- Use non linear optimization models
- Perform benefit cost calculation for Projects
- Allocate water resources based on scientific criterion

UNIT I

Introduction

Concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models objective function and constraints, types of optimization techniques.

Linear Programming - I

Formulation linear programming models, graphical method, simplex method, application of Linear programming in water resources.

UNIT II

Linear Programming - II

Revised simplex method, duality in linear programming, sensitivity and past optimality analysis.

UNIT III

SDynamics programming

Belman's of principles of optimality forward and backward recursive dynamic programming, case of dimensionality, application of dynamic for resource allocation.

UNIT IV

Non-linear Optimization Techniques

Clerical of method optimization, Kuch-Tucleer, gradient based research techniques for simple unconstrained optimization.

Simulation : Application of simulation techniques in water resources.

UNIT V

Water- resources economics

Principles of Economics analysis, benefit cost analysis socio economic intutional and pricing of water resources.

Water resources management

Planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, conjunctive use of surface and sub-surface water resources.

TEXT BOOKS

1. Water Resources System Analysis-Vedula & Mujumdar – Tata Mc.Graw-Hill Company Ltd.2005.
2. Water Resources Economics – James & Lee. Oxford Publishers 2005.

REFERENCE BOOKS

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.

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IV Year B. Tech CE – II Sem	**L**	**T/P/D**	**C**
Elective- II	**4**	**0**	**4**

(CED1146) PAVEMENT ANALYSIS DESIGN AND EVALUATION

Course Objectives: Student will be able to

- Understand the basic modeling concepts used to analyze flexible and rigid pavements.
- Appreciate pavement management concepts to better manage road pavement.
- Apply the various types of highway appurtenance to enhance the safety of motorists.
- Learn to estimate traffic noise and the effect of noise attenuation measures.

Course Outcomes: On successful completion of this course, it is expected that students should be able to

- Design flexible and rigid pavements
- Propose a pavement management system framework
- Design highway appurtenance and highway drainage
- Design mitigation measures to attenuate traffic noise

UNIT – I

Some Fundamentals of Pavements

Functions and Desirable characteristics of Pavements, Types of pavements, Comparision of Flexible and rigid pavements, Functions of Individual Layers, Factors affecting design of pavements – wheel loads –ESWL Concept- tyre pressure – contact pressure, Material characteristics – Environmental and other factors.

UNIT –II

Design of Flexible pavements

Stresses in Flexible pavements – Visco elasic theory and assumptions, Layerd system concepts, Stress solution for one and two layered systems, Fundamental design concepts, Methods of design of flexible pavements, AASHTO and IRC method of Pavement design.

UNIT –III

Design of Rigid Pavement

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, Westergard's theory and assumptions, IRC method of Rigid pavement design – Importance of Joints in Rigid Pavements- Types of Joints – Use of Tie Bars and Dowell Bars, AASHTO method of Design.

UNIT – IV

Highway Materials and Construction Aspects

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, 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 – V

Pavement Evaluation

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, IRC method of Overlay design, Importance of profile correction course.

Text Books

1. Highway Engineering – S.K.Khanna & C.J.Justo, Nemchand & Bros., 7th Edition (2000).
2. Principles and Practices of Highway Engineering – Dr.L.R.Kadiyali & Dr.N.B.Lal – Khanna publishers – (2003).

REFERENCE BOOKS

1. Principles of Pavement design, Yoder.& Witzorac Mathew, John Wiley & Sons Inc.
2. Pavement Analysis and Design, Yang H. Huang, Prentice Hall Inc.
3. IRC codes for Design of Flexible and Rigid Pavements.