ADIKAVI NANNAYAUNIVERSITY

UNIVERSITY COLLEGE OF ENGINEERING

R A J A M A H E N D R A V A R A M

Department of Civil Engineering

B.Tech (CE)

SYLLABUS &
MODEL QUESTION PAPERS

I, II, III & IV YEAR
(*For the admitted batch of* 2020-21)

Board of Studies

University College of Engineering

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BTECH CIVIL ENGINEERING PROGRAMME STRUCTURE

Branch/Course: Civil Engineering Semester I (First year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
HSMC-CE101	English-I	75	25	100	3	0	0	3
BSC-CE102	Engineering Mathematics-I	75	25	100	3	0	0	3
BSC-CE103	Engineering Chemistry	75	25	100	3	0	0	3
ESC-CE104	Fundamentals of Computer Science	75	25	100	3	0	0	3
ESC-CE105	Engineering Graphics	75	25	100	3	0	0	3
LC-CE106	English Communication Skills Lab	50	50	100	0	0	3	1.5
LC-CE107	Engineering Chemistry Lab	50	50	100	0	0	3	1.5
LC-CE108	IT Workshop Lab	50	50	100	0	0	3	1.5
MC-CE109	Professional Ethics and Human Values	75	25	100	2	0	0	0
Induction Programme		3 Weeks Duration						
	Total Credits							**19.5**

Branch/Course: Civil Engineering Semester II (First year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
HSMC-CE201	English II	75	25	100	3	0	0	3
BSC-CE202	Engineering Mathematics II	75	25	100	3	0	0	3
BSC-CE203	Engineering Physics	75	25	100	3	0	0	3
ESC-CE204	Programming for Problem Solving	75	25	100	3	0	0	3
ESC-CE205	Engineering Mechanics	75	25	100	3	0	0	3
LC-CE206	Engineering Physics Lab	50	50	100	0	0	3	1.5
LC-CE207	Engineering Workshop Lab	50	50	100	0	0	3	1.5
LC-CE208	Programming for Problem Solving Lab	50	50	100	0	0	3	1.5
MC-CE209	Environmental Science	75	25	100	2	0	0	0
	Total Credits							**19.5**

Branch/Course: Civil Engineering Semester III (Second year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
BSC-CE301	Probability and Statistics	75	25	100	3	0	0	3
PCC-CE302	Strength of Materials	75	25	100	3	0	0	3
PCC-CE303	Surveying and Geometrics	75	25	100	3	0	0	3
PCC-CE304	Fluid Mechanics	75	25	100	3	0	0	3
PCC-CE305	Building Materials, Construction and Planning	75	25	100	3	0	0	3
LC-CE306	Strength of Materials Lab	50	50	100	0	0	3	1.5
LC-CE307	Surveying Field Work – I	50	50	100	0	0	3	1.5
LC-CE308	Building Planning and Design	50	50	100	0	0	3	1.5
MC-CE309	Essence of Indian Traditional Knowledge	75	25	100	2	0	0	0
MC-CE310	Skill Oriented Course - Soft Skills Lab	50	50	100	1	0	2	2
	Total Credits							**21.5**

Branch/Course: Civil Engineering Semester IV (Second year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
ESC-CE401	Engineering Geology	75	25	100	3	0	0	3
PCC-CE402	Hydraulics and Hydraulic Machinery	75	25	100	3	0	0	3
PCC-CE403	Structural Analysis	75	25	100	3	0	0	3
PCC-CE404	Transportation Engineering	75	25	100	3	0	0	3
HSMC-CE405	Managerial Economics & Financial Analysis	75	25	100	3	0	0	3
LC-CE406	Transportation Engineering Lab	50	50	100	0	0	3	1.5
LC-CE407	Engineering Geology Lab	50	50	100	0	0	3	1.5
LC-CE408	Fluid Mechanics & Hydraulics Machinery Lab	50	50	100	0	0	3	1.5
MC-CE409	Skill Oriented Course - MOOCs (from same domain)	50	50	100	1	0	2	2
	Total Credits							**21.5**

For MOOCs, guidelines outlined in Academic Regulations for MOOCs will be applicable

***Summer Internship 2 Months (Mandatory) after second year (to be evaluated during Semester-V)**

Branch/Course: Civil Engineering Semester V (Third year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PCC-CE501	Concrete Technology	75	25	100	3	0	0	3
PCC-CE502	Environmental Engineering	75	25	100	3	0	0	3
PCC-CE503	Geotechnical Engineering	75	25	100	3	0	0	3
OEC-CE504	**Open Elective – I** 1. Construction Management 2. Smart Cities 3. Green Technology	75	25	100	3	0	0	3
PEC-CE505	**Professional Elective – I** 1. Reinforced Soil Structures 2. Railways & Airport Engineering 3. Remote Sensing & GIS	75	25	100	0	0	3	3
LC-CE506	Concrete Technology Lab	50	50	100	0	0	3	1.5
LC-CE507	Environmental Engineering Lab	50	50	100	0	0	3	1.5
MC-CE508	Constitution of India	75	25	100	2	0	0	0
MC-CE509	Skill Oriented Course - Tutorials in same Domain	50	50	100	1	0	2	2
Summer Internship 2 Months (Mandatory) after second year(to be evaluated during V semester					0	0	0	1.5
	Total Credits							**21.5**

Branch/Course: Civil Engineering Semester VI (Third year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PCC-CE601	Design & Drawing of Reinforced Concrete Structures	75	25	100	3	0	0	3
PCC-CE602	Water Resources Engineering	75	25	100	3	0	0	3
PCC-CE603	Design & Drawing of Steel Structures	75	25	100	3	0	0	3
PEC-CE604	**Professional Elective-II** 1. Prestressed Concrete 2. Estimation, Specifications and Contracts 3. Foundation Engineering	75	25	100	3	0	0	3
OEC-CE605	**Open Elective-II** 1. Disaster Management 2. Elements of Coastal Engineering 3. Project Management	75	25	100	3	0	0	3
LC-CE606	Geotechnical Engineering Lab	50	50	100	0	0	3	1.5
LC-CE607	Computer Aided Engineering Drawing LAB	50	50	100	0	0	3	1.5
LC-CE608	Surveying Field Work – II	50	50	100	0	0	3	1.5
MC-CE609	Skill Oriented Course - Tutorials in same Domain	50	50	100	1	0	2	2
	Total Credits							**21.5**

Industrial Internship 2 Months (Mandatory) after third year (or) Mini project (to be evaluated during VII semester)

Branch/Course: Civil Engineering Semester VII (Fourth year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PEC-CE701	**Professional Elective-III** 1. Finite Element Methods 2. Earth & Rock fill Dams 3. Building Services	75	25	100	3	0	0	3
PEC-CE702	**Professional Elective-IV** 1. Solid Dynamics and Machine Foundations 2. Air Pollution & Control 3. Bridge Engineering	75	25	100	3	0	0	3
PEC-CE703	**Professional Elective-V** 1. Urban Hydrology 2. Ground Improvement Techniques 3. Low-Cost Housing	75	25	100	3	0	0	3
OEC-CE704	**Open Elective-III** 1. Environmental Impact Assessment 2. Earth Retaining Structures 3. Airport Planning and Design	75	25	100	3	0	0	3
OEC-CE705	**Open Elective-IV** 1. Watershed Management 2. Travel Demand Analysis 3. Traffic Safety	75	25	100	3	0	0	3
HSMC-CE706	Industrial Engineering and Management	75	25	100	3	0	0	3
MC-CE707	Advance Structural Design By Using Staad Pro	50	50	100	1	0	2	2
Industrial Internship 2 Months (Mandatory) after third year (or) Mini project (to be evaluated during VII semester								3
	Total Credits							**23**

Branch/Course: Civil Engineering Semester VIII (Fourth year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int					
PROJ	Project Work	200	100	300				12
	Total Credits							12

Branch/Course: Civil Engineering Semester I (First year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
HSMC-CE101	English-I	75	25	100	3	0	0	3
BSC-CE102	Engineering Mathematics-I	75	25	100	3	0	0	3
BSC-CE103	Engineering Chemistry	75	25	100	3	0	0	3
ESC-CE104	Fundamentals of Computer Science	75	25	100	3	0	0	3
ESC-CE105	Engineering Graphics	75	25	100	3	0	0	3
LC-CE106	English Communication Skills Lab	50	50	100	0	0	3	1.5
LC-CE107	Engineering Chemistry Lab	50	50	100	0	0	3	1.5
LC-CE108	IT Workshop Lab	50	50	100	0	0	3	1.5
MC-CE109	Professional Ethics and Human Values	75	25	100	2	0	0	0
Induction Programme		3 Weeks Duration						
	Total Credits							**19.5**

Course Code	**HSMC-CE101**				
Category	**Humanities and Social Science including Management Courses**				
Course Title	**English I**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-I**
	3	**0**	**0**	**3**	
Prerequisites (if any)	**Basic knowledge of grammar (+2 level)**				

Course Description

The syllabus is intended to enhance the communication skills of the students in the mode of Activity Based Language Teaching and Learning. The syllabus is designed to impart not just grammatical knowledge but also provide a platform for developing communication skills through activity and interaction so as to enable the learner to become proficient in all aspects of English Language that is Listening, Speaking, Reading and Writing.

Course Objectives:

1. To encourage the all-round development of students by focusing on communication skills.
2. To develop and nurture the Language skills of the students through individual and group activities.
3. To develop grammar and pronunciation of the English of the students.
4. To develop reading skills among students

Course Outcomes:

5. Understand basic grammar principles and be able to synthesize and transform sentences.
6. Show enhanced communication ability in English.
7. Understand the processes at work behind word formation in English thereby leading to better use of vocabulary in speech and written modes.
8. Understand the theory of communication and utilize the knowledge to interact in the language.
9. Interpret implicit and explicit meaning of a text while reading.

HSMC-CE101 ENGLISH I

Theory: 3Hrs/Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Listening: Listening to short audio texts and identify the topic and supporting ideas
Speaking: Self-introduction
Reading: Skimming and Scanning
Writing: Paragraph Structure and types
Grammar: Content words and function words, basic sentence structure, wh-questions
Vocabulary: Introduction to word formation
Poem*:* Once upon a time by Gabriel Okara

UNIT-II

Listening: Listening for comprehension and summarizing what is listened to.
Speaking: Group Discussions
Reading: Identifying the structure of the text, transition words and linkers
writing: Punctuation, use of phrases and clauses in sentences Grammar**:**
Articles, use of prepositions
Vocabulary: Root words from other languages
Short Story: A Horse and Two Goats by R.K. Narayan

UNIT III

Listening: Making predictions while listening to conversations
Speaking: Role plays – asking for and giving information/ directions
Reading: Intensive Reading / Detailed reading – recognizing, inferring and interpreting specific contexts; strategies to use text clues for reading comprehension
Writing: Principles of Good Writing, Introduction to Essay Writing
Grammar: Verb – tenses, subject-verb agreement
Vocabulary: Prefixes and Suffixes
Speech: Fringe Benefits of failure by JK Rowling

UNIT IV

Listening: Identifying key terms and concepts
Speaking: Formal oral presentations on topics from academic contexts – without PPT
Reading: Use of graphic elements in text, understanding patterns
Writing: Types of essays – paragraph organization, creating coherence, summarization/ précis writing
Grammar: Noun –pronoun agreement, subject – verb agreement
Vocabulary: Synonyms, antonyms
Letter: On saving Time by Seneca

REFERENCE BOOKS:

1. Krishna Swamy N., Modern English Grammar, MacMillan India Ltd.
2. Oxford Advanced Learner's Dictionary of Current English,8th ed. Oxford: Oxford UP,2010
3. Bailey, Stephen, Academic Writing: A handbook for international students, Routledge, 2014
4. Chase, Becky Tarver, Pathways: Listening, Speaking and Critical Thinking, Heinley ELT; 2nd Edition, 2018

Course Code	**BSC-CE102**				
Category	**Basic Science Course**				
Course Title	**Engineering Mathematics – I**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – I**
	3	**0**	**0**	**3**	
Prerequisites (if any)					

Course objectives:

1. The course is designed to equip the students with necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course with help the students from a necessary base to develop analytic and design concepts.

Course Outcomes:

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

3. Solve linear differential equations of first, second and higher order.
4. Calculate total derivative, Jocobian and Minima of function of two variables.
5. Find the extreme values of functions of two variables with/without constraints.
6. The fallouts of Rolle's Theorem that is fundamental to application of analysis to engineering problems.

BSC-CE102: ENGINEERING MATHEMATICS I

Theory: 3Hrs/Week **Credits: 3**

Int Marks: 25 **Ext Marks: 75**

UNIT-I

Differential Equations of first order and first degree

Linear differential equations and Bernoulli's differential equations, Exact equations, Equations reducible to Exact form (i.e Integrating factor $\frac{1}{Mx+Ny}$, $\frac{1}{Mx-Ny}$, $e^{\int f(x)dx}$, $e^{\int g(y)dy}$) ,Orthogonal Trajectories :

Cartesian form- Polar form.

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

UNIT-II

Linear Differential Equations of Higher Order

Non-Homogeneous equations of higher order with constant coefficients of R.H.S terms of the type $e^{ax}, \sin ax, \cos ax,$ polynomials in x , $e^{ax}V(x)$ and $xV(x)$; Method of Variation of parameters;

Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.

UNIT-III

Partial Differentiation

Introduction, Partial Differentiation, Homogeneous functions, Euler's Theorem; Total derivative, Chain Rule, Jacobian, Taylor's and Maclaurin's series expansion of function of two variables; Functional dependence & independence.

Applications: Maxima and minima of functions of two variables without constraints and Lagrange's Method with constraints.

UNIT-IV

Differential Calculus

Mean Value Theorems: Rolle's Theorem, Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorem, Taylor's and Maclaurin's Theorems with Reminders, indeterminate forms and L'Hospital's Rule; Form $\frac{0}{0}$, Form $\frac{\infty}{\infty}$,and Forms reducible to $0 \times \infty$, $\infty - \infty$ Maxima and Minima.

Text Books:

- Dr. B.S. Grewal, Higher Engineering Mathematics, Khanna publishers, 44th Edition.
- Dr. S.K. Vali, Dr. G Venkata Rao, Engineering Mathematics- I, Cengage Publications.

Reference Books:

a) NP Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint,2008.

b) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

c) Erwin Kreyszig, Advanced Engineering Mathematics,9th Edition, John Wiley&Sons,2006.

d) GB Thomas and RL Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.

Course Code	**BSC-CE103**				
Category	**Basic Science Course**				
Course Title	**Engineering Chemistry**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – I**
	3	**0**	**0**	**3**	
Prerequisites (if any)	**Knowledge of theoretical chemistry from +2 level**				

Course objectives:
The purpose of this course is to emphasize the relevance of fundamentals of chemical sciences in the field of engineering and to provide basic knowledge polymers, electrochemistry, batteries, corrosion and the role of water as an engineering material in domestic-industrial use.

- This course will also impart the knowledge of stereochemistry, understanding the chemical reaction pathway mechanisms.
- To enhance the thinking capabilities in the modern trends in Engineering & Technology.
- This is the basic source to design a new material as well as utilizing the available resources

Course Outcomes:
The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools.

- Usage of plastics not only in household appliances and also used as composites in automotive industries, bio plastic in surgeries. The students able to design FRP, Biodegradable polymers and Usage of conducting polymers as battery cells
- Creating awareness on problems created by corrosion of metals and its control methods.
- The students able to construct the Electro chemical cell and develop different types of battery cells like organic, inorganic, fuel cells.
- The course will enable the student to: The impurities present in raw water, problems associated with hard water in industries and how to avoid them are understood. The students would be aware of different types of sterilization methods to get the drinking water.
- The students would be able to design, develop advanced engineering materials like Nano materials.

BSC-CE103: ENGINEERING CHEMISTRY

Theory: 3 Hrs/Week **Credits: 3**

Int Marks: 25 **Ext Marks: 75**

UNIT-I

High Polymers: Definition -Types of Polymerization (Addition & Condensation) – Mechanisms-Stereo Polymers – Physical and Mechanical properties of polymers.

Plastics: Thermo plastics and Thermo setting plastics – Compounding and Fabrication of plastics – preparation and properties of Polyethylene, PVC and Bakelite.

Elastomers: Rubber, Natural Rubber and Elastomers – Vulcanization – Styrene butadiene rubber-Thiokol rubber – applications - Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT-II

Corrosion: Causes and effects of corrosion – theories of corrosion (dry/ chemical and wet / electrochemical corrosion) – Factors effecting corrosion – Corrosion control methods – Cathode protection – Sacrificial Anodic, Impressed current methods – Surface coating – Methods of application on metals (Hot dipping, Galvanizing, tinning, Cladding, Electroplating, Electro less plating)

Thermodynamics: Thermodynamic functions: energy, entropy and free energy. Free energy and emf. Electrode potentials - Nernst equation and applications. Galvanic cells - Electrochemical series- Primary, Secondary and Fuel Cells.

UNIT-III

Fuels: Coal – Proximate and ultimate analysis – Numerical problems based on analysis – Calorific value (Bomb Calorimeter) – HCV and LVC - Refining – Cracking – Petrol – Diesel – Octane and Cetane numbers - Knocking and anti-knocking, Synthetic Petrol - Fisher-Tropsh Method.

Types of Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings.

Introduction to Stereo chemistry: Structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity.

UNIT-IV

Water Technology: Determination of hardness of water by EDTA method – Potable water – Municipal water treatment - Sterilization and Disinfection – Boiler feed water – Boiler troubles – Priming and foaming, scale and sludge formation, corrosion, caustic embrittlement, turbine deposits. Desalination of brackish water -Reverse osmosis and Electro Dialysis.

Nanotechnology: Nanomaterials– Properties of nanomaterials –Engineering applications

Text Books:

1. Jain and Jain (Latest Edition), Engineering Chemistry, Dhanpat Rai Publishing company Ltd.,
2. N. Y. S. Murthy, “A Text Book of Engineering Chemistry” Maruthi Publications.
3. C. Parameswara Murthy Text Book of Engineering Chemistry, B. S. Publications.

Course Code	**ESC-CE104**				
Category	**Engineering Science Course**				
Course Title	**Fundamentals of Computer Science**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – I**
	3	**0**	**0**	**3**	
Prerequisites (if any)	**Knowledge of Computer basics**				

Course Objectives

- Explain the concepts of computers and classify based on type and generation
- Demonstrate the techniques of writing algorithms pseudo codes & schematic flow of logic in software development process.
- Teach about Operating Systems and its concepts.
- Teach about the purpose of networks and types of networks and media to connect the computers

Course Outcomes:

By the end of the course, the student will be

- Explain the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming
- Able to develop techniques of writing algorithms pseudo codes and logic
- Summarize the concepts of Operating Systems
- Recognize the Computer networks, types of networks and topologies

ESC-CE104: FUNDAMENTALS OF COMPUTER SCIENCE

Theory: 3Hrs/week **Credits: 3**

Int Marks: 25 **Ext Marks: 75**

UNIT I

Introduction to Computers: History of Computers, Central processing unit, Characteristics and limitations of computer, Types of Computers, Types of memories

Peripheral Devices: Input, Output and storage, Input devices, Output devices, Secondary devices, Communication between the CPU and Input/ Output devices.

Software, Types of software. Number Systems (Binary, Octal, Hexadecimal).

UNIT II

Problem Solving and Programming: Algorithm development, Flowcharts, Looping, some programming features, Pseudo code, structured programming concepts.

Programming Languages: Machine Language and assembly language, high-level and low level languages, Assemblers, Compilers and Interpreters.

UNIT-III

Operating System: Introduction to OS, Types of OS, Functions of OS, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Parallel, Distributed Systems, Real-Time Systems. MSDOS Internal Commands: chdir, cls, path, prompt, label, ver, vol, echo, set. External Commands: scandisk, discopy, diskcomp, format, backup, restore.

MS-Office (Word, Excel & PowerPoint): Introduction of Word Processing, MSWord: Creating, Editing, printing, page formatting, sorting and tables, Mail Merge. MS Excel: Introduction to spreadsheet, creating, formatting, printing, Graphs of worksheets. MS PowerPoint: Creating a presentation with effects.

UNIT IV

Computer Networks: Introduction to computer Networks, Network topologies -Bus topology, star topology, Ring topology, Mesh topology, Hybrid topology

Types of Networks: Local area Network, Wide Area Networks, Metropolitan Networks, Campus/ Corporate Area Network, Personal Area Network

Network Devices: Hub, Repeater, Switch, Bridge, Router, Gateway, Network interface Card

TEXT BOOKS:

1. An Introduction to Computer studies –Noel Kalicharan-Cambridge
2. Fundamentals of Computers –Reema Thareja-Oxford higher education
3. V. Rajaraman : Fundamental of Computers

REFERENCE BOOKS:

1. Peter Norton_s, Introductions to Computers, Tata McGraw Hill.
2. Computer Networks : Tannenbaum
3. Silberschatz, Galvin and Gagne, “Operating Systems Concepts”, Wiley

Course Code	**ESC-CE105**				
Category	**Engineering Science Course**				
Course Title	**Engineering Graphics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-I**
	1	**0**	**4**	**3**	
Prerequisites (if any)					

Course objectives:

1. To provide basic concepts in engineering drawing.
2. To impart knowledge about standard principles of orthographic projection of objects.
3. To draw sectional views and pictorial views of solids.

Course Outcomes:

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

4. Preparing working drawings to communicate the ideas and information.
5. Read, understand and interpret engineering drawings.

ESC-CE105: ENGINEERING GRAPHICS

Theory: 1L+4P Hrs/Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Introduction: Lines, Lettering and Dimensioning.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general and special methods, tangents & normal for the curves.

UNIT – II

Scales: Plain scales, diagonal scales and Vernier scales

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either two of the reference planes (HP,VP or PP)

UNIT – III

Projections of Straight Lines: Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

Projections of Planes: Regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT – IV

Projections of Solids: Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

Isometric Views: Introduction to Isometric projection, Isometric scale and Isometric view. Isometric views of simple planes. Isometric view of Prisms, Pyramids, cylinder and cone. Isometric view of an object when projections are given.

Text Book

1. Elementary Engineering Drawing by ND Bhatt, Charotar Publishing House.

Reference Books

i) Engineering Drawing by KL Narayana & P Kannaiah, Scitech Publishers.
ii) Engineering Drawing 2nd Edition– K Venugopal, V Prabhu Raja, New Age.

Course Code	**LC-CE106**				
Category	**Laboratory Course**				
Course Title	**English Communication Skills Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – I**
	0	**0**	**3**	**1.5**	
Prerequisites (if any)					

Laboratory Outcomes:
The English Communication Skills Lab is designed to assist the English theory curriculum. The students will learn:

- Learn and practice accurate pronunciation.
- Learn phonetic symbols through visual and audio aids.
- Use the lab as a platform for group discussions and mock interviews.

LC-CE106: ENGLISH COMMUNICATION SKILLS LAB

Lab: 3 Hrs/Week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

List of Experiments:

a) ***Letters and sounds of English:***

Letters and sounds, Speech organs

b) ***Interaction I:***

Greeting and Taking leave, introducing oneself to others

c) ***The sounds of English:***

Consonants, consonant clusters and Vowels

d) ***Pronouncing words:***

Silent letters, plural markers and past tense markers

e) ***Interaction II:***

Making request and response, ask for and give/ refuse permission

f) ***Stress and Intonation***

g) ***Interaction III:***

Invite, accept and declining invitations, Make complaints and respond to them, express sympathy

h) ***Presentation skills:***

Oral and PPT Presentations

i) ***Interaction IV:***

Apologize and respond, advice and suggest, telephone skills

j) ***Group Discussions***

List of Augmented Experiments:

+ Common errors in English
+ Listening Skills
+ Writing Skills
+ Reading Skills
+ Public Speaking
+ Interview Skills
+ Business Communication
+ Functional English
+ Preparation for GRE/ TOEFL
+ Preparation for IELTS/ CAT/ GMAT

*Student will have to choose and perform one of the Augmented Experiments

Course Code	**LC-CE107**				
Category	**Laboratory Course**				
Course Title	**Engineering Chemistry Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – I**
	0	**0**	**3**	**1.5**	
Prerequisites (if any)	**Knowledge of theoretical, experimental Physics from +2 level and Mathematics.**				

Laboratory Outcomes:

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

The students will learn to:

- Estimate rate constants of reactions from concentration of reactants/products as a function of time.
- Measure molecular/system properties such as surface tension, viscosity, Conductance of solutions, hardness of water, etc.
- Synthesize a small polymer molecule.

LC-CE107: ENGINEERING CHEMISTRY LAB

Theory: 3 Hrs/Week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

List of Experiments:

1. Determination of Sodium Hydroxide with HCl (Na2CO3 Primary Standard)
2. Determination of Fe(II)/Mohr's Salt by Permanganometry
3. Determination of Oxalic Acid by Permanganometry
4. Determination of Hardness of Water sample by EDTA method
5. Determination of Chromium (VI) by Mohr's Salt Solution
6. Conductometric Titration between Strong Acid and Strong Base
7. Conductometric Titration between Strong Acid and weak Base
8. Determination of Surface tension of Lubricants
9. Determination of Viscosity of Lubricants.
10. Preparation of Phenol Formaldehyde Resin

Reference Books:

1. Vogel's Quantitative Chemical Analysis – V – Edition – Longman
2. Experiments in Applied Chemistry (For Engineering Students) – Sinita Rattan – S. K. Kataria &Sons, New Delhi

Course Code	**LC-CE108**				
Category	**Laboratory Course**				
Course Title	**IT Workshop Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – I**
	0	**0**	**3**	**1.5**	
Prerequisites (if any)					

Course Objectives:

The learning objectives of this course are:

a. Explain the internal parts of a computer, peripherals, I/O ports, connecting cables
b. Demonstrate basic command line interface commands on MSDOS
c. Demonstrate Office Tools such as Word processors, Spreadsheets and Presentation tools

Course Outcomes:

By the end of the course, the student will be

1. Assemble and disassemble components of a PC
2. Installing an Operating System such as Windows on Computer hardware.
3. Internet Accessing and Working with Office tools

LC-CE108: IT WORKSHOP LAB

Lab: 3Hrs/week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

Computer Hardware:
Experiment 1: Identification of peripherals of a PC, Laptop, Server and Smart Phones

Experiment 2: Prepare a report containing the block diagram along with the configuration of each component and its functionality, Input/ Output devices, I/O ports and interfaces, main memory, cache memory and secondary storage technologies, digital storage basics, networking components and speeds.

Operating Systems:

Experiment 3: Operating System installation: Installing an Operating System such as Windows on Computer hardware.
Experiment 4: MSDOS Operating System commands:
Internal Commands: chdir, cls, path, prompt, label, ver, vol, echo, set.
Experiment 5: External Commands: scandisk, discopy, diskcomp, format, backup, restore

Introduction of Internet:

Experiment 6: Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails.

Office Tools:

Experiment 7: Office Tools: Demonstration and practice on Microsoft Word

Experiment 8: Demonstration and practice on Microsoft Excel.

Experiment 9: Demonstration and practice on Power Point

Experiment 10: Demonstration and practice on LaTeX and produce professional pdf documents.

TEXT BOOKS:
1. Computer Fundamentals, Anita Goel, Pearson Education, 2017
2. PC Hardware Trouble Shooting Made Easy, TMH

Course Code	**MC-CE109**				
Category	**Mandatory Course**				
Course Title	**Professional Ethics and Human Values**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – I**
	2	**0**	**0**	**0**	
Prerequisites (if any)	**Knowledge of moral values.**				

Course Objectives:

1. To lay a strong foundation in value based living
2. To create awareness in students towards realizing self and the effect of right understanding.
3. To inculcate in students, a sense of respect towards harnessing values of life and spirit of fulfilling social responsibilities.
4. To enable students to lead a practical life adding value to human relations.

Course outcomes:

1. The students start exploring themselves; get comfortable to each other and to the teacher and start finding the need and relevance for the course.
2. The students start finding out that technical education with study of human values can generate more problems than solutions.
3. They also start feeling that lack of understanding of human values is the root cause of all the problems and the sustained solution could emerge only through understanding of human values and value based living. Any solutions brought out through fear, temptation or dogma will not be sustainable
4. The students are able to see that their practice in living is not in harmony with their natural acceptance at most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony.
5. The students become aware of their activities of "I" and start finding their focus of attention at different moments.

MC-CE109: PROFESSIONAL ETHICS AND HUMAN VALUES

Theory: 2 Hrs/Week **Credits: 0**

Int Marks: 25 **Ext Marks: 75**

UNIT –I

Ethics and Human Values: Understanding Value Education: Need for Value Education, Content of Value Education; Process of Value Education. Self-Exploration as the Process for Value Education: Introspection; Process of Self Exploration. Ethics: Ethical Vision and Ethical Decisions Human Values: Classification of Values and Universality of Values.

UNIT – II

Engineering Ethics: Nature of Engineering Ethics, Profession and Professionalism, Professional Ethics Code of Ethics, Sample codes- IEEE, ASCE, ASME and CSI. Engineering as Social Experimentation; Engineering Professionals – Life Skills. Engineers as Managers, Consultants and Leaders; Role of Engineers in promoting ethical climate

UNIT – III

Safety Social Responsibility and Rights: Safety and Risk, Moral Responsibility of Engineers for safety. Case Studies: Bhopal Gas Tragedy, Chernobyl disaster, Fukushima Nuclear disaster. Professional Rights; Gender discrimination, Sexual harassment at work place. Balanced outlook on Law.

UNIT – IV

Global Issues: Globalization and MNCs, Environmental Ethics. Computer Ethics; Cybercrimes. Ethical Living; Concept of Harmony in Life

Text Books

1. Govindharajan, M., Natarajan, S. and Senthil Kumar, V.S., Engineering Ethics, Prentice Hall of India, (PHI) Delhi, 2004.
2. Subramaniam, R., Professional Ethics, Oxford University Press, New Delhi, 2013.

Reference Books

1. Charles D, Fleddermann, Engineering Ethics, Pearson/ PHI, New Jersey 2004. (Indian Reprint)
2. Guar, R.R., Sangal, R., and Bagaria, G.P. A Foundation course in Human Values and Professional Ethics, Excel Books, New Delhi, 2010.

Branch/Course: Civil Engineering Semester II (First year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
HSMC-CE201	English II	75	25	100	3	0	0	3
BSC-CE202	Engineering Mathematics II	75	25	100	3	0	0	3
BSC-CE203	Engineering Physics	75	25	100	3	0	0	3
ESC-CE204	Programming for Problem Solving	75	25	100	3	0	0	3
ESC-CE205	Engineering Mechanics	75	25	100	3	0	0	3
LC-CE206	Engineering Physics Lab	50	50	100	0	0	3	1.5
LC-CE207	Engineering Workshop Lab	50	50	100	0	0	3	1.5
LC-CE208	Programming for Problem Solving Lab	50	50	100	0	0	3	1.5
MC-CE209	Environmental Science	75	25	100	2	0	0	0
	Total Credits							**19.5**

Course Code	**HSMC-CE201**				
Category	**Humanities and Social Science including Management Courses**				
Course Title	**English II**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-II**
	3	**0**	**0**	**3**	
Prerequisites (if any)	**Basic knowledge of grammar**				

Course Description

The syllabus is intended to enhance the communication skills of the students in the mode of Activity Based Language Teaching and Learning. The syllabus is designed to impart not just grammatical knowledge but also provide a platform for developing communication skills through activity and interaction so as to enable the learner to become proficient in all aspects of English Language that is Listening, Speaking, Reading and Writing.

Course Objectives:

1. To encourage the all-round development of students by focusing on communication skills.
2. To develop and nurture the Language skills of the students through individual and group activities.
3. To develop an understanding of style in various texts.
4. To develop necessary writing skills among students

Course Outcomes:

1. Understand basic grammar principles and be able to synthesize and transform sentences.
2. Understand the processes at work behind word formation in English thereby leading to better use of vocabulary in speech and written modes.
3. Develop effective writing skills for academic and professional purposes.
4. Compose and present a specific topic using necessary aids.
5. Interpret implicit and explicit meaning of a text while reading.

HSMC-CE201 ENGLISH II

Theory: 3 Hrs/Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Listening: Listening for presentation strategies
Speaking: Formal presentation using PPT (without graphic elements)
Reading: Reading for presenting – strategies to select, compile and synthesize information for presentation.
Writing: Paraphrasing; using quotations in writing; using academic style; using suitable claims, examples and evidence for presenting views, opinion and position
Grammar: Phrasal Verbs, Phrasal prepositions
Vocabulary: Standard abbreviations
Novel: *Time Machine* by H.G. Wells

UNIT II

Listening: Following an argument/ logical flow of thought, understanding spoken discourse
Speaking: Group Discussion – agreeing or disagreeing using claims.
Reading: Understand formal and informal styles; differentiate between facts and opinions
Writing: Formal letter writing and e-mail writing**,** Writing one's CV/ Resume and cover letter
Grammar: Transformation of sentences
Vocabulary: Language for different functions – stating a point, expressing opinion, agreeing/ disagreeing
Drama: *Hayavadana (ACT II)* by Girish Karnad

UNIT III

Listening: Identifying views and opinions expressed by different speakers while listening to discussions
Speaking: Group discussion – reaching consensus in group work (academic context)
Reading: Identifying claims, evidences, views, opinions and stance/ position
Writing: Writing reports, articles, minutes of meetings, event reports
Grammar: Active and Passive voice – use of passive verbs in academic writing
Vocabulary: Language for different functions II – Interrupting, defying and clarifying
Autobiography: *Wings of Fire* by Abdul Kalam

UNIT IV

Listening: Understanding inferences; processing of information using specific context clues and processing of explicit and implicit information inferable from the text or from previous/ background knowledge.
Speaking: Formal team presentations using PPT
Reading: Reading for inferential comprehension and implicit information
Writing: Structure and contents of a project report; identifying sections in project report; understanding the purpose of each section; significance of references
Grammar: Direct and indirect speech, reporting verbs
Vocabulary: Indianisms
Essay: *Of Friendship* by Francis Bacon

REFERENCE BOOKS:

1. Krishna Swamy N., Modern English Grammar, MacMillan India Ltd.
2. Oxford Advanced Learner's Dictionary of Current English,8th ed. Oxford: Oxford UP,2010
3. Skillful Level 2 Reading and Writing Student's Book Pack (B1) Macmillan Educational
4. William Zinsser, On Writing Well, Harper Resource Book, 2001

Course Code	**BSC-CE202**				
Category	**Basic Science Course**				
Course Title	**Engineering Mathematics – II**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – II**
	3	**0**	**0**	**3**	
Prerequisites (if any)					

Course objectives:

The course is designed to equip the students with necessary mathematical skills and techniques that are essential for an engineering course.

The skills derived from the course with help the students from a necessary base to develop analytic and design concepts.

Course Outcomes:

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

1. Determine rank, Eigen values and Eigen vectors of a given matrix and solve simultaneous linear equations, numerically using various matrix methods.
2. Determine double integral over a region and triple integral over a volume.
3. To apply differential and integral calculus to notions of curvature and to improper integrals.
4. Evaluate the improper integrals using Beta and Gamma function. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
5. Calculate gradient of a scalar function, divergence and curl of a vector function.
6. Determine line, surface and volume integrals. Apply Greens, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

BSC-CE202: ENGINEERING MATHEMATICS II

Theory: 3 Hrs/Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Matrices

Rank of matrix–Echelon form–Normal form- Normal form of the type PAQ, Solution of linear system of equations - Gauss Elimination, Gauss – Jordan and Gauss – Seidel Methods, Consistency and Inconsistency of linear system of equations.

Eigen Values – Eigen Vectors and Quadratic forms: Eigen values and Eigen Vectors, Properties of Eigen values (without Proof), Cayley- Hamilton theorem (without proof), Diagonalization, Quadratic form, reduction of Quadratic forms to canonical form by Orthogonalisation and Diagonalisation, Nature of a quadratic form.

UNIT-II

Multiple Integrals

Evalution of Double integrals; change of order of integration- change of variables; Evalution of triple integrals -change of order of integration- change of variables.

Applications: Finding, areas and volumes.

UNIT-III

Special Functions

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals by using Beta and Gamma functions.

Applications: Evaluation of integrals by using Beta and Gamma functions.

UNIT-IV

Vector Calculus

Vector Differentiation:

Scalar and Vector Point Functions Gradient- Directional Derivatives, Divergence- Curl - Laplacian and second order operators -Vector identities.

Applications: Equation of continuity, potential surfaces.

Vector Integration:

Line integral – Work done – Surface and volume integrals, Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

Applications: Work done, Force.

Text Books:

1. Dr BS Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. Dr GVenkata Rao, Dr AV Papa Rao, Engineering Mathematics – III, Cengage Publications.

Reference Books:

1. Greenberg, Advanced Engineering Mathematics, 2nd edition, Pearson Education.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India
3. Peter O'Neil, Advanced Engineering Mathematics,7th edition, Cengage Learning.
4. Dass H.K., Rajnish Verma. Er, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.
5. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

Course Code	**BSC-CE203**				
Category	**Basic Science Course**				
Course Title	**Engineering Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – II**
	3	**0**	**0**	**3**	
Prerequisites (if any)	**Knowledge of theoretical, experimental Physics from +2 level and Mathematics.**				

Course Objectives:

1. To knowledge the designing of Electrical and Magnetic response of naturally abundant and artificially made materials.
2. To introduce basic concepts of Optical Interference, Diffraction and Polarization to design instruments with higher resolution and apply the concepts of coherent sources, its realization and utility in optical instrumentation, establishing a structure property relationship for materials.
3. Convening the physics knowledge base in establishing a structure property relationship for materials and to deeper understanding of vectorial concepts of EM fields paves the student to gear – up for a deeper understanding.
4. To Gain knowledge about structure of solids and crystal lattices of semiconductors. To compare the energies of the conduction bands and valence bands in metals, insulators, and semiconductors in understanding the physics of electronic transport as underlying mechanism for appliances.

Course Outcomes:

At the end of the course the student is able to

1. Understand applications of optics using basic fundamentals of Physics and formulate and solve the engineering problems on light and optics, Electromagnetism, wave mechanics
2. Explain the Modern Physics Concepts
3. Identify the appropriate solid state materials for engineering applications.
4. Familiarise with Basic Elements of Quantum Theory and knowledge about dual nature of wave function, Applications of Schrodinger wave equation, intrinsic and extrinsic semiconductors, Semiconductor conductivity
5. Correlate Advanced Topics in Physics with Engineering Applications and Get acquainted with Current Trends in Physics. Apply the knowledge of Solar PV cells for choice of materials in efficient alternate energy generation.

BSC-CE203: ENGINEERING PHYSICS

Theory: 3 Hrs/Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Electro Magnetism and Magnetic materials:

Introduction - Gauss and Stokes Theorems- Fundamental laws of Electromagnetism: Gauss law of Electrostatics-Gauss law of magneto statics- Faraday's law- Ampere's law, Modified form of Ampere's law- Maxwell's equations, Applications.

Magnetic Permeability- Magnetization- Origin of Magnetic moment- Classification of Magneticmaterials-Dia,Para,Ferro,AntiferroandFerrimagneticmaterials-Hysterisiscurve, Applications.

UNIT II

Coherent waves and Optics in Communication:

Interference: Introduction-Interference due to reflected light rays - Newton's rings expt.- Michelson's Interferometer. **Diffraction**: Fraunhofer Diffraction due to single slit- The Rayleigh criterion for resolution- Diffraction gratings and their resolving power. **Polarization and Geometric properties**: reflection and refraction, Brewster's angle, Malus law, Double refraction, Nicol Prism and Total internal reflection.

LASERS: Introduction- Coherence, Principle and working of Laser, Properties of laser beams, amplification of light by population inversion, different types of lasers: gas lasers (He-Ne), solid-state lasers (ruby), Applications of lasers in science, engineering and medicine. **Fiber Optics**: Introduction-Principle of Optical fibre, Acceptance angle, Acceptance cone, Numerical aperture, Block diagram of Optical fiber communication. Applications of optical fibres

UNIT III

Wave nature of particles and the Schrodinger's equation:

Quantum Mechanics: Introduction to Quantum Mechanics- Wave nature of particles, de-Broglie'shypothesis-Time-dependentandtime-independentScrodinger'swaveequationsfor wave function, Particle in a one- dimensional box.

Band Theory of Solids: Free electron theory of metals- Fermi level- Density of states- Bloch' theorem for particles in periodic potential, Kronig- Penney Model - origin of energy bands in solids.

UNITIV

Semiconductor physics:

Intrinsic and Extrinsic Semiconductors- Carrier concentrations- equation of conductivity- Drift and Diffusion currents, Hall Effect

P-N junction diode -Diode Current Equation, LED: device structure, materials, characteristics, and figures of merit. Photo diode, Solar cell.

Text books:

1. Physics by David Halliday and Robert Resnick– Part I & PartII Wiley Halliday & Resnick
2. A textbook of Engineering Physics by MN Avadhanulu & PG Kshirasagar (S. Chand)
3. Solid State Physics by A.J. Dekker (Mc Millan IndiaLtd).
4. Engineering Physics by M.R. Srinivasan (New age International Publishers)
5. Electronic Devices and Circuits-Millman Halkias

Course Code	**ESC-CE204**				
Category	**Engineering Science Course**				
Course Title	**Programming for Problem Solving**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-II**
	3	**0**	**0**	**3**	
Prerequisites (if any)					

Course Objectives:

The course is designed to provide complete knowledge of programming languages. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Course Outcomes:

1. After the completion of this course, the students will be able to develop applications.
2. Write programs that perform operations using derived data types.
3. Design, implement, test, debug, and document programs in C.
4. Program with pointers and arrays, perform pointer arithmetic, and use the pre-processor.
5. Program low-level input and output routines in C
6. Understand how to write and use functions, how the stack is used to implement function calls, and parameter passing options
7. Write programs that perform explicit memory management.
8. Understand and use the common data structures typically found in C programs —
    i. Namely arrays, strings, lists.

ESC-CE204: PROGRAMMING FOR PROBLEM SOLVING

Theory: 3 Hrs/Week **Credits: 3**

Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction to C: Basic Structure of C Program, Constants, Variables and data types, Operators and expressions, Arithmetic precedence and associativity, Type Conversions, Managing Input and Output Operations, Formatted Input and Output statements.

Decision making, Branching, looping: Decision making with if statement ,Simple if statement, The if....else statement, Nesting of if.....else statement, the else.....if ladder, switch statement ,the (?:) operator, the GOTO statement ., The while statement ,the do statement, the for statement , Jumps in Loops. Examples on Decision making, Branching, Looping.

UNIT-II

Arrays and strings: One, Two-dimensional Arrays, Character Arrays, Declaration and initialization of Strings, reading and writing of strings, String handling functions, Table of strings, Sparse matrices, Storage classes& C-preprocessors. Examples on Arrays & strings.

UNIT-III

Functions: Definition of Functions, Return Values and their types, Function Calls, Function Declaration, Category of Functions: No Arguments and no Return Values, Arguments but no Return values, Arguments with Return values, No Argument but Returns a Value, Functions that return Multiple Values. Nesting of functions, recursion, passing arrays to functions, passing strings to functions, The scope, visibility and lifetime of variables.

Pointers: Accessing the address of a variable, declaring pointer variables, initializing of pointer variables, accessing variables using pointers, chain of pointers, pointer expressions, pointers and arrays, pointers and character strings, array of pointers, pointers as function arguments, functions returning pointers, pointers to functions, pointers to structures, Memory allocations in C – program Applications

UNIT-IV

Structure and Unions: Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, arrays of structures, within structures, structures within structures, structures and functions and unions, size of structures and bit-fields –program applications.

File Handling: Defining and opening a file, closing a file, Input /Output operations on files, Error Handling during I/O operations, random access to files and command Line Arguments- program Applications.

Text Books:

1. C & Data Structures (A practical approach) - by GS Baluja and GK Baluja, Dhanapatrai & Co publishers

Course Code	**ESC-CE205**				
Category	**Engineering Science Course**				
Course Title	**Engineering Mechanics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-II**
	3	**0**	**0**	**3**	
Prerequisites (if any)	**-**				

Course Objectives:

The objectives of this course are to:

1. Explain the resolution of a system of forces, compute their resultant and solve problems using equations of equilibrium
2. Perform analysis of bodies lying on rough surfaces.
3. Locate the Centroid of a body and compute the area moment of inertia and mass moment of inertia of standard and composite sections
4. Explain kinetics and kinematics of particles, projectiles, curvilinear motion, Centroidal motion and plane motion of rigid bodies.
5. Explain the concepts of work-energy method and its applications to translation, rotation and plane motion.

Course Outcomes:

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

1. Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.
2. Solve problem of bodies subjected to friction.
3. Find the location of Centroid and calculate moment of inertia of a given section.
4. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.
5. Solve problems using work energy equations for translation, fixed axis rotation and plane motion.

ESC-CE205: ENGINEERING MECHANICS

Theory: 3 Hrs/Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Introduction to Engineering Mechanics:

Basic concepts: System of Forces, Coplanar Concurrent Forces, Components in Space – Resultant- Moment of Forces and its Application; Couples and Resultant of Force System.

Friction: Introduction, Limiting Friction and impending motion, Coulomb's Laws of Friction, Coefficient of Friction, Cone of Friction.

UNIT II

Equilibrium of System of Forces:

Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial Systems, Lami's Theorem, Graphical methods for the Equilibrium of Coplanar Forces, Converse of the Law of Triangle of Forces, and Converse of the Law of Polygon of Forces Condition of Equilibrium.

UNIT III

Centroid & Centre of Gravity: Centroid of simple figures from basic principle, Centroid of composite sections, Centre of Gravity of Simple body, Centre of Gravity of Composite bodies.

Area moment of inertia- Definition, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and Composite sections; Mass moment inertia of circular plate, Cylinder, Cone, Sphere.

UNIT IV

Kinematics & Kinetics: Rectilinear, Curvilinear Motions; Velocity and Acceleration, Motion of Rigid body and simple problems; D'Alembert's principle and its applications in plane motion and connected bodies

Work-Energy Method: Work energy principle and its application in plane motion of connected bodies.

Text Books:

1. Engineering Mechanics –S. Timoshenko & D.H. Young, Mc Graw Hill publications.
2. Engineering Mechanics – Dr RK Bansal, Laxmi Publications.

Reference Books:

1. Shanes and Rao (2006), Engineering Mechanics, Pearson Education.
2. Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education.
3. Reddy Vijay Kumar K. and K. Suresh Kumar (2010), Singer's Engineering Mechanics.
4. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.

Course Code	**LC-CE206**				
Category	**Laboratory Course**				
Course Title	**Engineering Physics Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – II**
	0	**0**	**3**	**1.5**	
Prerequisite(if any)	**Knowledge of theoretical, experimental Physics from +2 level and Mathematics.**				

Course Objectives:

1. To be highly skilled, interdisciplinary professionals who can identify and solve engineering problems from unusually broad physical perspectives.
2. To be able to use engineering and communications skills in other areas such as research, consulting, law, medicine, business, public policy, etc.
3. To engage vigorously in further studies in interdisciplinary graduate programs and a wide variety of other lifelong learning opportunities.
4. To pursue careers that in corporate ethical and professional responsibility, as well as good citizenship.

Course Outcomes:

At the end of the laboratory session the student acquire

1. An ability to apply knowledge of mathematics, science, and engineering.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. An ability to design a system, component, or process to meet desired needs within realistic constraints.
4. An ability to identify, formulate, and solve engineering problems.
5. An ability to communicate effectively.
6. A recognition of the need for, and an ability to engage in life-long learning.

LC-CE206: ENGINEERING PHYSICS LAB

Lab: 3 Hrs/Week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

List of Experiments

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying
4. Circular Coil.
5. Determination of Refractive Index of Ordinary ray μo and Extraordinary μe ray.
6. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
7. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
8. Photoelectric cell-Characteristics.
9. Laser- Diffraction.
10. Characteristics of a Zener Diode.
11. Energy band gap of a semiconductor.
12. Determination of Acceleration due to gravity – Compound Pendulum
13. Carey Foster's Bridge – Verification of laws of Resistance and Determination of Specific Resistance
14. Plank's Constant
15. Compound Pendulum

Reference Books:

1. Engineering Physics by M.N. Avadhanulu & P.G. Kshirasagar; S.Chand &Company Ltd.
2. Modern Engineering Physics by A.S. Vadudeva
3. University Physics by Young and Freedman
4. Nonconventional Energy by Ashok V. Desai

Course Code	**LC-CE207**				
Category	**Laboratory Course**				
Course Title	**Engineering Workshop Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-II**
	0	**0**	**3**	**1.5**	
Prerequisites (if any)	**-**				

Course Objectives:

1. To Study of different hand operated power tools, uses and their demonstration.
2. To gain a good basic working knowledge required for the production of various engineering products.
3. To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
4. To develop a right attitude, team working, precision and safety at work place.
5. It explains the construction, function, use and application of different working tools, equipment and machines.
6. To study commonly used carpentry joints.
7. To have practical exposure to various welding and joining processes.
8. Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Course Outcomes:

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

1. Study and practice on machine tools and their operations
2. Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, house wiring and welding.
3. Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiselling.

LC-CE207: ENGINEERING WORKSHOP LAB

Lab: 3 Hrs/Week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

List of Experiments:

1.Carpentry

a. T-Lap Joint
b. Cross Lap Joint
c. Dovetail Joint

2. Fitting

a. V Fit
b. Square Fit

3. House Wiring

a. Parallel / Series Connection of three bulbs
b. Stair Case wiring

4. Tin Smithy

a. Cylinder
b. Square Tray
c. Open Scoop

5. Welding Shop

a. Lap Joint
b. Butt Joint

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

Textbooks:

1. Elements of Workshop by Hajara Choudary-Vol-1

Course Code	**LC-CE208**				
Category	**Laboratory Course**				
Course Title	**Programming for Problem Solving Lab**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-II**
	0	**0**	**3**	**1.5**	
Prerequisites (if any)					

Course Objectives:

The course is designed to provide complete knowledge of programming languages. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future.

Course Outcomes:

After Completion of the course student should able to

1. Know concepts in problem solving
2. To do programming in C language
3. To write diversified solutions using C language
4. Understand functions in C++ programming

LC-CE208: PROGRAMMING FOR PROBLEM SOLVING LAB

Lab: 3 Hrs/Week **Credits: 1.5**

Int Marks: 50 **Ext Marks: 50**

LIST OF PROGRAMS:-

1. a) Write a program to find area of triangle.

   1. Write a program to find largest of three numbers.

2. a) Write a program to find swapping of two variables.

   1. Write a program to find arithmetic operations by using Switch statement.

   a) Write a program to find given number is Palindrome or not.
   2. Write a program to find given number is Armstrong or not.

3. a) Write a program to generate Pascal triangle.
   1. Write a program to generate pyramid triangle.

4. Write a program to generate the patterns using nested for loops:

1. i. *	2) 1	3) 1	4) A B C D
i. * *	1 2	2 3	A B C
ii. * * *	1 2 3	4 5 6	A B
iii. * * * *	1 2 3 4	7 8 9 10	A

5. a) Write a program to implement accessing array elements.
   1. Write a program to implement insert element into an array.
   2. Write a program to implement delete element from the array.

6. a) Write a program to find smallest and largest element in an array.
   1. Write a program to implement addition of two matrices.

7. Write a program to implement multiplication of two matrices.

8. Write a program that manipulates string handling functions.

9. a) Write a program to find swapping of two numbers using functions.
   1. Write a program to generate problems to function arguments.

10. Write a program to accessing the student information using arrays of structures.

11. Write a program to implement structure within a structure concept.

12. Write a program to implement file handling functions.

Course Code	**MC-CE209**				
Category	**Mandatory Course**				
Course Title	**Environmental Science**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester – II**
	2	**0**	**0**	**0**	
Prerequisites (if any)	**Basic knowledge from +2 level**				

Course Objectives:

1. Understand and define terminology commonly used in environmental science.
2. Briefly summarize and describe global, regional, and landscape scale environmental processes and Systems
3. Students will be able to list common and adverse human impacts on biotic communities, soil, water and air quality and suggest sustainable strategies to mitigate these impacts
4. Students will be able to read, critically evaluate presented information and data using scientific
5. Principles and concepts, synthesize popular media reports/articles discussing environmental issues and verbally discuss and defend their Introduction to Environmental Science, interdisciplinary perspective.

Course Outcomes:

1. Getting more knowledge on the concepts and methods from ecological and physical sciences and their application in environmental problem solving.
2. Master core concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
3. Appreciate the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
4. Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales.
5. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes

MC-CE209: ENVIRONMENTAL SCIENCE

Theory: 2 Hrs/Week **Credits: 0**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health. **Ecosystems:** Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II

Natural Resources: Natural resources and associated problems, **Forest resources:** Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people, **Water resources**: Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems. **Mineral resources:** Use and exploitation, environmental effects of extracting and using mineral resources. **Food resources:** World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity. **Energy resources:** Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. **Land resources:** Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Individual's role in conservation of natural resources.

UNIT – III

Biodiversity and its conservation:

Definition & classification: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, Biodiversity at national and local levels. India as a mega-diversity nation - Hot-sports of biodiversity, Threats to biodiversity: habitat loss, man- wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT – IV

Social Issues and the Environment: Urban problems related to energy - Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible Solutions. Public awareness.

Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism.

Text Books:

a) Environmental Studies by R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.
b) A Textbook of Environmental Studies by Shaashi Chawla, TMH, New Delhi.
c) Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai.

Reference Books:

a) Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
b) Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada.

Branch/Course: Civil Engineering Semester III (Second year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
BSC-CE301	Probability and Statistics	75	25	100	3	0	0	3
PCC-CE302	Strength of Materials	75	25	100	3	0	0	3
PCC-CE303	Surveying and Geometrics	75	25	100	3	0	0	3
PCC-CE304	Fluid Mechanics	75	25	100	3	0	0	3
PCC-CE305	Building Materials, Construction and Planning	75	25	100	3	0	0	3
LC-CE306	Strength of Materials Lab	50	50	100	0	0	3	1.5
LC-CE307	Surveying Field Work – I	50	50	100	0	0	3	1.5
LC-CE308	Building Planning and Design	50	50	100	0	0	3	1.5
MC-CE309	Essence of Indian Traditional Knowledge	75	25	100	2	0	0	0
MC-CE310	Skill Oriented Course - Soft Skills Lab	50	50	100	1	0	2	2
	Total Credits							**21.5**

Semester III (Second year) Curriculum

Course Code &Title: BSC-CE301: PROBABILITY AND STATISTICS **Semester & Year of study: III & 2021-2022** **Course Index: C301**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
The ideas of probability and random variables and various discrete and continuous Probability distributions and their properties.	
The basic ideas of statistics including measures of correlation and regression	
The statistical methods of studying data samples.	
The idea of curve fitting, correlation and regression.	
Course Outcomes: By the end of the course, the student will be	
Course Index	**Course Outcomes**
C301.1	Formulate and solve problems involving random variables and apply statistical method for analyzing experimental data
C301.2	Correlate the material of one unit to the material of other unit.
C301.3	Resolve the potential misconceptions and hazards in each topic of study.

BSC-CE301: PROBABILITY AND STATISTICS

Theory: 3Hrs/week
Credits: 3
Int Marks: 25 Ext Marks: 75

UNIT-I

Probability

Probability spaces, conditional probability, independent events, and Bayes' theorem.
Random variables: Discrete and continuous random variables, Expectation of Random Variables, Variance of random variables

UNIT-II

Probability distributions

Binomial, Poisson, evaluation of statistical parameters for these distributions, Poisson Approximation to the binomial distribution, Continuous random variables and their Properties, distribution functions and density functions, Normal, evaluation of statistical parameters for these distributions.

UNIT-III

Estimation & Tests of Hypotheses

Introduction, Statistical Inference, Classical Methods of Estimation, Estimating the Mean, Standard Error of a Point Estimate, Estimating the Variance, Estimating a Proportional of single mean, Difference between Two Means, between Two Proportions for two Samples Statistical Hypotheses: General Concepts, Testing a Statistical Hypothesis, Tests Concerning a Single Mean, Tests on Two Means, Test on a Single Proportion, Two Samples: Tests on Two Proportions.

UNIT-IV

Applied Statistics

Curve fitting by the method of least squares- fitting of straight lines, second degree Parabolas and more general curves, Correlation and regression - Rank correlation.

Text Books:

1. A Text Book of Probability and Statistics – Dr.ShanazBathul – Vgs.Book Links

Reference Books:

1. J.W Brown and R.V Churchil, Complex variables and Applications , 7th Ed.,MC-GrawHill,2004
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press
3. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics For Engineers & Scientists, 9th Ed. Pearson Publishers.

Course Code &Title: PCC-CE302 STRENGTH OF MATERIALS
Semester & Year of study: III & 2020-2021
Course Index: C302

Course Objectives: The learning objectives of this course are:

Course Objectives

The students completing this course are expected to understand the basic terms like stress, strain, poisons ratio… etc. and different stress induced in beams, thin cylinders, thick cylinders and columns. Further the student shall be able to understand the shear stresses in circular shafts.

Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C302.1	To gain a fundamental understanding of the concepts of stress and strain by analysis of solids and structures.
C302.2	To study engineering properties of materials, force-deformation, and stress-strain relationship.
C302.3	To learn fundamental principles of equilibrium, compatibility, and force-deformation relationship, and principle of superposition in linear solids and structures.
C302.4	To analyze determinate and indeterminate axial members, torsional members, and beams to determine axial forces, torque, shear forces, and bending moments.

PCC-CE302: STRENGTH OF MATERIALS

Theory: 3Hrs/week **Credits: 3**
Int. Marks: 25 **Ext. Marks: 75**

UNIT – I

SIMPLE STRESSES & STRAINS: Elasticity and plasticity – Types of stresses & strains– Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Bars of varying section – composite bars – Temperature stresses. Principal planes and principal stresses – Concept o f Mohr's circle limited to simple problems only.

UNIT – II

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: M/ I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T sections – Design of simple beam sections.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T sections.

UNIT – IV

THIN CYLINDERS: Thin cylindrical vessels subjected to internal pressure, longitudinal and circumferential stresses & strains, Volumetric strains – changes in dimensions of thin cylinders – Thin spherical shells.

THICKCYLINDERS – Stresses in a thick cylindrical shell, lame's equation – cylinders subjected to inside & outside pressures – stresses in compound thick cylinders.

TEXT BOOKS:

1. Strength of materials by R.K.Bansal, Laxmi Publications.
2. Strength of materials by Bhavikatti, Lakshmi publications.
3. Strength of materials by RK Rajput, S Chand publications.

REFERENCES: 1.Strength of Materials by S.Timshenko

Course Code &Title: PCC-CE303 SURVEYING AND GEOMETRICS'
Semester & Year of study: III & 2020-2021
Course Index: C303

Course Objectives: The learning objectives of this course are:

Course Objectives
Know the principle and methods of surveying.
Measure horizontal and vertical- distances and angles
Recording of observation accurately
Perform calculations based on the observation
Identification of source of errors and rectification methods
Apply surveying principles to determine areas and volumes and setting out curves

Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C303.1	Apply the knowledge to calculate angles, distances and levels
C303.2	Identify data collection methods and prepare field notes
C303.3	Understand the working principles of survey instruments, measurement errors and corrective measures
C303.4	Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies

PCC-CE303: SURVEYING AND GEOMETRICS'

Theory: 3Hrs/week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT - I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, surveying accessories. Introduction to Compass, leveling and Plane table surveying.

Measurement of Distances and Directions

Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip – W.C.B systems and Q.B. system of locating bearings.

UNIT - II

Leveling- Types of levels, temporary and permanent adjustments, methods of leveling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, methods of contour surveying.

Areas - Determination of areas consisting of irregular boundary and regular boundary.

Volumes -Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrically leveling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Introduction to Omitted measurements.

UNIT - IV

Curves: Types of curves and their necessity, elements of simple, compound, reverse curves.

Tachometric Surveying: Principles of Tachometry, stadia and tangential methods of Tacheometry,

Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total station- advantages and Applications. Introduction to Global Positioning System.

Photogrammetry Surveying:

Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

TEXT BOOKS:

1. Surveying (Vol – 1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi.
2. Chandra A M, "Plane Surveying and Higher Surveying", , New Delhi.
3. Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

REFERENCES:

1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
2. Surveying and Levelling by R. Subramanian,
3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi.

Course Code &Title: PCC-CE304 FLUID MECHANICS
Semester & Year of study: III & 2020-2021
Course Index: C304

Course Objectives: The learning objectives of this course are:

Course Objectives
To understand the properties of fluids and fluid statics.
To derive the equation of conservation of mass and its application.
To solve kinematic problems such as finding particle paths and streamlines.
To use important concepts of continuity equation, Bernoulli's equation and turbulence, and apply the same to problems.
To analyze laminar and turbulent flows.
To understand the various flow measuring devices.
To study in detail about boundary layers theory.

Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C304.1	Understand the various properties of fluids and their influence on fluid motion and analyse a variety of problems in fluid statics and dynamics.
C304.2	Calculate the forces that act on submerged planes and curves.
C304.3	Ability to analyse various types of fluid flows.
C304.4	Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
C304.5	Able Measure the quantities of fluid flowing in pipes, tanks and channels.

PCC-CE304: FLUID MECHANICS

Theory: 3Hrs/week **Credits: 3**
Int. Marks: 25 **Ext. Marks: 75**

UNIT I

Introduction: Dimensions and units – Physical properties of fluids - specific gravity, viscosity, surface tension, vapour pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law -atmospheric, gauge and vacuum pressures- measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

Hydrostatics: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure.

UNIT – II

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

Fluid Dynamics: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line - Momentum equation and its application – forces on pipe bend.

UNIT – III

Laminar Flow and Turbulent Flows: Reynold's experiment – Characteristics of Laminar & Turbulent flows, Shear and velocity distributions, Laws of Fluid friction, Hagen-Poiseulle Formula, Flow between parallel plates, Flow through long tubes, hydro dynamically smooth and rough flows.

Closed Conduit Flow: Darcy-Weisbach equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line, variation of friction factor with Reynold's number – Moody's Chart, Pipe network problems, Hazen-Williams formula, Hard-Cross Method,

UNIT – IV

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

Boundary Layer Theory: Boundary layer (BL) – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarman momentum integral equation, laminar and turbulent Boundary layers (no deviations)- BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

Text Books:

1. Modi P.N and Seth S.M.(2018), "Fluid mechanics", Standard book house, New Delhi
2. A text of Fluid mechanics and hydraulic machines, R.K.Bansal-Laxmi Publications (P) ltd., New Delhi

References:

1. K. Subramanyam, Fluid mechanics and hydraulic machines Mc graw hill education, IInd Edition
2. Fluid Mechanics and Machinery, C.S.P. Ojha, R. Berndtsson and P.N. Chandramouli, Oxford Higher Education.
3. Principle of fluid mechanics and fluid machines III edition, university press

Course Code &Title: PCC-CE305 BUILDING MATERIALS, CONSTRUCTION & PLANNING

Semester & Year of study: IV & 2020-2021

Course Index: C305

Course Objectives: The learning objectives of this course are:

Course Objectives
Initiating the student with the knowledge of basic building materials and their properties.
Imparting the knowledge of course pattern in masonry construction and flat roofs and techniques of forming foundation, columns, beams, walls, sloped and flat roofs.
The student is to be exposed to the various patterns of floors, walls, different types of paints and varnishes.
Imparting the students with the techniques of formwork and scaffolding.
The students should be exposed to classification of aggregates, moisture content of the aggregate

Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C305.1	The student should be able to identify different building materials and their importance in building construction.
C305.2	The student is expected to differentiate brick masonry, stone masonry construction and use of lime and cement in various constructions.
C305.3	The student should have learnt the importance of building components and finishing.
C305.4	The student is expected to know the classification of aggregates, sieve analysis and moisture

PCC-CE305: BUILDING MATERIALS, CONSTRUCTION & PLANNING

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Stones, Bricks and Tiles: Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials

UNIT II

Masonry: Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry. Cavity and partition walls. Wood: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiber Reinforced Plastics, Steel, Aluminium.

UNIT III

Lime and Cement: Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime.
Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties. Various field and laboratory tests for Cement. Various ingredients of cement concrete and their importance – various tests for concrete.

Building Components: Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre-fabricated roofs.

UNIT IV

Finishings and Aggregates: Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering. Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.
Aggregates - Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

Text Books:

1. Building Materials, S. S. Bhavikatti, Vices publications House private ltd.
2. Building Construction, S. S. Bhavikatti, Vices publications House private ltd.
3. Building Materials, B. C. Punmia, Laxmi Publications private ltd.
4. Building Construction, B.C. Punmia, Laxmi Publications (p)ltd.

References:

1. Building Materials, S. K. Duggal, New Age International Publications.
2. Building Materials, P. C. Verghese, PHI learning (P)ltd.
3. Building Materials, M. L. Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction, P. C. Verghese, PHI Learning (P)Ltd.
5. Building Materials, Construction and Planning, S. Mahaboob Basha, Anuradha Publications, Chennai.

Course Code &Title: LC-CE306 STRENGTH OF MATERIALS LAB
Semester & Year of study: III & 2020-2021
Course Index: C306

Course Objectives: The learning objectives of this course are:

Course Objectives
To impart practical knowledge on the evaluation of material properties through various destructive testing procedures and their hardness evaluation.

Course Outcomes: By the end of the course, the student will be

Course Index	Course Outcomes
C306.1	To understand evaluation of material properties through various testing procedures.

LC-CE306: STRENGTH OF MATERIALS LAB

Lab: 3Hrs/week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

Experiments

1. Tension test on Mild steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test (Charpy and Izod impact test)
9. Sheartest (on UTM)
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges
12. Continuous beam – deflection test.

List of Major Equipment:

1. Universal Testing Machine
2. Torsion testing machine
3. Brinnell's / Rock well's hardness testing machine
4. Setup for spring tests
5. Compression testing machine
6. Izod Impact machine
7. Shear testing machine
8. Beam setup for Maxwell's theorem verification.
9. Electrical Resistance gauges

Course Code &Title: LC-CE307 SURVEYING FIELD WORK-I
Semester & Year of study: III & 2020-2021
Course Index: C307

Course Objectives:
The learning objectives of this course are:

Course Objectives

The Lab sessions would include experiments on
Chain Surveying Chain Traverse Compass Surveying Compass surveying Traversion Plane Table Surveying – Radiation, intersection, Traverse, Resection Leveling

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C307.1	Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling apply the procedures involved in field work and to work as a surveying team plan a survey appropriately with the skill to understand the surroundings take accurate measurements, field booking, plotting and adjustment of errors can be understood plot traverses / sides of building and determine the location of points present on field on a piece of paper .

LC-CE307: SURVEYING FIELD WORK-I

Lab: 3Hrs/week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

List of Field Works:

1. Survey by chain survey of road profile with offsets in case of road widening.
2. Survey in an area by chain survey (Closed circuit)
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse)
5. Plane table survey; finding the area of a given boundary by the method of Radiation
6. Plane table survey; finding the area of a given boundary by the method of intersection.
7. Two Point Problem by the plane table survey.
8. Fly levelling : Height of the instrument method (differential levelling)
9. Fly levelling: rise and fall method.
10. Fly levelling: closed circuit/ open circuit.
11. Fly levelling; Longitudinal Section and Cross sections of a given road profile.
12. Fly levelling and Fly chaining (complete field work).

Note: Any 10 field work assignments must be completed.

Course Code &Title: LC-CE308 BUILDING PLANNING AND DESIGN **Semester & Year of study: IV & 2020-2021** **Course Index: C308**
Course Objectives: The learning objectives of this course are:
Course Objectives
Students will able to understand 2D drawings.
Course Outcomes: By the end of the course, the student will be
Draw the plan, section and elevation of a building.
Create, analyze and produce 2D drawings of buildings in AUTO CAD environment.
Detailing building plans in CAD environment.

LC-CE308: BUILDING PLANNING AND DESIGN

Lab : 3 Hrs/week **Credits : 1.5**
Int Marks : 50 **Ext Marks : 50**

1. Getting started with AutoCAD.

2. Understanding the basic commands.

3. Executing Electric drawings.

4. Executing Mechanical drawings.

5. Drawing a civil engineering structures with design notations.

6. Drawing various plans and elevations.

7. Executing a spiral stair case in 3D.

Reading: 1. AutoCAD Manual.

Course Code &Title: MC-CE309 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
Semester & Year of study: III & 2020-2021
Course Index: C309

Course Objectives:
The learning objectives of this course are:

Course Objectives
Learn about Introduction to traditional knowledge, Indigenous Knowledge
Learn about Protection of traditional knowledge, The Biological Diversity Act 2002 and Rules 2004, the protection of TK bill, 2016. Geographical indicators act 2003
Learn about Traditional knowledge and intellectual property, global legal FORA
Learn about Traditional knowledge in different sectors

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C309.1	Understand about Introduction to traditional knowledge, Indigenous Knowledge
C309.2	Understand about Protection of traditional knowledge, The Biological Diversity Act 2002 and Rules 2004, the protection of TK bill, 2016. Geographical indicators act 2003
C309.3	Understand about Traditional knowledge and intellectual property, global legal FOR A
C309.4	Understand about Traditional knowledge in different sectors

MC-CE309: ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Theory: 2 Hrs/week **Credits: 0**

Int Marks : 25 **Ext Marks : 75**

UNIT I

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge.

UNIT II

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indicators act 2003.

UNIT III

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

UNIT IV

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Text Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.

Reference Books:

1. Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
2. "Knowledge Traditions and Practices of India" Kapil Kapoor1, Michel Danino2

Branch/Course: Civil Engineering Semester IV (Second year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
ESC-CE401	Engineering Geology	75	25	100	3	0	0	3
PCC-CE402	Hydraulics and Hydraulic Machinery	75	25	100	3	0	0	3
PCC-CE403	Structural Analysis	75	25	100	3	0	0	3
PCC-CE404	Transportation Engineering	75	25	100	3	0	0	3
HSMC-CE405	Managerial Economics & Financial Analysis	75	25	100	3	0	0	3
LC-CE406	Transportation Engineering Lab	50	50	100	0	0	3	1.5
LC-CE407	Engineering Geology Lab	50	50	100	0	0	3	1.5
LC-CE408	Fluid Mechanics & Hydraulics Machinery Lab	50	50	100	0	0	3	1.5
MC-CE409	Skill Oriented Course - MOOCs (from same domain)	50	50	100	1	0	2	2
	Total Credits							**21.5**

Industrial Internship 2 Months (Mandatory) after second year (to be evaluated during V semester

Course Code &Title: ESC-CE401 ENGINEERING GEOLOGY
Semester & Year of study: IV & 2020-2021
Course Index: C401

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce the course: Engineering Geology to the Civil Engineering graduates.
To enable the students, understand what minerals and rocks are and their formation and identification.
To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures.
To enable the student, realise its importance and applications of Engineering Geology in Civil Engineering constructions.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C401.1	Identify and classify the geological minerals
C401.2	Measure the rock strengths of various rocks
C401.3	Classify and measure the earthquake prone areas to practice the hazard zonation
C401.4	Classify, monitor and measure the Landslides and subsidence
C401.5	Prepares, analyses and interpret the Engineering Geologic maps
C401.6	Analyses the ground conditions through geophysical surveys.

ESC-CE401: ENGINEERING GEOLOGY

Theory: 3Hrs/week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction: Branches of geology; Importance of geology in Civil engineering.

Physical Geology: Geological processes; Weathering, Erosion, and Civil engineering importance of weathering and Erosion:

Mineralogy: Definition of mineral; Importance of study of minerals; Significance of different physical properties in mineral identification; Study of physical properties, structure and chemical composition of following common rock forming and economic minerals: Feldspar, Quartz, Olivine, Augite, Hornblende, Muscovite, Biotite, Asbestos, Apatite , Kyanite, Garnet, Beryl, Talc, Calcite, Dolomite, Pyrite, Hematite, Magnetite, Galena, Graphite, Magnesite , Bauxite and Clay minerals:

UNIT- II

Petrology: Introduction; Definition of Rock, Civil engineering importance of petrology; Rock cycle, Geological Classification of rocks:

Igneous Rocks: Forms, Structures and textures of igneous rocks. Megascopic description and civil engineering uses of Granite, Basalt, Dolerite, Pegmatite and Charnockite:

Sedimentary Rocks: Formation; Structures and textures of sedimentary rocks. Megascopic description and civil engineering uses of Laterite, Conglomerate, Sand stone, Lime stone and Shale:

Metamorphic Rocks: Types of metamorphism; Structures and textures of metamorphic rocks. Megascopic Description and Civil engineering uses of Gneiss, Schist, Quartzite, Marble and Slate.

UNIT-III

Structural Geology: Introduction; Out crop, Strike and dip, Causes for development of secondary structures: Classification of Structures associated with rocks like Folds, Faults, Joints, Unconformities and their Civil engineering importance :

Earthquakes: Classification and causes; Intensity and magnitude and their measuring scales; Effects of earthquakes; Seismic belts; Civil Engineering considerations in seismic areas; Seismic zones of India:

Land Slides: Classification; Causes and effects; Preventive measures of landslides:

Ground water: Introduction: Classification of rocks based on porosity and permeability; Types of aquifers; Effects of groundwater over draft.

UNIT- IV

Geophysical Investigations: Geophysical methods of investigation – Over view; Electrical resistivity method; Seismic refraction method:

Dams: Types of Dams; Geological considerations for the selection of dam sites; Stages of investigation; Case histories of some dam failures; Geology of some Indian dam sites:

Tunnels: Purpose of Tunneling; Geological considerations for tunneling; Effects of tunneling; Over break; Geology of some tunnel sites:

Improvement in the Properties of Rock Mass: Materials and Methods of Grouting, Principles and mechanism of Rock bolting.

TEXT BOOK

1. A text Book of Engineering Geology by N. Chennakesavulu; Macmillan India Ltd., Delhi.

REFERENCE BOOKS

1. Principles of Engineering Geology- KVGK Gokhale - B. S. Publication

Course Code &Title: PCC-CE402 Hydraulics And Hydraulic Machinery
Semester & Year of study: IV & 2020-2021
Course Index: C402

Course Objectives:
The learning objectives of this course are:

Course Objectives
To study about uniform and non-uniform flows in open channel and also to learn about the characteristics of hydraulic jump.
To introduce dimensional analysis for fluid flow problems.
To understand the working principles of various types of hydraulic machines and Pumps.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C402.1	Solve uniform and non-uniform open channel flow problems.
C402.2	Apply the principals of dimensional analysis and similitude in hydraulic model testing.
C402.3	Understand the working principles of various hydraulic machineries and pumps.

PCC-CE402: HYDRAULICS AND HYDRAULIC MACHINERY

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

UNIFORM FLOW IN OPEN CHANNEL:
Types of channels –Types of flows - Velocity distribution – Energy and momentum correction factors – Chezy's, and Manning's formulae for uniform flow – Most Economical sections, Critical flow: Specific energy-critical depth – computation of critical depth

UNIT II

NON-UNIFORM FLOW IN OPEN CHANNELS: Steady Gradually Varied flow-Dynamic equation, Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method-Rapidly varied flow, hydraulic jump, energy dissipation.

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.

UNIT – IV

HYDRAULIC TURBINES – I: Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines. Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and efficiency. Governing of turbines-surge tanks-unit and specific quantities, selection of turbines, performance characteristics-geometric similarity-cavitation.

PUMPS :

CENTRAIFUGAL-PUMPS: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel and series - performance of pumps-characteristic curves- NPSH- Cavitation.

RECIPROCATING PUMPS: Introduction, classification, components, working, discharge, indicator diagram, work done and slip.

Text Books:

1. Open Channel flow, K. Subramanya, Tata McGraw HillPublishers
2. Fluid mechanics and hydraulic machines, Rajput, A.K(2018) , S Chand ,New Delhi
3. Fluid Mechanics, Modi and Seth, Standard book house.

References:

1.Fluid Flow in Pipes and Channels, G.L. Asawa, CBS
2.Fluid Mechanics and Machinery, C.S.P. OJHA, R. BERNDTSSON and P.N. Chandramouli, Oxford Higher Education.
3.Fluid Mechanics and Machinery, Md. Kaleem Khan, Oxford Higher Education.
Fluid mechanics and Hydraulic machines, R.K. Bansal, Laxmi publications ,New Delhi

Course Code &Title: PCC-CE403 STRUCTURAL ANALYSIS
Semester & Year of study: IV & 2020-2021
Course Index: C403

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.	
To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions	
The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.	
The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans rolling loads of Pratt and Warren trusses.	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C403.1	Distinguish between the determinate and indeterminate structures
C403.2	Identify the behaviour of structures due to the expected loads, including the moving loads, acting on the structure.
C403.3	Estimate the bending moment and shear forces in beams for different fixity conditions.
C403.4	Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.

PCC-CE403: STRUCTURAL ANALYSIS

Theory: 3Hrs/ Week **Credits 3**
Int Marks: 25 **Ext Marks :75**

UNIT – I

Displacements Of Determinate Structures Using Energy Methods
Maxwell's reciprocal theorem; Maxwell – Betti's generalized reciprocal theorem; castigliano's theorems; Application of Castigliano's theorem for calculating deflection of beams, frames and trusses; Virtual work method for deflections.

UNIT – II

Influence Lines For Statically Determinate Structures
Moving loads and influence lines; Influence lines for beam reactions; Influence lines for shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence lines for simple trusses.

UNIT – III

Propped Cantilevers
Analysis of propped cantilever by method of consistent deformations.

Fixed Beams
Fixed moments for a fixed beam of uniform section for different types of loading; Effect of sinking of support; Effect of rotation of a support; Bending moment diagram for fixed beams.

Clapeyron's Theorem Of Three Moments
Analysis of continuous beam by Clapeyron's theorem of three moments.

UNIT – IV

Strain Energy Method
Strain energy method for analysis of continuous beams and rigid joined plane frames up to second degree redundancy.

Redundant Pin Jointed Frames
Analysis of pin jointed frames (only single degree of redundancy); Forces in indeterminate pin jointed frames due to temperature variation and lack of fit; Composite structure.

Text Book
Analysis of Structures vols. 1 & 2 by Vazirani&Ratwani; Khanna Publishers; Delhi.

References

1. Structural Analysis by Devdas Menon, NarosaPublishinh House.
2. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications
3. Mechanics of structures – II by Junnarkar& Shah, Charotar Publishing House
4. Structural analysis by R. C. Hibbeler, Pearson Education.
5. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill.

Course Code &Title: PCC-CE404 TRANSPORTATION ENGINEERING
Semester & Year of study: IV & 2020-2021
Course Index: C404

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To impart different concepts in the field of Highway Engineering	
To acquire design principles of Highway Geometrics and Pavements	
To acquire design principles of Intersections	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C403.1	Plan highway network for a given area.
C403.2	Determine Highway alignment and design highway geometrics.
C403.3	Design Intersections and prepare traffic management plans
C403.4	Judge suitability of pavement materials and design flexible and rigid pavements

PCC-CE404: Transportation Engineering

Theory: 3Hrs/ Week **Credits 3**

Int Marks: 25 **Ext Marks :75**

UNIT I

Highway Planning and Alignment: Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans– First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II

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

UNIT – III

Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents- Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals –Webster Method –IRC Method.

UNIT – IV

Highway Materials: Subgrade soil: classification –Group Index – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen – Bituminous paving mixes: Requirements – Marshall Method of Mix Design.

Design Of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors

Flexible Pavements*:* Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.

Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses –Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

TEXT BOOKS:

1. Highway Engineering, Khanna S. K., Justo C. E. G and Veeraragavan A, Nem Chand Bros., Roorkee.
2. Traffic Engineering and Transportation Planning, Kadiyali L. R, Khanna Publishers, New Delhi.

REFERENCES:

1. Principles of Highway Engineering, Kadiyali L. R, Khanna Publishers, New Delhi
2. Principles of Transportation Engineering, Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi

Course Code &Title: HSMC-ME405 MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS
Semester & Year of study: IV & 2020-2021
Course Index: C405

Course Objectives:
The learning objectives of this course are:

Course Objectives

The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.

To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.

To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital budgeting proposals.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C405.1	The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
C405.2	One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
C405.3	The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making

HSMC-CE405: MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

Theory: 3Hrs/ Week **Credits 3**

Int Marks: 25 **Ext Marks :75**

UNIT I

Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics– Demand Analysis: Demand Determinants, Law of Demand and its exceptions. Elasticity of Demand: 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, judgmental approach to demand forecasting)

UNIT II

Theory of Production and Cost Analysis: Production Function – Isoquants and Isocosts, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production function, Laws of Returns, Internal and External Economies of Scale. Cost Analysis: Cost concepts, Opportunity cost, Fixed vs. Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break-even Analysis (BEA)-Determination of Break-Even Point (simple problems)- Managerial Significance and limitations of BEA.

UNIT III

Markets structures and Pricing Strategies: Market structures: Types of competition, Features of Perfect competition, Monopoly and Monopolistic Competition. Price-Output Determination in case of Perfect Competition and Monopoly. Objectives and Policies of Pricing- Methods of Pricing:

Business and 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 IV

Financial Accounting: Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts. 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, Interest Coverage ratio), and Profitability ratios (Gross Profit Ratio, Net Profit ratio, Operating Ratio, P/E Ratio and EPS).

TEXT BOOKS:

1. Aryasri: Managerial Economics and Financial Analysis, 2/e, TMH, 2005.
2. Varshney & Maheswari: Managerial Economics, Sultan Chand, 2007.

REFERENCES:

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education, New Delhi.
2. Suma Damodaran, Managerial Economics, Oxford University Press.
3. Lipsey & Chrystel, Economics, Oxford University Press.

Course Code &Title: LC-CE406 Transportation Engineering Lab
Semester & Year of study: IV & 2020-2021
Course Index: C406

Course Objectives:
The learning objectives of this course are:

Course Objectives
To test crushing value, impact resistance, specific gravity and water absorption, attrition value, abrasion value, flakiness index and elongation index for the given road aggregates.
To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
To test the stability for the given bituminous mix.
To carry out surveys for traffic volume, speed and parking.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C406.1	Test aggregates and judge the suitability of materials for the road construction.
C406.2	Test the given bitumen samples and judge their suitability for the road construction.
C406.3	Obtain the optimum bitumen content for Bituminous Concrete.
C406.4	Determine the traffic volume, speed and parking characteristics.
C406.5	Draw highway cross sections and intersections.

LC-CE406: Transportation Engineering Lab

Lab : 3 Hrs/week **Credits : 1.5**
Int Marks : 50 **Ext Marks : 50**

SYLLABUS: At least 10 experiments must be conducted

I. ROAD AGGREGATES:

1. Aggregate Crushing value Test
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption Test
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING

1. Earthwork calculations for road works
2. Drawing of road cross sections
3. Rotary intersection design

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Elongation and thickness gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches

TEXT BOOKS:

1. 'Highway Material Testing Manual' by S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.
2. Highway Material Testing & Quality Control by Rao Wiley India pvt. Ltd., Noida, New Delhi

REFERENCE BOOKS:

1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.

Course Code &Title: LC-CE407 ENGINEERING GEOLOGY LAB
Semester & Year of study: IV & 2020-2021
Course Index: C407

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To identify the Megascopic types of Ore minerals & Rock forming minerals	
To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.	
To identify the topography of the site & material selection.	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C407.1	Identify Megascopic minerals & their properties.
C407.2	Identify Megascopic rocks & their properties.
C407.3	Identify the site parameters such as contour, slope & aspect for topography.
C407.4	Know the occurrence of materials using the strike & dip problems.

LC-CE407: ENGINEERING GEOLOGY LAB

Lab: 3 Hrs /Week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

SYLLABUS:

LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of
a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
2. Megascopic description and identification of rocks.
a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, Geomorphology & Structural Geology.

COURSE CODETITLE:LC-CE408 FLUID MECHANICS & HYDRAULIC MACHINERY LAB
SEMESTER & YEAR OF STUDY: IV & 2020-2021
COURSE INDEX: C408

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C408.1	Calculate the coefficient of discharge for Orifice meter and Venturimeter.
C408.2	Predict performance characteristics of centrifugal pump and submergible pump.
C408.3	Predict performance characteristics of turbines

LC-CE408: FLUID MECHANICS & HYDRAULIC MACHINERY LAB

Lab: 3 Hrs/Week **Credits: 1.5**

Int Marks: 50 **Ext Marks: 50**

List of Experiments: At least 10 experiments must be conducted

1. Impact of jets on Vanes.
2. Performance Test on Pelt on Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

Branch/Course: Civil Engineering Semester V (Third year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PCC-CE501	Concrete Technology	75	25	100	3	0	0	3
PCC-CE502	Environmental Engineering	75	25	100	3	0	0	3
PCC-CE503	Geotechnical Engineering	75	25	100	3	0	0	3
OEC-CE504	**Open Elective – I** 1. Construction Management 2. Smart Cities 3. Green Technology	75	25	100	3	0	0	3
PEC-CE505	**Professional Elective – I** 1. Reinforced Soil Structures 2. Railways & Airport Engineering 3. Remote Sensing & GIS	75	25	100	0	0	3	3
LC-CE506	Concrete Technology Lab	50	50	100	0	0	3	1.5
LC-CE507	Environmental Engineering Lab	50	50	100	0	0	3	1.5
MC-CE508	Constitution of India	75	25	100	2	0	0	0
MC-CE509	Skill Oriented Course – Tutorial in Same Domain	50	50	100	1	0	2	2
Summer Internship 2 Months (Mandatory) after second year(to be evaluated during V semester					0	0	0	1.5
	Total Credits							**21.5**

COURSE CODE & TITLE: PCC-CE501 CONCRETE TECHNOLOGY
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C501

Course Objectives:
The learning objectives of this course are:

Course Objectives
Student will able to understand Chemical and Mineral Admixtures, Dimensional Stability and Durability, Durability of Concrete, Mix Design, Special Concretes**.**

Course Outcomes:
By the end of the course, the student will be

Course Index	**Course Outcomes**
C501.1	Assess the ingredients of concrete, admixtures and Test the fresh concrete properties.
C501.2	Familiar with properties of fresh and harden concrete.
C501.3	Prepare concrete mix design.
C501.4	Familiar with the basic concepts of special concrete and their production and applications. Understand the behaviour of concrete in various environments.

PCC-CE501: CONCRETE TECHNOLOGY

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Portland cement – Chemical composition, Hydration and structure of hydrate cement, Tests on various phys ical properties of cement, Different grades of cement, Admixtures, accelerators, Retarders & Air entertainers, Plasticizers and super plasticizers, Fly ash and silica fume, Classification of aggregate, Particle shape & texture, Bond, strength & other mechanical properties of aggregates, Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate, Bulking of sand –Deleterious substance in aggregate, Soundness of aggregate, Alkali aggregate reaction, Thermal properties, Sieve analysis fineness modulus Grading curves – Grading of fine & coarse Aggregates, Gap graded and well graded aggregate as per relevant IS code, Maximum aggregate size, Quality of mixing water

UNIT-II

Fresh Concrete: Steps in Manufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of 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, Ready mixed concrete, Shotcrete

Hardened Concrete: Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete: Compression tests – Tension tests – Factors affecting strength – Flexure tests –Splitting tests – Non- destructive testing methods – codal provisions for NDT.

UNIT-III

Elasticity, Creep & Shrinkage, Modulus of elasticity, Dynamic modulus of elasticity, Poisson's ratio, Creep of concrete, Factors influencing creep, Relation between creep & time, Nature of creep, Effects of creep – Shrinkage –types of shrinkage.

Mix Design: Review of Methods and Philosophies of IS, BS and ACI Methods, Mix Design for Special Purposes. Acceptance Criteria for Compressive Strength of Concrete

UNIT-IV

Special Concretes: Properties and Applications of High Strength – High Performance Concrete, Reactive Powder Concrete, Lightweight, Heavyweight and Mass Concrete; Fibre Reinforced Concrete; Self-compacting Concrete; Shotcrete.

Text Books:

1. Concrete Technology, M. S. Shetty. – S. Chand & Company

2. Concrete Technology, A. R. Santha Kumar, Oxford University Press, NewDelhi

References:

1. Properties of Concrete, A. M. Neville – PEARSON – 4thedition

2. Concrete Technology, M.L. Gambhir. – Tata Mc. Graw Hill Publishers, NewDelhi

COURSE CODE & TITLE: PCC-CE502 ENVIRONMENTAL ENGINEERING
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C502

Course Objectives:
The learning objectives of this course are:

Course Objectives
Outline planning and the design of water supply systems for a community/town
Provide knowledge of water quality requirement for domestic usage
Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
Selection of valves and fixture in water distribution systems
Impart knowledge on design of water distribution network

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C502.1	Plan and design the water and distribution networks and sewerage systems
C502.2	Identify the water source and select proper intake structure
C502.3	Select the appropriate appurtenances in the water supply
C502.4	Selection of suitable treatment flow for raw water treatments

PCC-CE502: ENVIRONMENTAL ENGINEERING

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting.

UNIT-II

Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.
Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, laying of pipelines

UNIT-III

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water
Treatment of Water: Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration

UNIT–IV

Disinfection: Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odours –Iron and manganese removal – Adsorption-fluoridation and deflouridation– aeration–Reverse Osmosis-Iron exchange– Ultra filtration
Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods -Components of Distribution system: valves such as sluice valves, air valves, scour valves and check valves, hydrants, and water meters–Laying and testing of pipe lines- selection of pipe materials, pipe joints

Text Books

1. Water Supply and Sanitary Engineering – G. S. Birdie and J. S. Birdie
2. Elements of Environmental Engineering – K. N. Duggal, S. Chand & Company Ltd., New Delhi,2012.

References

1. Water Supply Engineering – P. N. Modi.
2. Water Supply Engineering – B. C. Punmia
3. Environmental Engineering, D.Srinivasan, PHI Learning Private Limited, NewDelhi, 2011

COURSE CODE & TITLE: PCC-CE503 GEOTECHNICAL ENGINEERING
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C503

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives

The objective of this course is:

- To enable the student to find out the index properties of the soil and classify it.
- To impart the concept of seepage of water through soils and determine the seepage discharge.
- To enable the students to differentiate between compaction and consolidation of soils and to determine the magnitude and the rate of consolidation settlement.
- To enable the student to understand the concept of shear strength of soils, assessment of the shear parameters of sands and clays and the areas of their application.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C503.1	The student must know the definition of the various parameters related to soil mechanics and establish their inter-relationships.
C503.2	The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
C503.3	The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
C503.4	The student should be able to apply the above concepts in day-to-day Civil Engineering practice.

PCC-CE503: GEOTECHNICAL ENGINEERING

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density, Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.
Index Properties Of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT – II

Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law-permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses –quick sand condition – 2-D flow and Laplace's equation - Seepage through soils – Flow nets: Characteristics and Uses.

UNIT – III

Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method.
Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one- dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (cv) - Over consolidated and normally consolidated clays.

UNIT – IV

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress- Strain behavior of clays – Shear Strength determination- various drainage conditions

Text Books:
1. Basic and Applied Soil Mechanics, Gopal Ranjan and A. S. R. Rao, New Age International Publishers.
2. Soil Mechanics and Foundation Engineering, V. N. S. Murthy, CBS publishers

References:
1. Fundamentals of Soil Mechanics, D. W. Taylor, Wiley.
2. An introduction to Geotechnical Engineering, Holtz and Kovacs; Prentice Hall.
3. Fundamentals of Geotechnical Engineering, B M Das, Cengage Learning, New Delhi.

COURSE CODE & TITLE:OEC-CE504A CONSTRUCTION MANAGEMENT (ELECTIVE-I)
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C504A

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To introduce to the student, the concept of project management including network drawing and monitoring.	
To introduce various equipment's like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery, related to constriction.	
To introduce the importance of safety in construction projects	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504A.1	Appreciate the importance of construction planning.
C504A.2	Understand the functioning of various earths moving equipment.
C504A.3	Know the methods of production of aggregate products and concreting and usage of machinery required for the works.
C504A.4	Apply the gained knowledge to project management and construction techniques.

OEC-CE504A: CONSTRUCTION MANAGEMENT (ELECTIVE-I)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT- I

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical Path Method – Applications

UNIT -II

Project Evaluation and Review Technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources

UNIT- III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers

UNIT -IV

Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing. Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering

Text Books:

1. Construction Planning Equipment and Methods, Peurifoy and Schexnayder , Shapira, Tata Mcgraw hill
2. Construction Project Management Theory and Practice, Kumar NeerajJha (2011), Pearson.
3. Construction Technology, Subir K. Sarkar and Subhajit Saraswati, Oxford University press.
4. Project Planning and Control with PERT and CPM, B. C. Punamia and K K Khandelwal, Laxmi Publications Pvt Ltd. Hyderabad.

References:

1. Construction Project Management - An Integrated Approach, Peter Fewings , Taylor and Francis
2. Construction Management Emerging Trends and Technologies, Trefor Williams, Cengage learning.
3. Hand Book of Construction Management, P. K. Joy, Trinity Press Chennai, New Delhi.

COURSE CODE & TITLE: OEC-CE504B SMART CITIES (ELECTIVE-I)
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C504B

Course Objectives:
The learning objectives of this course are:

Course Objectives
Developing a sensitization.
Skills to understand.
Applicability of Inclusive urban planning.
Improving towards the sustainable development

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504B.1	Understand the importance.
C504B.2	Practicing the concept of inclusive urban planning.
C504B.3	Will have sensitization towards implementing contributions in sustainable development.

OEC-CE504B: SMART CITIES (ELECTIVE-I)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Understanding Inclusive Planning:
Definition and components; urban consultations; basic principles of urban consultation, process of urban consultations; urban strategic planning, good urban governance, subsidiarity, equity, efficiency, transparency and accountability, civic engagement and citizenship, security; valuing difference and working with diversity; liveable cities;

UNIT – II

Stakeholders profile and needs, access to shelter, services and livelihoods:
Urban Poor, Informal Sector, Gender, Children, Elderly, Disabled, Displaced people, etc.; Slums - dimensions, causative factors, determinants, location characteristics of settlements; Informal sector - growth, characteristics, functions, economic contributions, linkages with formal sector, impact on Urban Development

UNIT – III

Participatory Planning Process and Policies, Programmes and Legislation:
Methods, role of stakeholders (including civil society organizations), etc.; Related Acts, Five year plans, policies and programmes at various levels.

UNIT- IV

Smart Cities:
Innovation economy (Innovation in industries, clusters, districts of a city; Knowledge workforce: Education and employment; Creation of knowledge-intensive companies); Urban Infrastructure (Transport, Energy/ Utilities, protection of the environment and safety); Governance (Administration services to citizens, participatory and direct democracy, services to the citizen, quality of life)

Planning interventions:
Inclusive zoning, development and building regulations, Slum Improvement; drafting strategic urban development plans – objectives and key actors; planning framework for actions, process of drafting the plan, key considerations; urban design and decision-making; city transport for all; water supply and sanitation, urban disaster management, management through decentralization,

Text Books :

1. Jo Beall (1997); “A city for all: valuing differences and working with diversity”; Zed books limited, London
2. UN-Habitat; “Inclusive and sustainable urban planning: a guide for municipalities”; Volume 3: Urban Development Planning (2007); United Nations Human Settlements Programme
3. Arup Mitra; “Insights into inclusive growth, employment and wellbeing in India”; Springer (2013), New Delhi

Reference Books:

1. William J. V. Neill (2004); “Urban Planning and cultural identity”; Routledge, London
2. John S. Pipkin, Mark E. La Gory, Judith R. Balu (Editors); “Remaking the city: Social science perspective on urban design”; State University of New York Press, Albany
3. Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; Nataša Pichler-Milanovic; Evert Meijers (2007). "Smart cities – Ranking of European medium-sized cities". Smart Cities. Vienna: Centre of Regional Science
4. "Draft Concept Note on Smart City Scheme". Government of India - Ministry of Urban Development (http://indiansmartcities.in/downloads/CONCEPT_NOTE_3.12.2014_REVISED_AND_LATEST_pdf)

COURSE CODE & TITLE: OEC-CE504C GREEN TECHNOLOGY (ELECTIVE-I)
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C504C

Course Objectives:
The learning objectives of this course are:

Course Objectives
To present different concepts of green technologies.
To acquire principles of Energy efficient technologies.
To impart knowledge on the methods of reducing CO_2 levels in atmosphere.
To gain knowledge of the importance of life cycle assessment
To learn the importance of green fuels and its impact on environment.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C504C.1	Enlist different concepts of green technologies in a project.
C504C.2	Understand the principles of Energy efficient technologies
C504C.3	Estimate the carbon credits of various activities.
C504C.4	Identify the importance of life cycle assessment.
C504C.5	Recognize the benefits of green fuels with respect to sustainable development.

OEC-CE504C: GREEN TECHNOLOGY (ELECTIVE-I)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT- I

Introduction: Green Technology – definition- Importance – Historical evolution – advantages and disadvantages of green technologies-factors affecting green technologies- Role of Industry, Government and Institutions – Industrial Ecology – role of industrial ecology in green technology.

Cleaner Production (CP): Definition – Importance – Historical evolution - Principles of Cleaner Production–Benefits–Promotion – Barriers – Role of Industry,

UNIT- II

Cleaner Production Project Development and Implementation:

Government and Institutions – clean development mechanism, reuse, recovery, recycle, raw material substitution-Wealth from waste, case studies.

Overview of CP Assessment Steps and Skills, Process Flow Diagram, Material Balance, CP Option Generation – Technical and Environmental Feasibility analysis – Economic valuation of alternatives - Total Cost Analysis – CP Financing – Preparing a Program Plan – Measuring Progress- ISO 14000.

UNIT- III

Pollution Prevention and Cleaner Production Awareness Plan – Waste audit – Environmental Statement, carbon credit, carbon sequestration, carbon trading, Life Cycle Assessment - Elements of LCA – Life Cycle Costing – Eco Labelling.

UNIT -IV

Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possibilities of energy need and availability. Non-conventional energy sources: Solar Energy-solar energy conversion technologies and devices, their principles, working and application.

Green Fuels – Definition-benefits and challenges – comparison of green fuels with conventional fossil fuels with reference to environmental, economical and social impacts- public policies and market-driven initiatives.

Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in Indian context; tidal and geothermal energy.

TEXT BOOKS:

1. 'Pollution Prevention: Fundamentals and Practice' by Paul L Bishop (2000), McGraw Hill International.
2. 'Cleaner Production Audit' by Prasad Modak, C. Visvanathan and Mandar Parasnis (1995), Environmental System Reviews, No.38, Asian Institute of Technology, Bangkok
3. 'Non-conventional Energy Sources' by Rai G.D.

REFERENCES:

1. 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' by World Bank Group (1998), World Bank and UNEP, Washington D.C.
2. 'Handbook of Organic Waste Conversion' by Bewik M.W.M.
3. 'Energy, The Solar Hydrogen Alternative' by Bokris J.O.
4. 'Solar Energy' by Sukhatme S.P.
5. 'Waste Energy Utilization Technology' by Kiang Y. H.

COURSE CODE & TITLE: PEC-CE505A REINFORCED SOIL STRUCTURES (ELECTIVE-I)
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C505A

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To understand the history and mechanism of reinforced soil.	
To know the various types of geo-synthetics, their functions and applications.	
To enable the design of reinforced soil retaining structures.	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505A.1	Understand the history and mechanism of reinforced soil.
C505A.2	Become aware about situations where geo-synthetics can be used.
C505A.3	Know about various types of geo-synthetics and their functions.
C505A.4	Be able to do dimple design of reinforced soil retaining walls and reinforced earth beds.

PEC-CE505A: REINFORCED SOIL STRUCTURES (ELECTIVE-I)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Introduction -history –ancient and modern structures- Types of geo-synthetics, advantages, disadvantages. Functions of geo-synthetics and application areas where these functions are utilized such as in retaining walls, slopes, embankments, railway tracks, pavements etc. (general overview). Raw materials used for geo-synthetics, manufacturing process of woven and non-woven geotextiles, geo-membranes, geo-grids.

UNIT II

Properties of geo-synthetics. Creep and long term performance. Reinforced soil - Advantages and disadvantages. Fills, Types of facings, Factors affecting the performance and behaviour of reinforced soil. Mechanism of reinforcement action - Equivalent Confining Stress Concept, Pseudo Cohesion Concept, Concept of Expanding soil mass. – Simple problems.

UNIT III

Design and analysis of vertically faced reinforced soil retaining walls- External stability and Internal stability – Tie back wedge analysis and coherent gravity analysis with metallic strip and continuous geo-synthetic reinforcements. Assumptions, limitations and numerical problems. Construction methods of reinforced retaining walls. Geo-synthetics in pavements, function and benefits.

UNIT IV

Bearing capacity improvement using soil reinforcement – Binquet and Lee's analysis – Assumptions, failure mechanisms. Simple problems in bearing capacity. Geo-synthetics for short term stability of embankments on soft soils. Natural geotextiles, Advantages and disadvantages, functions, erosion control- types of erosion control products, installation methods.
Prefabricated vertical drains along with design principles and installation method Concept of Geo-cells, Gabion Walls, encased stone columns, geo-composites, soil nailing, geo-tubes, geo-bags (only basic concepts), Natural geotextiles using coir and jute with relative advantages and disadvantages, application areas, application in landfills.

Text Books:

1. Jones, C.J.F.P. (1985). Earth reinforcement and soil structures. Butterworth, London.
2. Rao, G.V. (2007). Geo-synthetics – An Introduction. Sai Master Geo-environmental Services Pvt. Ltd., Hyderabad

References:

1. Koerner, R.M. (1999). Designing with Geosynthetics, Prentice Hall, New Jersey, USA, 4th edition.
2. Rao, G.V., Kumar, S. J. and Raju, G.V.S.S. (Eds.). Earth Reinforcement – Design and Construction. Publication No. 314, Central Board of Irrigation and Power, New Delhi, 2012.
3. Sivakumar Babu, G.L. (2006). An introduction to Soil reinforcement and geosynthetics. United Press (India) Pvt. Ltd. COURSE

COURSE CODE & TITLE: PEC-CE505B RAILWAYS & AIRPORT ENGINEERING (ELECTIVE-I)
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C505B

Course Objectives:
The learning objectives of this course are:

Course Objectives
To know various components and their functions in a railway track
To acquire design principles of geometrics in a railway track.
To know various techniques for the effective movement of trains.
To acquire design principles of airport geometrics and pavements.
To know the planning, construction and maintenance of Docks and Harbours.

Course Outcomes:
By the end of the course, the student will able to

Course Index	Course Outcomes
C505B.1	Familiarise the various components and their functions in a railway track
C505B.2	Design geometrics in a railway track.
C505B.3	Design airport geometrics and airfield pavements.
C505B.4	Plan, construct and maintain Docks and Harbours.

PEC-CE505B: RAILWAYS & AIRPORT ENGINEERING (ELECTIVE-I)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Components of Railway Engineering: Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density – Rail joints.
Geometric Design of Railway Track: Alignment – Engineering Surveys - Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – safe speed on curves – Transition curve – Compound curves – Reverse curves – Extra clearance on curves – widening of gauge on curves – vertical curves – cheek rails on curves.

UNIT – II

Turnouts & Controllers: Track layouts – Switches – Design of Tongue Rails
– Crossings – Turnouts – Layout of Turnout – Double Turnout – Diamond crossing – Scissors crossing. Signal Objectives – Classification – Fixed signals – Stop signals – Signalling systems – Mechanical signalling system – Electrical signalling system – System for Controlling Train Movement – Interlocking – Modern signalling Installations.

B.AIRPORT ENGINEERING

UNIT – III

Airport Planning & Design: Airport Master plan – Airport site selection – Air craft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway design – Terminal area and Airportlayout
– Visual aids and Air trafficcontrol.

Runway Design: Various Design factors – Design methods for Flexible pavements – Design methods for Rigid pavements – LCN system of Pavement Design – Airfield Pavement Failures – Maintenance and Rehabilitation of Airfield pavements – Evaluation & Strengthening of Airfield pavements – Airport Drainage – Design of surface and subsurface drainage.

C.DOCKS & HARBOURS

UNIT-IV

Planning, Layout, Construction & Maintenance Of Docks & Harbors: Classification of ports – Requirement of a good port – classification of Harbors – Docks - Dry & wet docks – Transition sheds and workhouses – Layouts; Quays – construction of Quay walls – Wharves – Jetties – Tides - Tidal data and Analysis – Break waters – Dredging – Maintenance of Ports and Harbors – Navigational aids.

TEXT BOOKS:

1. Railway Engineering, Satish Chandra and Agarwal M. M., Oxford University Press, NewDelhi
2. Airport Engineering, Khanna & Arora - Nemchand Bros, NewDelhi.
3. Docks and Harbor Engineering, Bindra S.P. – Dhanpathi Rai & Sons, NewDelhi.

REFERENCES:

1. Railway Engineering, Saxena & Arora – Dhanpat Rai, New Delhi.
2. Transportation Engineering Planning Design, Wright P. H. &Ashfort N. J., John Wiley & Sons.
3. Transportation Engineering Volume II, C Venkatramaiah, 2016, Universities Press, Hyderabad.
4. Transportation Engineering, Railways, Airports, Docks &Harbours, Srinivasa Kumar R, University Press, Hyderabad
5. Airport Engineering Planning & Design, Subhash C. Saxena, 2016, CBS Publishers, NewDelhi.
6. Highway, Railway, Airport and Harbor Engineering, Subramanian K. P, Scitech
Publications (India) Pvt Limited,Chennai

COURSE CODE & TITLE: PEC-CE505C REMOTE SENSING & GIS
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C505C

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
Introduce the basic principles of Remote Sensing and GIS techniques.	
Learn various types of sensors and platforms.	
Learn concepts of visual and digital image analyses	
Understand the principles of spatial analysis	
Appreciate application of RS and GIS to Civil Engineering	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C505C.1	Be familiar with ground, air and satellite based sensor platforms.
C505C.2	Interpret the aerial photographs and satellite imageries
C505C.3	Create and input spatial data for GIS application
C505C.4	Apply RS and GIS concepts for application in Civil Engineering

PEC-CE505C: REMOTE SENSING & GIS (ELECTIVE-I)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces, Characteristics of remote sensing systems

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT, MODIS, ASTER,RISAT and CARTOSAT

UNIT – II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT – III

Spatial data analysis: Introduction overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing and buffer analysis.

UNIT – IV

RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications,

Applications of Hydrology, Water Resources and Disaster Management:

Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management and disaster management with case studies.

TEXT BOOKS:

1. Remote sensing and GIS, Bhatta B (2008) , Oxford University Press
2. Remote Sensing and Image Interpretation, Lillesand, T.M, R.W. Kiefer and J.WChipman (2013), Wiley India Pvt. Ltd., NewDelhi
3. Fundamentals of Geographic Information Systems, Demers, M.N, Wiley India Pvt.Ltd, 2013.

REFERENCES:

1. Fundamentals of Remote Sensing, George Joseph, Universities Press, 2013.
2. Concepts and Techniques of Geographical Information System, Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. Remote Sensing and its Applications, Narayan LRA, Universities Press, 2012.
4. Introduction to Geographic Information Systems, Kand Tsung Chang, McGraw Hill Higher Education, 2009.
5. Basics of Remote sensing & GIS, Kumar S, Laxmi Publications, New Delhi, 2005.
6. Principals of Geographical Information Systems, Burrough P A and R.A. McDonnell, Oxford University Press, 1998.
7. Remote Sensing, Schowenger, R. A (2006), Elsevier publishers.

COURSE CODE & TITLE: LC-CE506 CONCRETE TECHNOLOGY LAB
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C506

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To test the basic properties ingredients of concrete, fresh and hardened concrete properties.	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C506.1	Determine consistency and fineness of cement.
C506.2	Determine setting times of cement.
C506.3	Determine specific gravity and soundness of cement.
C506.4	Determine compressive strength of cement.
C506.5	Determine workability of cement concrete by compaction factor, slump and Vee – Bee tests
C506.6	Determine specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
C506.7	Determine the flakiness and elongation index of aggregates.
C506.8	Determine the bulking of sand.
C506.9	Understand the non-destructive testing procedures on concrete.

LC-CE506: CONCRETE TECHNOLOGY LAB

Lab: 3 Hrs/Week **Credits: 1.5**

Int Marks: 50 **Ext Marks: 50**

List of Experiments: At least 10 experiments must be conducted (at least one for each property)

1. Determination of normal Consistency and fineness of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of specific gravity and soundness of cement.
4. Determination of compressive strength of cement.
5. Determination of grading and fineness modulus of Coarse aggregate by sieve analysis.
6. Determination of specific gravity of coarse aggregate
7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
8. Determination of bulking of sand.
9. Determination of workability of concrete by compaction factor method.
10. Determination of workability of concrete by slump test
11. Determination of workability of concrete by Vee-bee test.
12. Determination of compressive strength of cement concrete and its young's modulus
13. Determination of split tensile strength of concrete.
14. Non-Destructive testing on concrete (for demonstration)

LIST OF EQMIPMENT

1. Standard Set of sieves for Coarse aggregate and fine aggregate.
2. Vicat's Apparatμs.
3. Specific gravity bottle.
4. Lechatlier's Apparatμs.
5. Compaction factor Test Apparatμs.
6. Vee-Bee Test Apparatμs.
7. Slμmp Cone Test Apparatμs.
8. Pyconometer.
9. Wire Basket.
10. Compression Testing Machine (CTM) – 100 (or) 200 Tonnes
11. Rebound Hammer

Minor Equipments:

Gauging Trowel, Tamping rod, Stop Watch, Curing Tank, Weigh balance

Graduated Glass Cylinders, Cube Moulds & Cylindrical moulds.

COURSE CODE & TITLE: LC-CE507 ENVIRONMENTAL ENGINEERING LAB
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C507

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
	Estimation of important characteristics of water and wastewater in the laboratory.
	Inference with reference to the significance of the characteristics of the water and wastewater.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C507.1	Estimate some important characteristics of water, wastewater and soil in the laboratory.
C507.2	Draw some conclusion and decide whether the water is suitable for Drinking/Construction / Agriculture/ Industry.
C507.3	Estimate Chloride, EC and Salinity of Soil and suggest their suitability for Construction/Agriculture.
C507.4	Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments.
C507.5	Demonstration of various instruments used in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry.

LC-CE507: ENVIRONMENTAL ENGINEERING LAB

Lab: 3 Hrs/Week **Credits: 1.5**

Int Marks: 50 **Ext Marks: 50**

List of Experiments: At least 10 experiments must be conducted

1. Determination of p^H and Conductivity of a given water and waste water sample
2. Measurement of Turbidity using Nephelometric Turbid meter and Determination of optimum coagulant dosage (Jar Test).
3. Determination of Hardness in a given water sample
4. Estimation of Acidity of a water sample
5. Estimation of Alkalinity of a waste and wastewater sample
6. Determination of Available Chlorine in a given Bleaching power sample and residual Chlorine in a water sample
7. Estimation of Fluorides in a given water sample.
8. Estimation Iron in a water sample
9. Estimation of Total Solids: Settleable Solids: Suspended solids, dissolved solids.
10. Measurement of D.O. by volumetric analysis
11. Estimate the B. O. D. of a waste water sample.
12. Estimate the C. O. D. of a waste water sample.
13. Estimation of Chlorides in a water sample
14. Estimation of Nitrates in a given sample

Text Books

1. Standard Methods for Analysis of Water and Waste Water –APHA
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi

Reference

1. Relevant ISCodes.
2. Chemistry for Environmental Engineering by Sawyer and Mc.Carty. **Text Books**

List of equipment

1. pH meter – 1Unit
2. Turbidity meter – 1Unit
3. Conductivity meter – 1Unit
4. Muffle furnace – 1Unit
5. Dissolved Oxygen meter – 1Unit
6. COD Reflux Apparatus – 1Unit (Have to be referred)
7. BOD incubator – 1Unit
8. Muffle Furnace
9. Water Still
10. GLASS WARE: Beakers 100 ml, Wash Bottles 500ml Capacity (Polylab), Burette clamps with Stands, Burettes, Volumetric Pipette -5ml capacity (Borosil), Test Tubes- small – large.\

COURSE CODE & TITLE: MC-CE508 CONSTITUTION OF INDIA
SEMESTER & YEAR OF STUDY: V & 2021-22
COURSE INDEX: C508

Course Objectives:
The learning objectives of this course are:

Course Index	Course Objectives
To Enable the student to understand the importance of constitution.	
To understand the structure of executive, legislature and judiciary.	
To understand philosophy of fundamental rights and duties.	
To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.	
To understand the central and state relation financial and administrative.	

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C508.1	Understand the concept of Indian constitution.
C508.2	Understand the structure of Indian government.
C508.3	Understand the structure of state government.
C508.4	Understand the local Administration.
C508.5	Know the role of Election Commission apply knowledge.

MC-CE508: CONSTITUTION OF INDIA

Lab: 2 Hrs/Week **Credits: 0**

Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions;
State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT-III

A.**Local Administration** - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

UNIT-IV

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

Text Books:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H. M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

References:

1. J.C. Johari, Indian Government and Politics Hans
2. J. Raj Indian Government and Politics
3. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

Branch/Course: Civil Engineering Semester VI (Third year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PCC-CE601	Design & Drawing of Reinforced Concrete Structures	75	25	100	3	0	0	3
PCC-CE602	Water Resources Engineering	75	25	100	3	0	0	3
PCC-CE603	Design & Drawing of Steel Structures	75	25	100	3	0	0	3
PEC-CE604	**Professional Elective-II** 1. Prestressed Concrete 2. Estimation, Specifications and Contracts 3. Foundation Engineering	75	25	100	3	0	0	3
OEC-CE605	**Open Elective-II** 1. Disaster Management 2. Elements of Coastal Engineering 3. Project Management	75	25	100	3	0	0	3
LC-CE606	Geotechnical Engineering Lab	50	50	100	0	0	3	1.5
LC-CE607	Computer Aided Engineering Drawing	50	50	100	0	0	3	1.5
LC-CE608	Surveying Field Work – II	50	50	100	0	0	3	1.5
MC-CE609	Skill Oriented Course – Tutorials in Same Domain	50	50	100	1	0	2	2
	Total Credits							**21.5**

Course Code & Title: PCC-CE601 DESIGN & DRAWING OF REINFORCED CONCRETE STRUCTURES
Semester & Year of study: VI & 2021-2022
Course Index: C601

Course Objectives:
The learning objectives of this course are:

Course Objectives
Familiarize Students with different design philosophies.
Equip student with design of members in flexural and shear.
Understand bond and torsion.
Familiarize with design of compression members under different types of loading.
Understand different types of footings and design.

Course Outcomes:
By the end of the course, the student will able to

Course Index	Course Outcomes
C601.1	Work on different types of design methods.
C601.2	Carryout analysis and design of flexural members and detailing.
C601.3	Design of slabs and stair case.
C601.4	Design different type of compression members and footings.

PCC-CE601: **Design & Drawing of Reinforced Concrete Structures**

Theory: 3Hrs/ Week **Credits: 3**

Int Marks: 25 **Ext Marks: 75**

UNIT –I

Design Methods

Working stress method: Elastic theory: design constants, modular ratio, neutral axis depth and moment of resistance - balanced, under-reinforced and over-reinforced sections. Design of singly and doubly reinforced beams, IS Code Provisions.

Limit State Design: Basic statistical principles –Characteristic strength – Characteristic loads - Partial load and safety factors – stress-strain curves for HYSD bars and MS bars. Assumptions – stress block parameters – Moment of Resistance.

All units i.e. from unit II to unit IV are to be taught in Limit State Design.

UNIT –II

Design for Flexure and Shear: Design of singly reinforced beams- effective depth- Moment of Resistance- Doubly reinforced and flanged (T) beams- Minimum depth - Minimum and Maximum Flexural Tension Reinforcement - Design of Flanged Sections (T & L)- Effective width of flange - Analysis and Design Problems.

Design for Shear and Torsion: Analysis and design of sections for shear and torsion – bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.

UNIT – III

Slabs and Serviceability: Classification of slabs, design of one - way slabs, one way continuous slab using IS Coefficients (Conventional) –Design of two - way slabs - simply supported slabs and slabs with various edge conditions using IS Coefficients. Design of Stair case

Limit state of serviceability: Deflection, cracking and IS code provisions for beams and slabs.

UNIT – IV

Design of Compression members: Effective length, Braced and un-braced columns – IS Code provisions, Design of short and long columns under axial loads, uniaxial bending and biaxial bending (Demonstration using SP 16)

Footings: Types of footings – Design of isolated footings – pedestal, square, rectangular and circular footings subjected to axial loads, uni-axial bending moment.

NOTE: All the designs to be taught in Limit State Method Following plates should be prepared by the students.

1. Reinforcement detailing of T-beams, L-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
3. Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

Text Books:

1. Limit State Design, A. K. Jain, Nem Chand Brothers
2. Reinforced Concrete Structures, N. Krishna Raju & R. N. Pranesh, New Age Publications.
3. Structural Design and Drawing by N. Krishna Raju, Universities Press

References:

1. R C C Design, B.C Punmia, A. K. Jain and A. K Jain. Lakshmi Publications
2. Reinforced Concrete Structures, S. Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
3. Design of Reinforced concrete Structures, N. Subrahmanian, Oxford University Press.
4. Limit state design of reinforced concrete structures by P C Varghese, PHI Learning pvt. Ltd.

IS Codes: (Permitted to use in examination hall)

IS -456-2000 Code of practice for Reinforced Concrete Structures,

IS – 875 (Parts 1 and 2) & SP16

Course Code & Title: PCC-CE602 WATER RESOURCES ENGINEERING
Semester & Year of study: VI & 2021-2022
Course Index: C602

Course Objectives:
The course is designed to

Course Objectives
Understand about hydrology, hydrological cycle and components of the hydrological cycle. And learn about types and forms, measurement, presentation, frequency of precipitation
Learn the factors affecting, measurement and different aspects of evaporation, Evapotranspiration and infiltration.
Learn the factors affecting, measurement and different aspects of Run-Off and Provide an overview and understanding of Unit Hydrograph theory and its analysis by using different methods.
Understand flood frequency analysis, design flood, flood routing
Understand about groundwater movement and well hydraulics and can determine aquifer parameters and yield of wells. Study Advanced topics in Hydrology such as Rainfall-Runoff Modeling, IUH –Clark and Nash Models and general hydrological models –chow and Kulandai swamy models

Course Outcomes:
At the end of the course the students are expected to

Course Index	Course Outcomes
C602.1	Define hydrological cycle and types, forms, measurement and representation of precipitation
C602.2	Appraise the processes of Evaporation, Evapotranspiration and infiltration losses.
C602.3	Develop unit hydrograph and synthetic Hydrograph.
C602.4	Estimate the maximum flood by using various flood routing methods
C602.5	Appraise the knowledge of groundwater movement and well hydraulics. Understand the advanced topics in hydrology.

PCC-CE602: WATER RESOURCES ENGINEERING

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.
Precipitation: Types and forms, measurement, raingauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.
Abstractions from Precipitation: Initial abstractions.
Evaporation: factors affecting, measurement, reduction
Evapotranspiration: factors affecting, measurement, control
Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT-II

Runoff: Catchment characteristics**,** Factors affecting runoff, components, computation- empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.
Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT-III

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.
Flood Routing: Hydrologic routing, channel and reservoir routing-Muskingum and Puls methods of routing.

UNIT-IV

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.
Advanced Topics in Hydrology: Rainfall-runoff Modelling, instantaneous unit hydrograph (IUH) - conceptual models - Clark and Nash models, general hydrological models- Chow - Kulandaiswamy model.

Text Books:
1. Engineering Hydrology, Jayarami Reddy, P., Laxmi Publications Pvt. Ltd., (2013), NewDelhi
2. Irrigation and Water Power Engineering, B. C. Punmia, Pande B. B. Lal, Ashok Kumar Jain and Arun Kumar Jain, Lakshmi Publications (P)Ltd.

References:
1. Engineering Hydrology Subramanya, K, Tata McGraw-Hill Education PvtLtd, (2013),New Delhi.
2. Irrigation Engineering and Hydraulic Structure, Santosh Kumar Garg, Khanna Publishers.
3. Applied hydrology, Chow V. T., D. R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt Ltd, (2011), NewDelhi.
4. Water Resources Engineering, Mays L.W, Wiley India Pvt. Ltd,(2013).

Course Code & Title: PCC-CE603 DESIGN & DRAWING OF STEEL STRUCTURES
Semester & Year of study: VI & 2021-2022
Course Index: C603

Course Objectives:
The learning objectives of this course are:

Course Objectives
Familiarize Students with different types of Connections and relevant IS codes.
Equip student with concepts of design of flexural members.
Understand Design of tension and compression members in trusses.
Familiarize students with types of Columns, column bases and their Design.
Familiarize students with Plate girder and Gantry Girder and their Design.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C603.1	Work with relevant IS codes.
C603.2	Carryout analysis and design of flexural members and detailing.
C603.3	Design compression members of different types with connection detailing.
C603.4	Design Plate Girder and Gantry Girder with connection detailing.
C603.5	Produce the drawings pertaining to different components of steel structures.

PCC-CE603: DESIGN & DRAWING OF STEEL STRUCTURES

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Types of structural steel – Mechanical properties of steel – Concepts of plasticity – yield strength - Loads and Stresses – Local buckling behavior of steel. Concepts of limit State Design – Different Limit States – Load combinations for different Limit states - Design Strengths- deflection limits – serviceability – stability check.;
Connections: Design of Connections– Different types of connections – Bolted connections –Design strength – efficiency of joint
Welded connections: Advantages and disadvantages - Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to in-plane moment acting in the plane and at right angles to the plane of thejoints.

All units i.e. from unit II to unit-IV
to be taught in Limit State Design and in Welded connections only.

UNIT – II

*Plastic Analysis;*Plastic moment – Plastic section modulus - Plastic analysis of continuous beams
Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT –III

Compression and Tension Members: Effective length - Slenderness ratio – permissible stresses. Design of compression members, and struts. Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.
Roof Truss Element: Different types of trusses – Design loads – Load combinations as per IS Codes – Design of simple roof trusses involving design of purlins, rafters and joints – tubular trusses.

UNIT – IV

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected moment.
Design of Plate Girder: Design consideration – I S Code recommendations Design of plate girder - Welded – Curtailment of flange plates, stiffeners – splicing and connections.
Design of Gantry Girder: impact factors - longitudinal forces, Design of Gantry girders.

NOTE: Welding connections should be used in Units II – VI. The students should prepare the following plates.
Plate 1 Detailing of simple beams,
Plate 2 Detailing of Compound beams including curtailment of flange plates. Plate 3 Detailing of Column including lacing and battens,
Plate 4 Detailing of Column bases – slab base and gusseted base,
Plate 5 Detailing of steel roof trusses including joint details and
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

TEXT BOOKS
1. Steel Structures Design and Practice, N. Subramanian, Oxford University Press.
2. Limit State Design of steel structures, S. K. Duggal, Tata Mc Graw Hill, New Delhi

REFERENCES

1. Structural Design in Steel, Sarwar Alam Raz, New Age International Publishers, New Delhi
2. Structural Design and Drawing by N. Krishna Raju, Universities Press
3. Design of Steel Structures by K. S.S ai Ram, Person India Education Services

IS Codes: These codes and steel tables are permitted to use in the examinations.

1. IS 800:2007, Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2. IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian Standards.
3. Steel Tables.

Course Code & Title: PEC-CE604A PRESTRESSED CONCRETE
Semester & Year of study: VI & 2021-2022
Course Index: C604A

Course Objectives:
The learning objectives of this course are:

Course Objectives
Familiarize Students with concepts of Prestressing.
Equip student with different Prestressing systems and devices.
Understand losses of prestress including short and long term losses.
Familiarize students with analysis and design of prestressed concrete members under Flexure, shear and torsion.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C604A.1	Understand different methods of prestressing.
C604A.2	Estimate effective prestress including short and long term losses.
C604A.3	Analyze and design prestressed concrete beams under flexure and shear.
C604A.4	Understand the relevant IS Code provisions for prestressed concrete.

PEC-CE604A: PRESTRESSED CONCRETE (Professional Elective-II)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction &Methods and Systems of prestressing Historic development- General principles of prestressing Pretensioning and post tensioning- Advantages and limitations of Prestressed concrete- General principles of PSC- Classification and types of prestressing- Materials- high strength concrete and high tensile steel their characteristics. Pretensioning and Post tensioning methods and systems of prestressing like Hoyer system, Magnel Blaton system, Freyssinet system and Gifford- Udall System- Lee McCall system.

UNIT-II

Flexure: Analysis of sections for flexure- beams prestressed with straight, concentric, eccentric, bent and parabolic tendons, Line of Thrust – Pressure Line, Load Balancing Concept.
Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members -Elastic shortening, shrinkage, and creep of concrete; Relaxation of steel, slip in anchorage, and frictional losses- Total loss and allowable loss of prestress for design

UNIT-III

Design for Flexure - Types of failure – Code procedures - Design for flexure using IS Code (IS 1343 - 2012) Cable profile in two span continuous members.
Deflections: Importance of control of deflections- Factors influencing deflections – Short term deflections of uncracked beams- prediction of long time deflections- IS code requirements.

UNIT-IV

Composite Beams: Different Types- Propped and Unpropped- stress distribution- Differential shrinkage- Analysis of composite beams- Deflection of determinate composite beam.
Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcement - Code Provisions- Design for Torsion, Design for Combined bending, shear and torsion, Control of deflections- Factors influencing Deflection- Prediction of short term and long termdeflections.

Text Books:-

1. Prestressed Concrete by N. Krishna Raju, 6e Tata Mc Graw Hill Book co.
2. Prestressed Concrete by K. U.Muthu PHI Learning Pvt. Ltd.

References:

1. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
2. Prestressed Concrete by N. Rajagopalan Narosa Publishing House.
3. Prestressed concrete by S. Ramamrutham Dhanpat Rai & Sons, Delhi.

IS Codes: **These codes are permitted to use in the examinations.**

1. IS 1343:2012

Course Code &Title: PEC-CE604B ESTIMATION, SPECIFICATIONS AND CONTRACTS (Professional Elective-II)
Semester & Year of study: VI & 2021-2022
Course Index: C604B

Course Objectives:
The learning objectives of this course are:

Course Objectives
Understand the quantity calculations of different components of the buildings.
Understand the rate analysis of different quantities of the buildings components.
Learn the estimation of earth work for various structures.
Learn various specifications and components of the buildings.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C604B.1	The student should be able to determine the quantities of different components of buildings.
C604B.2	The student should be in a position to find the cost of various building components.
C604B.3	The student should be able to estimate the earth work for various structure
C604B.4	The student should be capable of finalizing the value of structures.

PEC-CE604B: ESTIMATION, SPECIFICATIONS AND CONTRACTS

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

UNIT – II

Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT-III

Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.

UNIT – IV

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation of buildings Standard specifications for different items of building construction.

Detailed Estimation of Buildings using individual wall and center line method

Text Books:

1. Estimating and Costing, B.N. Dutta, UBS publishers,2000.
2. Civil Engineering Contracts and Estimates, B. S. Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. Construction Planning and Technology, Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. Estimating and Costing, G. S. Birdie.

References Books:

1. Standard Schedule of rates and standard data book, Public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works –B.I.S.
3. Estimation, Costing and Specifications, M. Chakraborthi; Laxmi publications.
4. National Building Code

Course Code & Title: PEC-CE604C FOUNDATION ENGINEERING
(Professional Elective-II)
Semester & Year of study: VI & 2021-2022
Course Index: C604C

Course Objectives:
The learning objectives of this course are:

Course Objectives
To enable the student to appreciate how Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.
To teach the student special methods of computation of settlements and the corrections to be applied to settlements.
To enable the student to understand the advanced concepts of design of pile foundations.
To teach the student the problems posed by expansive soils and the foundation practices appropriate to expansive soils.
To enable the student to learn the difference between isolated and combined footings, the determination of bearing capacity of mats and proportioning of footings.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C604C.1	Compute the safe bearing capacity of footings subjected to vertical and inclined loads.
C604C.2	Understand the advanced methods of settlement computations and proportion Foundation footings..
C604C.3	Appreciate the methods of computing the pull-out capacity and negative skin friction of piles and compute the settlements of pile groups in clays.
C604C.4	Appreciate the problems posed by expansive soils and the different foundation Practices devised.
C604C.5	Appreciate the difference between isolated footings and combined footings and mat foundations.

PEC-CE604C: FOUNDATION ENGINEERING

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Bearing capacity of Foundations using general bearing capacity equation – Meyerhof's, Brinch Hansen's and Vesic's methods- Bearing capacity of Layered Soils: Strong layer over weak layer, Weak layer on strong layer – Bearing capacity of foundations on a top of slope – Bearing capacity of foundations at the edge of the slope.

Settlement analysis: Immediate settlement of footings resting on granular soils – Schmertmann & Hartman method – De Beer and Martens method - Immediate settlement in clays – Janbu's method – correction for consolidation settlement using Skempton and Bjerrum's method – Correction for construction period

UNIT-II

Mat foundations – Purpose and types of isolated and combined footings – Mats/Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils – compensated rafts.

UNIT-III

Earth-retaining structures – cantilever sheet piles – anchored bulkheads – fixed and free earth support methods – design of anchors – braced excavations – function of different components – forces in ties – stability against bottom heave.
Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils – Davisson and Gill method – Broms' analysis.

UNIT-IV

Foundations in expansive soils – definitions of swell potential and swelling pressure – determination of free swell index – factors affecting swell potential and swelling pressure – foundation practices – sand cushion method – CNS layer - drilled piers and belled piers – under-reamed piles – moisture control methods.

Text Books:
1. Principles of Foundation Engineering, BM Das, CENTAG Learning
2. Soil Mechanics and Foundation Engineering, VNS Murthy, CBSPublishers

Reference:
1. Foundation Analysis and Design, J.E. Bowles, JohnWiley

Course Code & Title: OEC-CE605A DISASTERMANAGEMENT

Semester & Year of study: VI & 2021-2022
Course Index: C605A

Course Objectives:
The learning objectives of this course are:

Course Objectives
Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ
Understand the 'relief system' and the 'disaster victim.'
Describe the three planning strategies useful in mitigation.
Identify the regulatory controls used in hazard management
Describe public awareness and economic incentive possibilities.
Understand the tools of post-disaster management.

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

Course Index	Course Outcomes
C605A.1	Affirm the usefulness of integrating management principles in disaster mitigation work
C605A.2	Distinguish between the different approaches needed to manage pre- during and post- disaster periods
C605A.3	Explain the process of risk management
C605A.4	Relate to risk transfer

OEC-CE605A: DISASTERMANAGEMENT
(OPEN Elective-II)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Natural Hazards And Disaster Management: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT-II

Man Made Disaster And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism - threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

Risk and Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

UNIT-III

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges-mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

UNIT-IV

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

Multi-sectional Issues: Impact of disaster on poverty and deprivation- Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction.- Institutional capacity in disaster management -The Red cross and red crescent movement.- Corporate sector and disaster risk reduction-A community focused approach.

TEXT BOOKS

1. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy (2009), Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCE BOOKS

1. 'Disaster Management' edited by H K Gupta (2003), Universities press.

Course Code & Title: OEC-CE605B ELEMENTS OF COASTAL ENGINEERING
Semester & Year of study: VI & 2021-22
Course Index: C605B

Course Objectives:
The learning objectives of this course are:

Course Objectives
Student will able to learn General Design Considerations for Coastal Engineering.
Understand Wind Set Up.
Understand Wave Mechanics and Wave Forces on Walls.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C605B.1	Understand the concept of Tsunamis, Storm Surge and Wind Set Up.
C605B.2	To learn Beach Profiles and Surf Zone Wave Breaking.

OEC-CE605B ELEMENTS OF COASTAL ENGINEERING

(OPEN Elective-II)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction, General Design Considerations for Coastal Engineering. Long Period Waves: Tides, Seiches, Tsunamis, Storm Surge and Wind Set Up.

UNIT-II

Solutions of Linear Wave Equation for Progressive and Standing Waves – Pressure Velocity Fields – Surface Profile and Dispersion Relationship – Principle of Super Position – Wave Energy, Energy Flux and Energy Principle – Group Velocity.

UNIT-III

Wave Mechanics. Celerity and Group Velocity. Wind Generated Waves. Wave Statistics. Wave Transformation: Shoaling, Refraction, Diffraction and Reflection. Wave Breaking Criteria. Wave Forecasting for Deepwater Waves.

UNIT-IV

Beach Profiles and Surf Zone Wave Breaking. Sediment Transport.

Impacts of Coastal Structures on Shoreline Changes. Seawalls, Breakwaters, Groins, Jetties, Wharves.
Wave Forces on Walls. Design of Breakwaters: Rubble Mound-Type, Wall-Type, Structural Cross-Section.
Wave Forces on Piles – Basic Assumptions – Values of the Inertia and Drag Coefficients and Their Dependence on the Wave Theory used.

TEXT BOOKS

1. Water Wave Mechanics for Engineers and Scientists by R.G.Dean and R.A.Darlymple, World Scientific Publishers.
2. Coastal Hydrodynamics by J.S.Mani. PHI Publishers 2nd Edition.

Course Code & Title: PEC-CE605C PROJECT MANAGEMENT (OPENN ELECTIVE-II)
Semester & Year of study: VI & 2021-2022
Course Index: C605C

Course Objectives:
The learning objectives of this course are:

Course Objectives
To introduce to the student, the concept of project management including network drawing and monitoring.
To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery.
To introduce the importance of safety in construction projects.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C605C.1	Appreciate the importance of construction planning.
C605C.2	Understand the functioning of various earths moving equipment.
C605C.3	know the methods of production of aggregate products and concreting
C605C.4	Apply the gained knowledge to project management and construction techniques.

PEC-CE605C: PROJECT MANAGEMENT

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT- I

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method

UNIT -II

Project evaluation and review technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources introduction to software's for construction management project management using PRIMAVERA (or) equivalent.

UNIT- III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers

UNIT -IV

Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets
Concreting equipment — concrete mixers – Batching plants, mobile using plants like "Ajax" etc. mixing and placing of concrete – consolidating and finishing

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering BIM for Civil Engineers (Building Information Modelling)

TEXT BOOKS:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder , Shapira, Tata Mcgrawhill
2. 'Construction Project Management Theory and Practice' by Kumar Neeraj Jha (2011), Pearson.
3. 'Construction Technology' by Subir K. Sarkar and Subhajit Saraswati, Oxford University press

REFERENCES:

1. 'Construction Project Management - An Integrated Approach' by Peter Fewings, Taylor and Francis
2. 'Construction Management Emerging Trends and Technologies' by Trefor Williams, Cengage learning

Course Code & Title: LC-CE606: GEO TECHNICAL ENGINEERING LAB
Semester & Year of study: VI & 2021-22
Course Index: C606

Course Objectives:
The learning objectives of this course are:

Course Objectives
To impart knowledge of determination of index properties required for classification of soils.
To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C606.1	Determine index properties of soil and classify them.
C606.2	Determine permeability of soils.
C606.3	Determine Compaction, Consolidation and shear strength characteristics.

LC-CE606: GEO TECHNICAL ENGINEERING LAB

Theory: 3Hrs/ Week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

LIST OF EXPERIMENTS

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Permeability of soil - Constant and Variable head tests
6. Compaction test
7. Consolidation test (to be demonstrated)
8. Direct Shear test
9. Triaxial Compression test
10. Unconfined Compression test
11. Vane Shear test
12. Differential free swell (DFS)
13. Field Plate Load Test demo
14. Field CBR demo

At least **Eight** experiments shall be conducted.

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
   a) Core cutter method
   b) Sand replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 0.15mm, and 0.075mm.
5. Hydrometer
6. Permeability apparatus for
   a) Constant head test
   b) Variable head test
7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot air ovens (range of temperature 500 - 1500C

References:

1. 'Determination of Soil Properties' by J. E. Bowles.
2. IS Code 2720 – relevant parts.

Course Code & Title: LC-CE607: COMPUTER AIDED ENGINEERING DRAWING LAB
Semester & Year of study: VI & 2021-22
Course Index: C607

Course Objectives:
The objective of this course is

Course Objectives
To enhance the students knowledge and skills in engineering drawing.
To introduce computer aided drafting packages and commands for modeling and sketching.
To learn surface modeling techniques required designing and machining
To draw the geometric entities and create 2D and 3D wire frame models.
To learn various modelling techniques such as edit, zoom, cross hatching, pattern filling, rotation etc.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C607.1	Understand the paper –space environment thoroughly
C607.2	Develop the components using 2D and 3D wire frame models through various editing commands.
C607.3	Generate assembly of various components of compound solids.

LC-CE607: COMPUTER AIDED ENGINEERING DRAWING LAB

Theory: 3Hrs/ Week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

PART-A: MANNUAL DRAFTING

UNIT-I

Objective: The knowledge of projections of solids is essential in 3D modelling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection and sections of solids.
Projections Of Planes & Solids : Projections of Regular Solids inclined to both planes – Auxiliary Views. Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.
Objective: The knowledge of development of surfaces of solids is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection. The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic.
Development And Interpenetration Of Solids: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts. Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT-II

Objective: Isometric projections provide a pictorial view with a real appearance.
Perspective views provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.

Isometric Projections : Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non-isometric lines. Isometric Projection of Spherical Parts. Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions.
Perspective Projections: Perspective View: Points, Lines, Plane Figures and Simple Solids, Vanishing Point Methods (General Method only).

PART- B COMPUTER AIDED DRAFTING

UNIT- III

Introduction To Computer Aided Drafting: Generation of points, lines, curves, polygons, dimensioning. Types of modelling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modelling, 3D wire frame modelling.
Objective: By going through this topic the student will be able to understand the paper-space environment thoroughly. View Points And View Ports: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete, joint, single option.

UNIT -IV

Computer Aided Solid Modelling: Isometric projections, orthographic projections of isometric projections ,Modelling of simple solids, Modelling of Machines & Machine Parts.

TEXT BOOKS :

1. Engineering Graphics, K.C. john, PHI Publications 2.Engineering drawingby N.D Bhatt, Charotar publications.

REFERENCES:

1. Mastering Auto CAD 2013 or modified version and Auto CAD LT2013or modified version – George Omura, Sybex
2. Auto CAD 2013 or modified versionfundamentals- Elisemoss, SDC Publ.
3. Engineering Drawing and Graphics using Auto Cad–T Jeyapoovan, vikas
4. Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja,New Age
5. Engineering Drawing – RK Dhawan, S Chand
6. Engineering Drawing – MBShaw, BC Rana, Pearson
7. Engineering Drawing – KL Narayana, P Kannaiah, Scitech
8. Engineering Drawing – Agarwal and Agarwal, Mc Graw Hill
9. Engineering Graphics – PIVarghese, Mc Graw Hill
10. Text book of Engineering Drawing with auto-CAD, K.VenkataReddy/B.S .Publications

Course Code & Title: LC-CE608 SURVEYING FIELD WORK-II
Semester & Year of study: IV & 2021-2022
Course Index: C608

Course Objectives:
The learning objectives of this course are:

Course Objectives
Illustrate with the measurement of angles & distances using Theodolite.
Memorize the design of Simple curves using linear methods.
Explain the concept of contouring using level
Define the functioning of Total Station

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C608.1	Experiment the method of Theodolite survey to calculate Distances & Areas.
C608.2	Design & setting out of Curve by linear methods.
C608.3	Sketch the Contour plan of an area using level
C608.4	Experiment of angles, heights & distances using Total station.

LC-CE608: SURVEYING FIELD WORK-II

Theory: 3Hrs/ Week **Credits: 1.5**
Int Marks: 50 **Ext Marks: 50**

List of Experiments

1. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
2. Theodolite Survey: Finding the distance between two inaccessible points.
3. Theodolite Survey: Finding the height of far object.
4. Tacheomatric Survey: Heights and distance problems using tacheomatric principles.
5. One Exercise on Curve setting.
6. One Exercise on contours.
7. Total Station: Introduction to total station and practicing setting up, levelling up and elimination of parallax error.
8. Total Station: Determination of area using total station.
9. Total Station: Traversing
10. Total Station: Contouring
11. Total Station: Determination of Remote height.
12. Total Station: distance between two inaccessible points.

Note: Any 10 field work assignments must be completed**.**

List of Equipment

1. Transit Theodolite with tripod stand & Aluminium leveling Staffs (4m)
2. Total Station with tripod stand & prism, ranging pole
3. Tape, chain, arrows, pegs and ranging rods

SEMESTER-VII (FOURTH YEAR)

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PEC-CE701	**Professional Elective-III** 1. Finite Element Methods 2. Earth & Rock fill Dams 3. Building Services	75	25	100	3	0	0	3
PEC-CE702	**Professional Elective-IV** 1. Solid Dynamics and Machine Foundations 2. Air Pollution & Control 3. Bridge Engineering	75	25	100	3	0	0	3
PEC-CE703	**Professional Elective-V** 1. Urban Hydrology 2. Ground Improvement Techniques 3. Low-Cost Housing	75	25	100	3	0	0	3
OEC-CE704	**Open Elective-III** 1. Environmental Impact Assessment 2. Earth Retaining Structures 3. Airport Planning and Design	75	25	100	3	0	0	3
OEC-CE705	**Open Elective-IV** 1. Watershed Management 2. Travel Demand Analysis 3. Traffic Safety	75	25	100	3	0	0	3
HSMC-CE706	Industrial Engineering and Management	75	25	100	3	0	0	3
MC-CE707	Advanced Structural Design by Using Staad.Pro	50	50	100	1	0	2	2
Industrial Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester								3
	Total Credits							**23**

Course Code & Title: PEC-CE701A FINITE ELEMENT METHOD
Semester & Year of study: VII & 2022-2023
Course Index: C701A

Course Objectives:
The learning objectives of this course are:

Course Objectives
To learn basic principles of finite element analysis procedure
To learn the theory and characteristics of finite elements that represent engineering structures
To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledge and skills needed to effectively evaluate finite element analyses performed by others
Learn to model complex geometry problems and solution techniques.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C701A.1	Understand the concepts behind vibration methods and weighted residual methods in FEM
C701A.2	Identify the application and characteristics of FEA elements such as bars, beams, and plane and isoperimetric elements
C701A.3	Identify the application and characteristics of FEA elements such as 3-D element.
C701A.4	Develop element characteristic equation procedure and generation of global stiffness equation will be applied.

PEC-CE701A: FINITE ELEMENT METHOD

(Elective-III)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction to finite element method, stress and equilibrium, strain – displacement relations, stress – strain relations, plane stress and plane strain conditions, variation and weighted residual methods, concept of potential energy.

One dimensional problem: Discretization of domain, element shapes, discretization procedures, band width, node numbering, and mesh generation, assembly of global stiffness matrix and load vector, Finite element equations, treatment of boundary conditions.

UNIT – II

Analysis of Trusses: Finite element modeling coordinates and shape functions, assembly of global stiffness matrix and load vector, finite element equations, treatment of boundary conditions, stress, and strain, support reaction calculations.

Analysis of Beams: Element stiffness matrix for Hermit beam element, derivation of load vector for concentrated and UDL, simple problems on beams.

UNIT – III

Finite element modelling of two dimensional stress analysis with constant strain triangles and treatment of boundary conditions, formulation of axisymmetric solids to axisymmetric loading with triangular element.

Higher order and isoperimetric elements: One dimensional quadratic element,Cubic elements in natural coordinates, two dimensional four nodeisoperimetric elements and numerical integration.

UNIT – IV

Steady state heat transfer analysis: One dimensional analysis of a fin and two dimensional steady state heat conduction problems with convection - Simplex elements only. Two dimensional analysis of thin plate, Finite Element formulation of inviscid and incompressible flow – Potential function formulation – Stream function.

Dynamic Analysis: Formulation of finite element model, element consistent and lumped mass matrices, evaluation of Eigen values and Eigen vectors of 1-D bar element, truss and beam, free vibration analysis. Formulation analysis of a uniform shaft subjected to torsion.

Text Books:

1. The Finite Element Methods in Engineering / SS Rao / Pergamum.

References Books:

1. Finite Element Method with applications in Engineering / YM Desai, Eldho & Shah /Pearson publishers
2. An introduction to Finite Element Method / JN Reddy / McGraw Hill
3. The Finite Element Method for Engineers – Kenneth H. Huebner, Donald L. Dewhirst, Douglas E. Smithand Ted G. Byrom / John Wiley & sons (ASIA) Pte Ltd.
4. Finite Element Analysis: Theory and Application with Ansys, Saeed Moaveniu, Pearson Education.

Course Code & Title: PEC-CE701B: EARTH & ROCK FILL DAMS
Semester & Year of study: VII & 2022-2023
Course Index: C701B

Course Objectives:
The learning objectives of this course are:

Course Objectives
Suitability of materials for earth and rock fill dams.
Causes of failures.
To determine slope stability.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C701B.1	Able to design earth and rock fill dams.
C701B.2	Get familiarity with slope stability calculations.
C701B.3	Prevention techniques for slope failures.

PEC-CE701B: EARTH & ROCK FILL DAMS
(Elective-III)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Earth and Rock fill Dams: General features, Selection of site; Merits and demerits of the earth and rock fill dams, Classification of earth dams, Materials of construction and requirements, Causes of failure, Safe design criteria. Instrumentation in earth dams: Pore pressure measurements, Settlement gauges, Inclinometers, Stress measurements, Seismic measurements.

UNIT-II

Failures, Damages and Protection of Earth Dams: Nature and importance of failure, Piping through embankment and foundations, Methods of seepage control through embankments and foundations, Design Criteria for filters, Treatment of upstream and downstream of slopes, Drainage control, Filter design.

UNIT-III

Slope Stability Analysis: Types of Failure: Failure surfaces – Planar surfaces, Circular surfaces, Non-circular surfaces, Limit equilibrium methods, Total stress analysis versus effective Stress analysis, Use of Bishop's pore pressure parameters, Short term and Long term stability in slopes.

UNIT-IV

Methods of Slope Stability: Taylor Charts, Method of Slices, Effect of Tension Cracks, Vertical Cuts. Bishop's Analysis, Bishop and Morgenstern Analysis, Non-circular Failure Surfaces: Morgenstern and Price Analysis, Janbu Analysis, Spencer Analysis, Sliding Block Analysis, Seismic stability, Stabilization of slopes: Drainage measures, Soil reinforcement (geo synthetics/soil nailing/micro piles etc), soil treatment (cement/lime/thermal treatment), surface protection (vegetation/erosion control mats/shotcrete).

Rock fill Dams: Requirements of compacted rock fill, Shear strength of rock fill, Rock fill mixtures, Rock fill embankments, Earth-core Rock fill dams, Stability, Upstream & Downstream slopes.

TEXT BOOKS:

1. Christian, K. Earth & Rock fill Dams – Principles of Design and Construction, CRC Press, 1997.
2. Sowers, G.F. – Earth and Rock fill Dam Engineering, Asia Publishing House, 1962.

REFERENCES:

1. Bharat Singh and Sharma, H. D. – Earth and Rock fill Dams, 1999
2. Abramson, L. W., Lee, T. S. and Sharma, S. – Slope Stability and Stabilization methods – John Wiley & sons. (2002)
3. Sherard, Woodward, Gizienski and Clevenger. Earth and Earth-Rock Dams. John Wiley &. Sons. 1963.
4. US Army Corp of Engineers, Earth and Rock-fill Dams, General Design and construction Considerations, University Press of the Pacific (2004)
5. Bromhead, E. N. (1992). The Stability of Slopes, Blackie academic and professional, London.

Course Code & Title: PEC-CE701C BUILDING SERVICES
Semester & Year of study: VII & 2022-2023
Course Index: C701C

Course Objectives:
The learning objectives of this course are:

Course Objectives
With fundamentals of air conditioning,
Firefighting and vertical Transport systems in building services.
Integration with architectural design.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C701C.1	Types of air conditioning.
C701C.2	Types of transportation system,
C701C.3	Fire fighting, electrical services,
C701C.4	Concepts of green building and energy efficient systems

PEC-CE701C: BUILDING SERVICES
(Elective-III)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Introduction to Building Services:
Definitions - Objective and uses of services - Applications of services for different types building considering - Classification of services- Types of services and selection of services- Natural and artificial lighting principles and factors- Arrangement of luminaries, Distribution of illumination, Utilization factors- Necessity of Ventilation Types – Natural and Mechanical Factors to be considered in the design of Ventilation.

UNIT II

Electrical Services and Layout:
Electrical services in the building -Technical terms and symbols for electrical installations and Accessories of wiring- Systems of wiring like wooden casing, cleat wiring, CTS wiring conduit wiring - Types of insulation- electrical layout for residence, small work shop, show room, school building, etc.

UNIT III

Mechanical Services in Buildings:
Introduction of mechanical services - Lift - Definition, Types of Lifts, Design Considerations, Location, Sizes, Component parts - Lift Well, Travel, Pit, Hoist Way, Machine, Buffer, Door Locks, Suspended Rope, Lift Car. Elevators & Escalators -Different types of elevators and Escalators -Freight Elevators- Passenger elevators –Hospital elevators -Uses of different types of elevators and Escalators.
Air Conditioning- Definition, Purpose, Principles, Temperature Control, Air Velocity Control, Humidity Control, Air Distribution system, Cleaners, Filters, Spray washers, Electric preceptors, Types of Air Conditioners (Central type, Split Unit).

UNIT IV

Fire Protection, Acoustic and Sound Insulations: Introduction- Causes of fire and Effects of fire- General Requirements of Fire Resisting building as per IS and NBC 2005-Characteristics of Fire resisting materials- Maximum Travel Distance- ire Fighting Installations for Horizontal Exit, Roof Exit / Fire Lifts, External Stairs- Requirement of good Acoustic -Various sound absolvent- Factors to be followed for noise control in residential building

Miscellaneous Services and Green Buildings Provisions: Rain water Harvesting for buildings- Concept of GREEN buildings -Components of GREEN building -Introduction and Significance to Grey water- Components of Grey water system -Management of Grey water system

Text Books:

1. A text book on Building Services by R. Uday kumar, Eswar Press, Chennai
2. Building Services by S. M. Patil, Seema Publication, Mumbai Revised edition
3. Heating, Ventilating and Air Conditioning: Analysis and Design, 6th Edition", Faye C. McQuiston, Jerald D. Parker and Jeffrey D. Spitler, John Wiley & Sons

Reference Books:

1. SP 7: 2005 National Building Code of India, Bureau of Indian Standards, BIS, New Delhi
2. Building Construction by B. C. Punmia, Laxmi Publications (P) Ltd., New Delhi
3. IS 3534: 1976 "Outline dimensions of electric lifts"
4. IS1860: 1980 "Code of Practice for Installation, Operation and Maintenance of Electric Passenger and Goods Lifts"

Course Code & Title: PEC-CE702A: SOLID DYNAMICS AND MACHINE FOUNDATIONS
Semester & Year of study: VII & 2022-2023
Course Index: C702A

Course Objectives:
The learning objectives of this course are:

Course Objectives
To calculate the fundamental vibration parameters.
To analyse the vibrations of machine foundations.
To determine the dynamic properties of soils.
To decide the suitable type of machine foundation and its design aspects.
To select the suitable vibration isolation method for machine foundations and liquefaction mitigation methods.

Course Index	Course Outcomes
C702A.1	Use theory of vibrations to find the behavior of soil under dynamic loading.
C702A.2	Design machine foundations under different loads and soil conditions.
C702A.3	Understand the liquefaction phenomena.
C702A.4	Conduct various laboratories and filed tests to determine the dynamic soil prosperities and its interpretation.
C702A.5	Design vibration isolators under any vibratory machines.

PEC-CE702A: SOLID DYNAMICS AND MACHINE FOUNDATIONS
(Elective-IV)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction: Types of motion- SHM- Fundamental definitions- SDOF systems- Free and forced vibration with and without damping - Constant force and rotating mass type excitation –Types of damping- Equivalent stiffness of springs in series and parallel. – Resonance and its effect - magnification- logarithmic decrement –Transmissibility.

UNIT-II

Theories of Vibration Analysis- EHS Theory and lumped parameter model- Different modes of vibration- Natural frequency of foundation soil system – Barkan and IS methods – Pressure bulb concept – Reisner Theory – Limitations of Reisner theory – Sung's solutions -- Pauw's Analogy – Heigh's Theory.

UNIT-III

Dynamic properties of soils, Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests.– Block vibration test – Determination of Damping factor.

UNIT-IV

Types of machine foundations – general requirements design – criteria for machine foundations, permissible amplitudes and bearing pressure
Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.
Design data, design criteria, IS code provisions for the design foundations of Impact type of machines.

Vibration Isolation: Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators- Types and their characterizes
Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction - Dynamic bearing capacity, Earth retaining structures under dynamic loads

TEXT BOOK:
1. 'Vibrations of Soils and Foundations' by Richart Hall and Woods

REFERENCES:
1. 'Vibration Analysis and Foundation Dynamics' by N.S.V. Kameswara Rao, Wheeler Publishing, New Delhi.
2. 'Foundations of Machines- Analysis and Design' by Prakash and Puri

Course Code & Title: PEC-CE702B: AIR POLLUTION & CONTROL
Semester & Year of study :VII & 2022-2023
Course Index: C702B

Course Objectives:
The learning objectives of this course are:

Course Objectives
Understand concepts of Classification of Air Pollutants.
Understand concepts of Control of Particulate Pollutants.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C702B.1	Student will able to learn Emission standards.
C702B.2	Understand the concept of Meteorology and Air Pollution.
C702B.3	Familiarize Students with different types of Design and operation

PEC-CE702B: AIR POLLUTION & CONTROL
(Elective-IV)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Air Pollution: Definition of Air Pollution - Sources & Classification of Air Pollutants - Effects of air pollution - Global effects - Air Quality and Emission standards - Sampling of Pollutants in ambient air - Stack sampling.

UNIT-II

Meteorology and Air Pollution: Factors influencing air pollution, Wind rose, Mixing Depths, Lapse rates and dispersion - Atmospheric stability, Plume rise and dispersion, Prediction of air quality, Box model - Gaussian model - Dispersion coefficient - Application of tall chimney for Pollutant dispersion.

UNIT-III

Control of Particulate Pollutants: Properties of particulate pollution - Particle size distribution - Control mechanism - Dust removal equipment - Design and operation of settling chambers, cyclones, wet dust scrubbers, fabric filters & ESP.

UNIT-IV

Control of Gaseous Pollutants: Process and equipment for the removal by chemical methods - Design and operation of absorption and adsorption equipment - Combustion and condensation equipment.

Text Books

1. Colls, J., Air Pollution: Measurement, Modeling and Mitigation, CRC Press, 2009.
2. Noel, D. N., Air Pollution Control Engineering, Tata McGraw Hill Publishers, 1999.
3. Stern, A.C., Fundamentals of Air Pollution, Academic Press, 1984

Course Code & Title :PEC-CE702C: BRIDGE ENGINEERING
Semester & Year of study :VII & 2022-2023
Course Index: C702C

Course Objectives:
The learning objectives of this course are:

Course Objectives
Familiarize Students with different types of Bridges and IRC standards.
Equip student with concepts and design of Slab Bridges, T Beam Bridges.
Understand concepts of design of Plate Girder Bridges.
Familiarize with different methods of inspection of bridges and maintenance.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C702C.1	Explain different types of Bridges with diagrams and Loading standards.
C702C.2	Carryout analysis and design of Slab bridges, T Beam bridges and suggest structural detailing
C702C.3	Carryout analysis and design of Plate girder bridges
C702C.4	Organize for attending inspections and maintenance of bridges and prepare reports.

PEC-CE702C: BRIDGE ENGINEERING
(Elective-IV)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction- Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading

UNIT-II

Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Guyon's – Massonet Method –Hendry- Jaegar Methods- Courbon's theory- Pigeaud's method

UNIT-III

T-Beam bridges- Analysis and design of various elements of bridge –Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing

UNIT-IV

Plate Girder Bridges: Elements of plate girder and their design-web- flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing

Sub Structure-Abutments-Stability analysis of abutments-piers-loads on piers- Analysis of piers-Wing walls-Design problems.

Text Book

1. Essentials of Bridge Engineering, Jhonson VictorD
2. Design of Bridge Structures, T. R. Jagadeesh, M.A. Jayaram, PHI
3. Design of Bridges, N. Krishna Raju, Tata McGraw Hill

References:

1. Design of Concrete Bridges, Aswini, Vazirani, Ratwani
2. Design of Steel Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications
3. Design of R C Structures, B. C. Punmai, Jain & Jain, Lakshmi Publications

Course Code & Title :PEC-CE703A: URBAN HYDROLOGY
Semester & Year of study :VII & 2022-2023
Course Index: C703A

Course Objectives:
The learning objectives of this course are:

Course Objectives
Appreciate the impact of urbanization on catchment hydrolog.
Understand the importance of short duration rainfall runoff data for urban hydrology studies.
learn the techniques for peak flow estimation for storm water drainage system design.
Understand the concepts in design of various components of urban drainage systems
learn some of the best management practices in urban drainage
Understand the concepts of preparation master urban drainage system.
Understand the concepts of preparation master urban drainage system.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C703A.1	Develop intensity duration frequency curves for urban drainage systems.
C703A.2	Develop design storms to size the various components of drainage systems.
C703A.3	Apply best management practices to manage urban flooding.
C703A.4	Prepare master drainage plan for an urbanized area.

PEC-CE703A: URBAN HYDROLOGY
(Elective-IV)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Introduction: Urbanization and its effect on water cycle – urban hydrologic cycle – trends in urbanization – Effect of urbanization on hydrology

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration -Frequency (IDF) curves, design storms for urban drainage systems.

UNIT II

Approaches to urban drainage: Time of concentration, peak flow estimation approaches , rational method, NRCS curve number approach, runoff quantity and quality, wastewater and stormwater reuse , major and minor systems.

UNIT III

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control

Analysis and Management: Storm water drainage structures, design of storm water network- Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for storm water management.

UNIT IV

Master drainage plans: Issues to be concentrated upon – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning , use of models in planning

Text Books:

1. Geiger W. F., J Marsalek, W. J. Rawls and F. C. Zuidema, (1987 - 2 volumes), UNESCO, Manualon Drainagein Urbanisedarea
2. Hall M J (1984), Elsevier Applied Science Publisher Urban Hydrology
3. Wanielista M P and Eaglin (1997), Wiley and Sons, Hydrology – Quantity and Quality Analysis,
4. Akan A.O and R.L. Houghtalen (2006), Wiley International, Urban Hydrology, Hydraulics and Storm water Quality: Engineering Applications and Computer Modelling,

References Books:

1. Storm water Detention for Drainage, Stahre P and Urbonas B (1990), Water Quality and CSO Management, PrenticeHall.
2. Urban water cycle processes and interactions, Marsalek et. al. (2006), Publication No. 78, UNESCO, Paris(http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)
3. Frontiers in Urban Water Management – Deadlock or Hope, by Maksimovic C and J A Tejada-Guibert (2001), IWA Publishing

Course Code &Title : **PEC-CE703B: GROUND IMPROVEMENT TECHNIQUES**
Semester & Year of study :VII & 2022-2023
Course Index: C703B

Course Objectives:
The learning objectives of this course are:

Course Objectives
To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
To enable the students to know how geo textiles and geo synthetics can be used to improve the engineering performance of soils.
To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C703B.1	By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.
C703B.2	The student should be in a position to design a reinforced earth embankment and check its stability.
C703B.3	The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
C703B.4	The student should be able to understand the concepts and applications of grouting.

PEC-CE703B: GROUND IMPROVEMENT TECHNIQUES
(Elective-IV)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT- I

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT -II

Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

UNIT- III

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests. Introduction to Liquefaction and its effects & applications.

UNIT- IV

Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

Geosynthetics – geotextiles – types – functions, properties and applications – geogrids, geomembranes and gabions - properties and applications.

TEXT BOOKS:

1. 'Ground Improvement Techniques' by Purushotham Raj, Laxmi Publications, New Delhi.
2. 'Ground Improvement Techniques' by Nihar RanjanPatro, Vikas Publishing House (p) limited, New Delhi.
3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, Universities Press.

REFERENCE BOOKS:

1. 'Ground Improvement' by MP Moseley, Blackie Academic and Professional, USA.
2. 'Designing with Geosynethetics' by RM Koerner, Prentice Hall

Course Code & Title : **PEC-CE703C: LOW-COST HOUSING** **Semester & Year of study :VII & 2022-2023** **Course Index: C703C**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
Student will able to understand Housing Scenario.	
Student will able to understand Planning of urban land.	
Course Outcomes: By the end of the course, the student will be	
Course Index	**Course Outcomes**
C703C.1	Student will able to learn Status of Rural Housing.
C703C.2	Student will able to learn Living conditions in slums.
C703C.3	Student will able to learn Development and Adopt on of Low-Cost Housing Technology

PEC-CE703C: LOW-COST HOUSING

(Elective-IV)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT – I

Housing Scenario Status of urban housing- Status of Rural Housing,
Housing Finance: Introducing- Existing finance system in India- Government role as facilitator Status at Rural Housing Finance- Impedimental in housing finance and related issues

UNIT- II

Land Use and Physical Planning for Housing:
Planning of urban land- Urban land ceiling and regulation act- Efficiency of building bye laws - Residential Densities
Housing the Urban Poor: Living conditions in slums- Approaches and strategies for housing urban poor

UNIT-III

Development and Adopt on of Low-Cost Housing Technology
Adoption of innovative cost effective construction techniques- Adoption of precast elements in partial prefabrication- Adopting of total prefabrication of mass housing in India- General remarks on pre cast rooting/flooring systems- Economical wall system- Single Brick thick loading bearing wall- 19cm thick load bearing masonry walls- Half brick thick load bearing wall-Fly ash, gypsum thick for masonry- Stone Block masonry- Adoption of precast R.C. plank and join system for roof/floor in the building
Alternative Building Materials for Low Cost Housing: Substitute for scarce materials- Ferro cement- Gypsum boards- Timber substitutions- Industrial wastes- Agricultural wastes

UNIT- IV

Low Cost Infrastructure Services
Present status- Technological options- Low cost sanitation's- Domestic wall- Water supply energy
Rural Housing: Introduction- traditional practice of rural housing continuous- Mud Housing technology- Mud roofs- Characteristics of mud- Fire resistant treatment for thatched roof- Soil stabilization- Rural Housing programs

Housing in Disaster Prone Areas
Earthquake- Damages to houses- Traditional Houses in disaster prone areas Type of Damages and Railways of non-engineered buildings- Repair and restore action of earthquake Damaged non-engineered buildings recommendations for future constructions- Requirements of structural safety of thin precast roofing units against - Earthquake forces- Status of R&D in earthquake strengthening measures- Floods- cyclone- future safety

TEXT BOOKS:

1. Building materials for low –income houses – International council for building research studies and documentation.
2. Modern trends in housing in development countries – A.G. Madhava Rao, D.S. Ramachandra Murthy & G. Annamalai
3. Light weight concrete- Academic Kiado- Rudhai. G – Publishing home of Hungarian Academy of Sciences 1963.

REFERENCE BOOKS:

1. Building Systems for Low Income Housing, Ashok Kumar Jain; Management Publishing House, 1992
2. Hand book of low-cost housing - by A. K. Lal – Newage international publishers.
3. Low Cost Housing in Developing Countries, Guru Charan Mathur; For Centre for Science & Technology of the Non-Aligned and Other Developing Countries, Oxford & IBH Publishing Company, 1993

Course Code & Title : **OEC-CE704A: ENVIRONMENTAL IMPACT ASSESSMENT**
Semester & Year of study :VII & 2022-2023
Course Index: C704A

Course Objectives:
The learning objectives of this course are:

Course Objectives
To impart knowledge on different concepts of Environmental Impact Assessment.
To know procedures of risk assessment.
To learn the EIA methodologies and the criterion for selection of EIA methods.
To know pre-requisites for ISO 14001certification.
To know the procedures for environmental clearances and audit.
To appreciate the importance of stakeholder participation in EIA.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C704A.1	Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
C704A.2	Selection of an appropriate EIA methodology.
C704A.3	Evaluation of impacts on environment.
C704A.4	Evaluation of risk assessment.
C704A.5	Know the latest acts and guidelines of MoEF & CC

OEC-CE704A: ENVIRONMENTAL IMPACT ASSESSMENT
(Elective-III)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Basic concepts of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination- life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA, Environmental economics, Cost/benefit Analysis - EIS and EMP. Identification of activities- application of remote sensing and GIS for EIA.

UNIT-II

EIA Methodologies: Introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods.

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area.

UNIT-III

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT-IV

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.
Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment- Advantages of Environmental Risk Assessment

EIA: MoEF & CC Acts, Notifications and Guidelines: Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report-evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO14000. Environmental compliance reports. Case studies and preparation of EIA statement for various Industries.

Text Books:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

References:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. Katania & Sons Publication, New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

Course Code &Title : **OEC-CE704B: EARTH RETAINING STRUCTURES**
Semester & Year of study :VII & 2022-2023
Course Index: C704B

Course Objectives:
The learning objectives of this course are:

Course Objectives
Student will able to understand earth pressure.
Understand Design Principles of Retaining Walls.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C704B.1	Student will able to learn Earthquake.
C704B.2	Student will able to learn Design of Anchored Sheet Pile Walls.
C704B.3	Student will able to learn Sheeting and Bracing Systems.

OEC-CE704B EARTH RETAINING STRUCTURES
(Open Elective-III)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Earth Pressure: Basic Concepts, Rankine and Coulomb Earth Pressure Theories, Determination of Active and Passive Pressures: Culmann's Graphical Method, Logarithmic Spiral Methods, Friction Circle Method. Consideration of Surcharge, Seepage, Earthquake, Wave Effect, Stratification, Type of Backfill, Wall Friction and Adhesion.

UNIT-II

Retaining Structures: Uses, Types, Stability and Design Principles of Retaining Walls, Backfill Drainage, Settlement and Tilting. Sheet Pile Walls: Types, Design of Cantilever Sheet Pile Walls in Granular and Cohesive Soils;

UNIT-III

Design of Anchored Sheet Pile Walls by Free and Fixed Earth Support Methods, Rowe's Theory of Moment Reduction, Design of Anchors.

UNIT-IV

Braced Excavations: Types of Sheeting and Bracing Systems, Lateral Earth Pressure on Sheeting in Sand and Clay, Design Components of Braced Cuts. Cellular Cofferdams: Types – Diaphragm and Circular Type, Design by TVA Method. Stability of Cellular Cofferdams, Cellular Cofferdams in Rocks and Soils.

Text Book

1. Foundation design by W. C. Teng, Prentice Hall

Reference Books

1. Basic and Applied Soil Mechanics by Gopal Rajan and A.S.R. Rao, New Age International Publishers.
2. Soil Mechanics in Engineering Practice by K.Terzaghi and R.B.Peck, John Wiley & Sons.
3. Foundation Analysis and Design by J. E. Bowles, Mc Graw-Hill Publishing Co.

Course Code & Title : **OEC-CE704C: AIRPORT PLANNING AND DESIGN**
Semester & Year of study :VII & 2022-2023
Course Index: C704C

Course Objectives:
The learning objectives of this course are:

Course Objectives
Student will able to understand Structure and Organization of Air Transport.
Student will able to understand Airport planning and Runway design, Taxiway Design, Air traffic control.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C704C.1	Understand history of Air Transport.
C704C.2	Understand Air Traffic Control.

OEC-CE704C: AIRPORT PLANNING AND DESIGN
(Open Elective-III)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Air Transport: History of Air Transport, Structure and Organization of Air Transport, National Airports Authority, Airports Authority of India, International Civil Aviation Organization. Airport Characteristics: Requirements of Aircraft Types, Weight Components, Aero plane Component Parts, Classification of Flying Activity, and Aircraft Characteristics.

UNIT-II

Airport Planning: Airport Master Plan, Regional Planning, Airport Site Selection, Estimation of Future Air-Traffic Needs. Airport Obstructions: Zoning Laws, Classification of Obstructions.

UNIT-III

Runway Design: Runway Orientation, Basic Runway Length, Corrections, Airport Classification, Runway Geometry Design. Airport Capacity and Configuration, Runway Intersection Design.

Taxiway Design: Geometric Design Standards, Exit Taxiways, Holding Aprons. Terminal Area and Airport Layout: Building Area, Terminal Area, Apron, Hangar, Typical Airport Layouts. Visual Aids: Airport Marking, Airport Lighting.

UNIT-IV

Air Traffic Control: Need of Air Traffic Control Air Traffic Control Network, Air Traffic Control Aids – Enroute Aids and Landing Aids, Instrumental Landing System

Text Book

1. Airport Planning and Design by S.K. Khanna, M.G. Arora, S.S. Jain, Nem-Chand and Bro.

Reference Book

1. Airport Engineering by Rangwala, Charotar Publications

Course Code & Title : **OEC-CE705A: WATER SHED MANAGEMENT** **Semester & Year of study :VII & 2022-2023** **Course Index: C705A**	
Course Objectives: The learning objectives of this course are:	
Course Objectives	
Understand concept of sustainable development and types of soil erosion, Artificial recharge of groundwater in small watersheds.	
Course Outcomes: By the end of the course, the student will be	
Course Index	**Course Outcomes**
C705A.1	Student will able to learn Hydrology of small watersheds, design of rainwater harvesting structures and Reclamation of saline soils.

OEC-CE705A: **WATER SHED MANAGEMENT**
(Open Elective-IV)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction, concept of watershed, need for watershed management, concept of sustainable development. Hydrology of .small watersheds.

UNIT-II

Principles of soil erosion, causes of soil erosion, types of soil erosion, estimation of soil erosion from small watersheds.

UNIT-III

Control of soil erosion, methods of soil conservation – structural and non-structural measures. Principles of water harvesting, methods of rainwater harvesting, design of rainwater harvesting structures.

UNIT-IV

Artificial recharge of groundwater in small watersheds, methods of artificial recharge. Reclamation of saline soils. Micro farming, biomass management on the farm.

Text Books:

1. Chatterjee, S. N., Water Resources Conservation and Management, Atlantic Publishers, 2008.
2. Murthy, V.V.N., Land and Water Management, Khalyani Publishers, 2004.
3. Muthy, J. V. S., Watershed Management, New Age International Publishers, 1998.
4. Suresh Rao, Soil and Water Conservation Practices, Standard Publishers, 1998.

Course Code & Title : **OEC-CE705B: TRAVEL DEMAND ANALYSIS**
Semester & Year of study :VII & 2022-2023
Course Index: C705B

Course Objectives:
The learning objectives of this course are:

Course Objectives
To know various components and functions of pavement management systems.
To know various pavement serviceability concepts and deterioration models.
To know various functional and structural evaluation methods
To study design alternatives, rehabilitation and maintenance of pavements.
To study the role of expert systems in pavement management.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C705B.1	Understand the features and functions of pavement management systems.
C705B.2	Asses pavement performance by observing different models.
C705B.3	Evaluate the pavement functionally and structurally
C705B.4	Identify and select suitable design strategies and decide the maintenance and rehabilitation measures required for a given pavement.

OEC-CE705B: **TRAVEL DEMAND ANALYSIS**
(Open Elective-IV)

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction: Definition -Components of Pavement Management Systems, Essential features. Pavement Management Levels and functions: Ideal PMS- Network and Project levels of PMS- Influence Levels- PMS Functions- Function of Pavement evaluation.

UNIT-II

Pavement Performance: Serviceability Concepts- roughness-Roughness Components-Equipment-IRI -modeling techniques, structural condition deterioration models, mechanistic and empirical models, HDM and other models, comparison of different deterioration models.

UNIT-III

Functional Evaluation: Functional and Structural deterioration models, unevenness prediction models and other models, comparison. Case studies. Equipments

Structural Evaluation: - Basics- NDT and Analysis—Condition Surveys-Distress-Destructive Structural Analysis- Application in Network and Project Levels

UNIT-IV

Design Alternatives, Rehabilitation and Maintenance: Design objectives and constraints, basic structural response models, physical design inputs, alternate pavement design strategies and economic evaluation, life cycle costing, analysis of alternate pavement strategies based on distress and performance, case studies. Equipment's, Identification of Alternatives-Deterioration Modeling- Priority Programming Methods.

Expert Systems and Pavement Management: Role of computers in pavement management, applications of expert systems for managing pavements, expert system for pavement evaluation and rehabilitation, knowledge-based expert systems, case studies.

TEXT BOOKS:

1. Ralph Haas and Ronald W. Hudson, 'Pavement Management System', McGraw Hill Book Co. 1978
2. Ralph Haas, Ronald Hudson Zanieswki. 'Modern Pavement Management, Kreiger Publications.

REFERENCES:

1. Proceedings of North American Conference on Managing Pavement.
2. Proceedings of International Conference on Structural Design of Asphalt Pavements NCHRP, TRR and TRB Special Reports

Course Code & Title : **OEC-CE705C: TRAFFIC SAFETY**
Semester & Year of study :VII & 2022 - 2023
Course Index: C705C

Course Objectives:
The learning objectives of this course are:

Course Objectives
This module on the fundamentals of traffic engg. & some of the statistical methods to analyse the traffic safety.
The accident interrogations and risk involved with measures to identify the causes are dealt.
The role of road safety in planning the urban infrastructures design is discussed.
Various mitigation measures to prevent the road accidents are dealt.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C705C.1	To understand fundamentals of Traffic Engineering.
C705C.2	To investigate and determine the collective factors & remedies of accident involved.
C705C.3	To design and plan various road geometrics.
C705C.4	To manage the traffic system from road safety point of view.

Theory: 3Hrs/ Week **Credits: 3**
Int Marks: 25 **Ext Marks: 75**

UNIT I

Fundamentals of Traffic Engineering:

Basic Characteristics of Motor-Vehicle Traffic, Highway Capacity, Applications of Traffic Control Devices, Traffic Design of Parking Facilities, Traffic Engineering Studies; Statistical Methods in Traffic Safety Analysis – Regression Methods, Poisson Distribution, Chi- Squared Distribution, Statistical Comparisons.

UNIT II

Accident Investigations and Risk Management:

Collection and Analysis of Accident Data, Condition and Collision Diagram, Causes and Remedies, Traffic Management Measures and Their Influence on Accident Prevention, Assessment of Road Safety, Methods to Identify and Prioritize Hazardous Locations and Elements, Determine Possible Causes of Crashes, Crash Reduction Capabilities and Countermeasures, Effectiveness of Safety Design Features, Accident Reconstruction.

UNIT III

Road Safety in Planning and Geometric Design:

Vehicle And Human Characteristics, Road Design and Road Equipments, Redesigning Junctions, Cross Section Improvements, Reconstruction and Rehabilitation of Roads, Road Maintenance, Traffic Control, Vehicle Design and Protective Devices, Post Accident Care.

UNIT IV

Role of Urban infrastructure design in safety:

Geometric Design of Roads; Design of Horizontal and Vertical Elements, Junctions, At Grade and Grade Separated Intersections, Road Safety in Urban Transport, Sustainable Modes and their safety.

Mitigation Measures:

Accident prevention by better planning, Accident prevention by better design of roads, Crash Countermeasures, Highway operation and accident control measures, Highway Safety Measures during construction, Highway geometry and safety; Safety in urban areas; Public transport and safety; Road safety policy making, Stakeholders involvement; Road safety law, Road safety audit.

TEXT BOOKS:

1. Institute of Transportation Engineers (ITE), The Traffic Safety Toolbox: A Primer on Traffic Safety, ITE, 1999.Towards Safe Roads in Developing country, TRL – ODA, 2004.
2. Traffic Engineering and Transportation Planning – L.R. Kadiyali, Khanna Publishers
3. Fundamentals of Traffic Engineering, Richardo G Sigua

REFERENCES:

1. Athelstan Popkess, Traffic Control and Road Accident Prevention, Chapman and Hall, 1997 (Digitized 2008)
2. Handbook of Road Safety measures, second Edition, Rune Elvik, Alena Hoye, TrulsVaa, Michael Sorenson
3. Ezra Hauer, Observational Before-After Studies in Road Safety, Pergamon Press, 1997 (reprinted 2002).
4. Geetam Tiwari and Dinesh Mohan, Transport Planning and Traffic Safety: Making Cities, Roads, and Vehicles Safer, CRC Press, 2016
5. Fundamentals of Transportation Engineering – C.S. Papacostas, Prentice Hall India.

Course Code & Title : **HSMC-CE706: INDUSTRIAL ENGINEERING & MANAGEMENT**
Semester & Year of study :VII & 2022-2023
Course Index: C706

Course Objectives:
The learning objectives of this course are:

Course Objectives
To impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering
To produce graduates with the ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.
To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society.
To enable students to understand their role as engineers and their impact to society at the national and global context.

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C706.1	Design and conduct experiments, analyze, interpret data and synthesize valid conclusions.
C706.2	Design a system, component, or process, and synthesize solutions to achieve desired needs.
C706.3	Can use the techniques, skills, and modern engineering tools necessary for engineering practice. Can adopt appropriate considerations for public health and safety, cultural, societal, and environmental constraints.
C706.4	Knows about Functions work effectively within multi-disciplinary teams.

HSMC-CE706: **INDUSTRIAL ENGINEERING & MANAGEMENT**

Theory: 3Hrs/ Week **Credits: 3**

Int Marks: 25 **Ext Marks: 75**

UNIT-I

Introduction to personnel management- Functions, Motivation, Theories of motivation, Hawthrone studies, Discipline in industry, Promotion, Transfer, lay off and discharge, Labour turnover.

Industrial relations- Trade unions, Industrial disputes, Strikes, Lock-out, Picketing, Gherao, Settlement of industrial disputes, Collective bargaining, Industrial dispute act 1947 and factories act 1948.

UNIT-II

Production Planning and Control: Types of productions, Production cycle, Product design and development, Process planning, Forecasting, Loading, Scheduling, Dispatching, Routing, Progress, Control, Simple problems.

Plant Layout: Economics of plant location, Rural Vs Suburban sites, Types of layouts, Types of building, Travel chart technique, Assembly line balancing simple problems.

UNIT-III

Materials Handling- Principles, Concept of unit load, Containerization, Pelletization, Selection of material handling equipment, Applications of belt conveyors, Cranes, Forklift trucks in industry.

Plant Maintenance: Objectives and types.

Work Study: Concept of productivity, Method Study - Basic steps in method study, Process charts, Diagrams, Models and Templates, Principles of motion economy, Micro motion study, Therbligs, SIMO chart. Work Measurement - Stop watch procedure of time study, Performance rating, allowances, Work sampling, Simple problems.

UNIT-IV

Materials Management: Introduction, Purchasing, Objectives of purchasing department, Buying techniques, Purchase procedure, Stores and material control, Receipt and issue of materials, Store records. Inventory Control, EOQ model (Simple problems).

Quality Control - Control charts of variables and attributes (Use of formulae only). Single and Double sampling plans.

Text Book:

1. Industrial Engineering and management by O.P Khanna, Khanna Publishers.
2. Industrial Engineering and Production Management, Martand Telsang, S.Chand & Company Ltd. New Delhi

References:

3. Principles of Management by Koontz & Donnel.
4. Production and Operations Management by Everette Adam & Ronald Ebert.
5. Operations Management by John McClain & Joseph Thames.
6. Industrial Engineering and Production Management by Telsay, S. Chand & Co.

COURSE CODE & TITLE: MC-CE707 ADVANCE STRUCTRAL DESIGN BY USING STAAD PRO
SEMESTER & YEAR OF STUDY: VI & 2022-23
COURSE INDEX: C707

Course Objectives:
The learning objectives of this course are:

Course Objectives

The main objectives of this course are to familiarize Analysis and design of structural elements, single storey , multistory frame and buildings by using staad pro

Course Outcomes:
By the end of the course, the student will be

Course Index	Course Outcomes
C707.1	Understand the staad pro basics and apply to solve practical problems used in industries where the speed and accuracy can be achieved.
C707.2	Understand the Analysis of continuous beam and single storey frames
C707.3	Understand the Analysis and design of multi-storey frame and buildings
C707.4	Understand the Analysis and design of Isolated and combined footings

MC-CE609: ADVANCE STRUCTRAL DESIGN BY USING STAAD PRO

1L+2P Hrs/ Week **Credits: 2**

Int Marks: 50 **Ext Marks: 50**

1. Introduction to staad pro
2. Analysis of continuous beam
3. Analysis of single storey frame
4. Analysis of multi-storey frame
5. Design of multi-storey frame
6. Analysis of multi-storeyed building
7. Design of multi-storeyed building
8. Wind load analysis on rcc building
9. Analysis and design of steel truss
10. Analysis and design of isolated footing
11. Analysis and design of combined footing
12. Analysis of bridge deck.

At least 10 Exercises are to be conducted using staad pro software

Text Books

1.N. Vazirani & M. M. Ratwani, Analysis of Structures, Khanna Publishers

Reference Books

1. R. L. Jindal, Indeterminate Structures, Tata McGraw Hill Publishing House.

2.G. S. Pandit & Gupta S. P., Structural Analysis (A matrix approach), Tata McGraw Hill Publishing Ltd.

3.Wang C. K., Matrix Method of Structural Analysis, Jon Wiley publications.

4.IS:456 -2000, IS:800-2007.

SEMESTER-VIII (FOURTH YEAR)

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int					
Project	Project Work	200	100	300				12
	Total Credits							12

ADIKAVI NANNAYA UNIVERSITY

RAJAMAHENDRAVARAM

UNIVERSITY COLLEGE OF ENGINEERING

Model Question Papers

B.Tech Civil Engineering

(For the admitted batch of 2020)

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
I B.Tech CE (2020-21 AB) I Semester
HSMC-CE101 ENGLISH-1 (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION– A

Answer ALL questions **4x15=60M**

1. Explain the central theme of the poem "*Once upon a time*". 15 M

OR

1. Answer the following: [5+5+5]

2. Differentiate between Skimming and Scanning. 5M

3. Write Wh-questions for the following responses. 5M

a) They are students.
b) She can come tomorrow.
c) We should buy tickets.
d) He has visited Italy.
e) I ate a salad.

4. Write a note on the use of irony in the poem "*Once Upon a time"* 5M

2. How does R.K. Narayan present the Indian rural ethos in the story *A Horse and Two Goats* 15M

OR

2. Answer the following: [5+5+5]

4. Punctuate the following sentences correctly 5M

a) There's no room for error, said the engineer so we have to double check every calculation.
b) In baseball, a show boat is a man who shows off
c) Darwin's on the origin of species 1859 caused a great controversy when it appeared
d) Oman is a beautiful country the beaches are warm sandy and spotlessly clean
e) She always enjoyed sweets chocolate marshmallows apples

5. Fill in the blanks with suitable prepositions 5M

a) Would you like to go_____the cinema tonight?
b) No, thanks. I was_____the cinema yesterday.
c) My brother's birthday is_____the 25th of November.
d) My birthday is_____May.
e) My friend has been living in Canada_____two years.

6. Fill in the blanks with suitable articles 5M

a) Right now,____euro is stronger than the dollar.
b) Did you see_____movie about Dian Fossey's work with mountain gorillas?
c) Did you know_____man who was talking to Laura?
d) Look at_____woman over there! She is a famous actress.
e) Where's_____electric heater? I can't find it.

3. Write an essay on the benefits of Failure according to JK Rowling. 15

OR

3. Answer the following: [5+5+5]

b). Fill in the blanks with appropriate tense form 5M

1. Both of Ravi's children_____(jog) every morning.
2. We_____(make) tea while Shanta is_____(clean) the house.

3. She_____(grow)very tired after she had walked five miles.
4. We_____(meet) him at the theatre at 8PM tonight.
5. You_____(find) mobile phone in my house I think I left it three.

c).Put the word in brackets into the correct form. You will have to use prefixes and/or suffixes. 5M

b) I couldn't find any_____in his theory. (weak)
c) He wants to be a_____when he grows up. (mathematics)
d) You need to be a highly trained_____to understand this report. (economy)
e) There were only a_____of people at the match. (hand)
f) She arrived late at work because she had_____. (sleep)

d). Write a paragraph on any one of the following: 5M

b) My first day at the University
c) What I know about Ocean
d) My favourite book
e) Games people play

4. What are the qualities of time according to Seneca? 15M

OR

4. Answer the following: [10+5]
b) Write an essay on any one of the following 10M
b) Population Explosion
c) Role of technology in human life
d) Students' role in empowering nation

b)Match the following words with appropriate synonyms: 5M

b)	Quaint---	1) travel
c) Crazy—		2) strange
d) Traverse—		3) mad
e) Discovered--		4) favorable
f) Congenial--		5) found

SECTION B

5. Answer any FIVE questions: 3x5 = 15M
b. Write a short note on Presentation Skills.
c. Explain the difference between content words and function words with examples.
d. Elucidate the characteristics of a good paragraph?
e. Define Intensive Reading.
f. What does the poet of *Once upon a time* want to learn from his son?
g. How did Muni calculate his age?
h. What are the disadvantages of Group Discussion?
i. Mention the steps involved in essay writing.

ADIKAVI NANNAYA UNIVERSITY::RAJAMAHENDRAVARAM
I B.Tech CE (2020-21 AB) I Semester
BSC-CE102 ENGINEERING MATHEMATICS-I (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

Section – A

Answer ALL Questions. **4x 15 = 60M**

2. a). Solve $\frac{dy}{dx} - \frac{y}{x+1} = e^{3x}(x+1)$

b).Solve $(1+xy)\,ydx + (1-xy)\,xdy = 0$ **[7+8]**

(OR)

c). Solve $\frac{dy}{dx} + x \sin 2y = x^3 \cos^2 y$

d). If the air is maintained at 30^0 *C* and the temperature of the body cools from 80^0 *C* to 60^0 *C* in12 minutes, find the temperature of the body after 24 minutes. **[7+8]**

3. a). Solve $\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 4\cos^2 x$

b). Using the method of Variation of parameters, solve $\frac{d^2y}{dx^2} + 4y = \tan 2x$ **[7+8]**

(OR)

c). Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$

d). Solve $(2x+3)^2 \frac{d^2y}{dx^2} - (2x+3)\frac{dy}{dx} - 12y = 6x$ **[7+8]**

4. a). If $u = Tan^{-1}\left(\frac{x^3+y^3}{x+y}\right)$, prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} = \sin 2u$

b).Find the maximum and minimum values of $x^3 + 3xy^2 - 15x^2 - 15y^2 + 72x$ **[7+8]**

(OR)

c). If $u = x\sqrt{(1-y^2)} + y\sqrt{(1-x^2)}, v = \sin^{-1}x + \sin^{-1}y$ show that u, v are functionally related and find the relationship.

d). Given $x+y+z=a$, fin the maximum value of $x^m y^n z^p$ **[7+8]**

5. a). Verify Rolle`s theorem for $f(x) = (x+2)^3(x-3)^4 \; in(-2,3)$ (if 0<a<b<1)

b). Prove that $\frac{b-a}{1+b^2} < Tan^{-1}b - Tan^{-1}a < \frac{b-a}{1+a^2}$ hence show that

$$\frac{\pi}{4}+\frac{3}{25}<\tan^{-1}\frac{4}{3}<\frac{\pi}{4}+\frac{1}{6}$$ **[7+8]**

(OR)

c). If f(x) and g(x) are respectively e^x and e^{-x}, prove that `C` of Cauchy`s mean value theorem is the arithmetic mean between a and b.

d).Using Taylor`s theorem prove that $x-\frac{x^3}{6}<\sin x<x-\frac{x^3}{6}+\frac{x^5}{120}$, $for x>0$ **[7+8]**

Section – B

Answer any FIVE Questions: **5x 3 = 15M**

5. a). Solve $\left(3x^2 + 6xy^2\right)dx + \left(6x^2y + 4y^3\right)dy = 0$

b)Find the orthogonal trajectories of the family of coaxial circles

$x^2 + y^2 + 2\lambda x + c = 2, \lambda$ being the parameter

c)Solve $\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - y = 0$

6. Solve $x^2\frac{d^2y}{dx^2} - x\frac{dy}{dx} + y = \log x$

7. If $u = \log\left(x^3 + y^3 + z^3 - 3xyz\right)$ show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x+y+z)^2}$

8. If $x = u(1-v), y = uv$, *provethatJJ*$^1 = 1$

9. Verify Lagranges`s mean value theorem for the function $f(x) = \sin x in [0, \pi]$ and determine c lying in o and π

10. Evaluate $\lim_{x\to 0} \frac{\log x}{\cot x}$

ADIKAVI NANNAYA UNIVERSITY::RAJAMAHENDRAVARAM
I B.Tech CE (2020-21 AB) I Semester
BSC-CE103 ENGINEERING CHEMISTRY (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION – A

Answer ALL questions **4 X 15=60M**

1.a) Write about the following **[8 + 7]**
(i) Difference between Addition and Condensation polymerization
(ii) Difference between Thermosetting and Thermoplastics

(OR)

b) Write about the following preparation and properties **[5+5+5]**
(i) Styrene butadiene Rubber (ii) Bakelite (iii) Thiokol Rubber

2.a) What is corrosion? Explain the various factors effecting on corrosion. **[15]**

(OR)

b) Write about the following **[5+5+5]**
(i) Galvanic Cells (ii) Fuel Cells (iii) Nernest Equation

3.a) Explain the Proximate and Ultimate Analysis of Coal **[15]**

(OR)

b) Explain the types of Organic Reactions with suitable Examples **[15]**

4.a) Write about the following **[7 + 8]**
i) Hardness of water (ii) Reverse Osmosis Method.

(OR)

b) Write about the Properties and Applications of Nano Materials. **[15]**

SECTION – B

5. Answer any FIVE question **5 X 3=15M**

a) Write about physical properties of Polymers

b) Write about Biodegradable polymers

c) Write about Galvanizing and Tinning

d) Write about Knocking

e) Write the Structural and Stereo Chemical isomers

f) Write about Electrodialysis

g) Write about Fisher Tropsch Process

h) Explain about Ring opening and Cyclization reactions

ADIKAVI NANNAYA UNIVERSITY::RAJAMAHENDRAVARAM
I B.Tech CE (2020-21 AB) I Semester
ESC-CE104 FUNDAMENTALS OF COMPUTER SCIENCE (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION-A

Answer All Questions **4X15 = 60M**

1.a) Illustrate the functions of various parts of a computer with a neat diagram. (8M)
b)What are the input and output devices necessary for a computer operation? Explain in detail with suitable examples. (7M)

(OR)

c)Why to use computer? Brief its benefits. Also focus on its limitations. (7M)
d)Discuss classification of Software with suitable examples. (8M)

2.a) Design an algorithm as well as flowchart for finding out largest number out of three given numbers. (8M)
b)Why is C language called as middle level language? Justify. (7M)

(OR)

c)Define an algorithm. List the characteristics of a good algorithm with an example. (7M)
c) What is Structured programming approach? Highlight the advantages and disadvantages of structured programming. (8M)
6. a) What is an operating system? Explain various types of operating systems. (8M)
b) Compare the features of Microsoft DOS with Microsoft Windows Operating systems. (7M)

(OR)

c) Write the process of preparing a Progress Report using Mail Merge in MS Word. (8M)
d) What are the process for preparing a student result sheet using formulae in MS Excel. (7M)
7. a) Explain the features of network topologies along with their merits and demerits. (15M)

(OR)

b) Discuss types of networks classified on the basis of their size. (15M)

SECTION-B

8. Answer any five Questions **5X3 = 15M**

a) Compare and contrast hardware with software.
b) Explain different types of printers.
c) Differentiate the language translators assembler, compiler and interpreter
d) Write and various steps involved in development of the program.
e) Write the functionalities of an operating system.
f) What are the types of graphs
g) Write a short notes on Gateway
h) Write a short notes on Router

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
I B Tech CE (2020-21 AB) II Semester
ESC-CE105 ENGINEERING GRAPHICS (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION– A

Answer ALL questions **4x15=60M**

2 a) The headlight reflector of a four–wheeler has a maximum rim diameter of 115 mm and a Maximum depth of 90 mm .Draw the Shape of the reflector. Draw a tangent and normal at any point on the curve. [10M]

16. Inscribe a regular pentagon in a circle of 70mm diameter [5M]

(OR)

17. The distance between two fixed points is 90mm. A point P moves such that the difference of its distances from two fixed points always remains constant and is equal to 60 mm. Draw the loci of P. Draw the tangent and normal at any point on the Hyperbola. [10M]

18. Supe r scribe/Describe/Circumscribe an equilateral triangle about a circle of 50 mm diameter. [5M]

3 a) Construct a Vernier scale of RF= 1: 25 to show decimeters, centimeters and millimeters. The scale should be capable of reading up to 4 decimeters
Mark on your scale the following distances: (a) 3.23 dm and (b) 3.65 dm [10M]

5. Draw the projections of the following, keeping the distance between the projectors as 25mm on the same reference line:

1. A- 25mm above HP and 50mm behind the VP.
2. B- 40 mm below HP and 45mm in front of the VP.
3. C- on HP and 25mm behind VP. [5M]

(OR)

6. A motor car is running at a speed of 60 kph. On a scale of RF = 1 / 4,00,000 show the distance travelled by car in 47 minutes. [10M]

7. A line CD 30 mm long is parallel to both the planes. The line is 40 mm above HP and 25 mm in front of Vertical Plane. Draw its Projections. [5M]

4 a) Draw the projections of a cone, bse 30 mm diameter and axis 50 mm long, resting on HP on a point of its base circle with

1. the axis making an angle of 45° with HP and its top view making an angle of 30° with VP and [7M]
2. The axis making 45° with HP and 30° with VP. [8M]

(OR)

6. A right hexagonal prism of side of base 24 mm and axis 56 mm long is lying on one of the corners of the base. Its axis is inclined an angle of 30° to HP. Draw the isometric projection of the solid. [15M]

5 a) The front view and top view of a straight line PQ measures 50mm and 65 mm respectively. The point P is in the HP and 20 mm in front of the VP and the front view of the line is inclined at 45° to the reference line. Determine the true length of PQ, true angles of inclination with the reference planes and the trace. [8M]

b) A thin rectangular plate of sides 50mm x 25mm has its shorter side in HP and inclined at an angle of 30° to the VP. Project its front view when its top view is a Perfect Square of 25mm side [7M]

(OR)

c) Draw the Projections of a line PQ 100 mm long inclined at 30° to HP and 45° to VP. Point P is 20 mm above HP and in VP. Also determine the apparent lengths and inclinations. [8M]

d) An isosceles triangular lamina has base 40 mm long and altitude 56 mm. It is so placed on Vertical Plane such that in the front view it is seen as an equilateral triangle of 40mm sides with the side that is contained in Vertical Plane is inclined at 45° to Horizontal Plane. Draw its Top View and front views. Also find the inclination of the lamina to Vertical plane [7M]

SECTION– B

Answer any FIVE **5x3=15M**

d. What is representative fraction?

e. Define the term horizontal trace.

f. What is meant by oblique plane?

g. Define the term apparent angles of inclination in the projection of straight lines

h. What do you understand by a “Right Regular Prism”?

i. What is the difference between right and oblique solids?

j. Define the terms: Isometric axes, Isometric Planes

k. Define first angle projection.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
I BTech CE (2020-21 AB) I Semester
MC-CE109 PROFESSIONAL ETHICS AND HUMAN VALUES (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION A

Answer ALL questions **4x15=60M**

1.a) Discuss the need for value education and enumerate its content. [7]
b) Critically evaluate the process of self-exploration. [8]
(OR)
c)Define ethics and give an account on ethical vision. [7]
d) Explain in detail the classification of human values. [8]

2.a) Elucidate the nature of ethics for engineering profession. [8]
b) Give a note on code of ethics with specific reference to CSI. [7]
(OR)
c) Write briefly about engineering as social experimentation. [7]
d) Explain the role of engineers in promoting ethical climate. [8]

3.a) Discuss the moral responsibility of engineers towards safety. [8]
b) Explain the Fukushima nuclear disaster with the ethical issues involved. [7]
(OR)
c) Enlist the rights of a professional. [7]
d) Trace the importance of having regulatory criteria for a balanced outlook on law. [8]
4.a) Define the concept of globalization and explain the role of MNCs in India. [8]
b) Discuss the importance of environmental ethics. [7]
(OR)
c) Critically classify cybercrimes with relevant examples. [8]
d) Discuss the concept of harmony in life. [7]

SECTION B

5.Answer any FIVE questions **5 X 3=15M**

a. Introspection
b. Ethical decisions
c. Professionalism
d. Engineers as leaders
e. Chernobyl disaster
f. Gender discrimination
g. Computer ethics
h. Ethical living

Branch/Course: Civil Engineering Semester II (First year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
HSMC-CE201	English II	75	25	100	3	0	0	3
BSC-CE202	Engineering Mathematics II	75	25	100	3	0	0	3
BSC-CE203	Engineering Physics	75	25	100	3	0	0	3
ESC-CE204	Programming for Problem Solving	75	25	100	3	0	0	3
ESC-CE205	Engineering Mechanics	75	25	100	3	0	0	3
LC-CE206	Engineering Physics Lab	50	50	100	0	0	3	1.5
LC-CE207	Engineering Workshop Lab	50	50	100	0	0	3	1.5
LC-CE208	Programming for Problem Solving Lab	50	50	100	0	0	3	1.5
MC-CE209	Environmental Science	75	25	100	2	0	0	0
	Total Credits							**19.5**

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
I B.Tech CE (2020-21 AB) II Semester
HSMC-CE201 ENGLISH-II (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION– A

Answer ALL questions **4x15=60M**

1. Describe the lifestyle of the Murlocks from *Time Machine*? 15M

(OR)

Answer the following: [5+5+5]

1. Correct the following sentences 5M

a) I will like more tea she said to the server.
b) After today I will had worked here for ten years.
c) I haven't not heard from John in six months.
d) When i am sixteen i am going get my license.
e) If I was president I will make health care more affordable.

2. Complete the following sentences with correct phrasal verbs 5M

a) Don't give_____singing. You are very talented.
b) Where is the fitting room? I'd like to try_____these trousers.
c) Have you tidied_____the kitchen, yet?
d) My little sister woke me_____in the middle of the night.
e) Don't put the vase there, it will fall_____.

3. Write a short note on academic style in writing. 5M

5. Write a character sketch of Padmini from *Hayavadana*.. 15M

(OR)

Answer the following: [8M+7M]

a) Write a letter to newspaper editor describing university 8M
b) How is *Hayavadana* a theatre of roots? 7M

6. What can we learn from "*Wings of Fire"?* 15M

(OR)

Answer the following: [5+10]

a) Rewrite the following sentences in Passive Voice 5M

a. My sister broke my parents' favourite lamp.
b. The veteran pitcher threw a ball travelling at incredible speed.
c. Some of the performances amazed us.
d. They gave up the search after three hours.
e. The impatient server cleared the dishes from the table.

b) Write a press report on a Tech fest organised at your University. 10M

7. Write a note on the aphoristic style of Francis Bacon's *Of Friendship* 15M

(OR)

Answer the following: [5+5+5]

a) Explain the different methods of referencing 5M
b) Change the following sentences from Direct to Indirect Speech 5M
c) "Do you like fish, Mary?" she asked.
d) The boy said," I couldn't come because of my father's illness."
e) "I am leaving" the sailor said
f) "What are you going to do tomorrow?
g) " she asked me.She said to me,
h) "Don't worry about it."
i) Write short notes on the various components of a project. 5M

SECTION - B

f) **Answer any FIVE questions** **5 X 3 = 15M**

a. Significance of References
b. Prepare your Resume
c. SQ3R
d. Formal and Informal styles
e. Expressions for Interrupting
f. Presentation Skills
g. Guidelines for Report Writing
h. Difference between Summarizing and Paraphrasing

ADIKAVI NANNAYA UNIVERSITY::RAJAMAHENDRAVARAM
I B.Tech ME (2020-21 AB) II Semester
BSC-CE202 ENGINEERING MATHEMATICS-II (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

Section – A

Answer ALL Questions. **4x 15 = 60M**

1. a) Reduce the following matrix into its normal form and hence find its rank

$$\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$$

b).Test for consistency and solve

$$2x-3y+7z=5, 3x+y-3z=13, 2x+19y-47z=32$$ **[7+8]**

(OR)

c). Find the eigen values and eigen vectors of $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$

d). Reduce the quadratic form $x_1^2+3x_2^2+3x_3^2-2x_2x_3$ into canonical form and hence write the nature. **[7+8]**

2. a). $Evaluate \int_0^1 \int_{e^x}^{e} \frac{dydx}{\log y}$ by changing the order of integration

b). $Evaluate \int_0^{\sqrt{(1-x^2)}} \int_0^{\sqrt{(1-x^2-y^2)}} \int_0^{} xyzdxdydz$ **[7+8]**

(OR)

c). Find the Volume of the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$

d). Evaluate $\int_0^{\infty}\int_0^{\infty} e^{-(x^2+y^2)} dxdy$ by changing to polar co-ordinates. Hence show that $\int_0^{\infty} e^{-x^2}dx=\sqrt{\frac{\pi}{2}}$ **[7+8]**

3. a). Given $\int_0^{\infty} \frac{x^{n-1}}{1+x}dx=\frac{\pi}{\sin n\pi}$ show that $\Gamma n\Gamma 1-n=\frac{\pi}{\sin n\pi}$,hence evaluate $\int_0^{\infty} \frac{1}{1+y^4}dy$

$\int_0^{\infty} \frac{x^c}{}$

b). Express $\int_0 c^x dx$ in gamma functions **[7+8]**

c). Show that (OR)

d). Show that $\Gamma\frac{1}{2} = \sqrt{\pi}$

$\int_0^\infty \frac{x^{10} - x^{18}}{(1+x)^{30}} dx = 0$ **[7+8]**

4. a). If $u = x + y + z, v = x^2 + y^2 + z^2, w = xy + yz + zx$ prove that $[gradu, gradv, gradw] = 0$ $\nabla^2(r^n) = n(n+1)r^{n-2}$ **[7+8]**

b). Show that

(OR)

c). Compute the line integral $\int_c (y^2 dx - x^2 dy)$ about the triangle whose vertices are (1,0),(0,1) and (-1,0)

d). Verify Greens theorem for $\int_c [(xy + y^2)dx + x^2 dy]$ where c is bounded by y=x and y= x^2 **[7+8]**

Section – B

5. Answer any FIVE Questions: **5x 3 = 15M**

a). Evaluate by Stokes theorem $\int_c (yzdx + zxdy + xydz)$ where c is the curve $x^2 + y^2 = 1, z = y^2$

b). Solve the equations $x_1 + x_2 + x_3 = 1, x_1 + 2x_2 + 3x_3 = 6, x_1 + 3x_2 + 4x_3 = 6$ by Gauss-Jordan method

c). Verify Cayley-Hamilton theorem for the matrix A= $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$

d). Evaluate $\int_0^1 \int_0^1 \int_0^{1-x} xdzdxdy$.

e). Show that $\tau n = \int_0^{y^2} \left(\log \frac{1}{y}\right)^{n-1}$

f). Show that $\tau m \tau m + \frac{1}{} = \underline{\sqrt{\pi}}\, dy (n > 0)$

g). Show that $\tau 2m \quad 2 \quad 2^{2m-1} \quad 5 \; x^2 \quad \int\int x\left(x^2 + y^2\right) dxdy \quad 0 \; 0$

h). State Green's theorem in plane.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

I BTech CE (2020-21 AB) II Semester

BSC-CE203 ENGINEERING PHYSICS (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION– A

Answer ALL questions **4x15=60M**

6. a) What are the Fundamental laws of Electromagnetism. Explain. [8M]
   g) Deduce Maxwell's equations [7M]

(OR)

   h) Classify the Magnetic materials Dia, Para, Ferro, Anti ferro and Ferri magnetic materials [10M]
   i) What is Origin of Magnetic moment. [5M]

7. a) Explain the intensity variation in a fraunhofer single slit diffraction. [12M]
   f) Newton rings are observed in the reflected light of wavelength 5900 ^{o}A, The diameter of 10^{th} dark ring is 0.5cm.Find the radius of curvature of the lens. [3M]

(OR)

   g) With neat diagrams, describe the principle, construction and working of Gas laser [10M]
   h) Write a short note on Acceptance angle, Acceptance cone, Numerical aperture. [5M]

8. a). Deduce time- independent Scrodinger's wave equation. [10M]
   e) Write its application with one timensional potential box. [5M]

(OR)

   f) Give the postulates of Free electron theory of metals. [5M]
   g) Explain Kronig- Penney Model for Energy bands. [10M]

4.a) Find the Carrier concentration in intrinsic semi-conductors. [10M]
   g) Write a note on Drift and Diffusion currents [5M]

(OR)

   h) With the statement and theory, calculate the Hall Coefficient. [10M]
   i) Explain the structure and characteristics of LED. [5M]

SECTION– B

Answer any FIVE questions **5x3=15M**

5. a. Explain Hysterisis curve.
   j. What is Bloch' theorem.
   k. Give some applications of Gauss's law
   l. Explain magnetic force on current
   m. Describe the arrangement of Newton's rings experiment.
   n. Explain Nicol's prism.
   o. Applications of optical fibre communication system .
   p. Write a short note on Solar cell.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
I BTech CE (2020-21 AB) II Semester
ESC-CE204 PROGRAMMING FOR PROBLEM SOLVING (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION-A

Answer All Questions **15X4 = 60M**

1. a)Explain Control Structures with an example.

(OR)

b)Explain conditional statements with examples.

2) a)Explain one and two dimensional array with examples

(OR)

b)Explain string handling functions with examples.

3) a)Explain parameter passing technique with examples.

(OR)

b)Define a pointer. Explain the concept of pointers to function with example.

4) a)Define a structure .Explain the concept of structure within a structure with example.

(OR)

b)Define a file. Explain the file handling functions with examples.

SECTION-B

5. Answer any five of the following :- **5x3=15M**

a) Write a program to find swapping of two numbers with out using third variable

b) Structure of C- Program

c) Explain the different data types in C.

d) WAP to implement insert an element into an Array.

e) Explain the categories of functions in C.

f) Explain storage classes in C.

g) Explain recursive function with example.

h) Difference between Structures and Unions

ADIKAVI NANNAYA UNIVERSITY::RAJAMAHENDRAVARAM
I B.Tech CE (2020-21 AB) II Semester
ESC-CE205 ENGINEERING MECHANICS (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION– A

Answer ALL questions **4x15=60M**

1. a. Three Forces of Magnitude 150N,300N and 500N are acting at the origin O(0,0,0) and are directed from the points A (3,2,4),B (3,-2,-4) and C (-1,-3,-4) respectively to the origin. Determine the Magnitude of the resultant. [8M]

   b. What are laws to add two forces and several concurrent, coplanar forces? Explain in detail [7M]

(OR)

   c. State and Prove Lamis Theorem. [7M]

   d. Five strings are tied at a point and are pulled in all directions, equally spaced,from one another. If the Magnitude of the pulls on three consecutive strings is 70N,40N and 55N respectively, find graphically the magnitude of the pulls on two other strings, if the system is in equilibrium [8M]

2. a. Explain the types of Friction with Examples. [7M]

   b. A ladder 5m long and 250N weight is placed against a vertical wall in a position where its inclination to the vertical is 30^0 . A man weighting 800N climbs the ladder. At what position will he induce slipping? The coefficient of friction or both the contact surfaces of the ladder with the floor is 0.2. [8M]

(OR)

   c. In the Figure 1, the two blocks (A=30 N and B=50 N) are placed on rough horizontal plane. Coefficient of friction between the block A and the plane is 0.3 and that between B and plane is 0.2. Find the minimum value of the force P to just move the system. Also find the tension in the string. [10M]

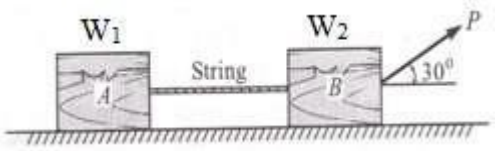


Figure 1

   d. Define the terms: (i) Friction; (ii) Coefficient of friction. [5M]

3. a)Determine an expression for the center of gravity of a right circular solid cone about is base from first principles. [7M]

   b) Find the center of gravity of the shaded area as shown in the Figure 2. [8M]

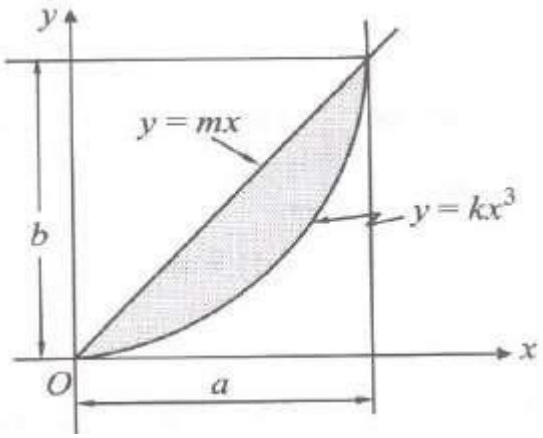


Figure 2.

(OR)

c. Derive an equation for moment of inertia of a Quarter circle. [8M]

d. Find the Moment of Inertia about the centroidal axis in the given Figure 3. [7M]

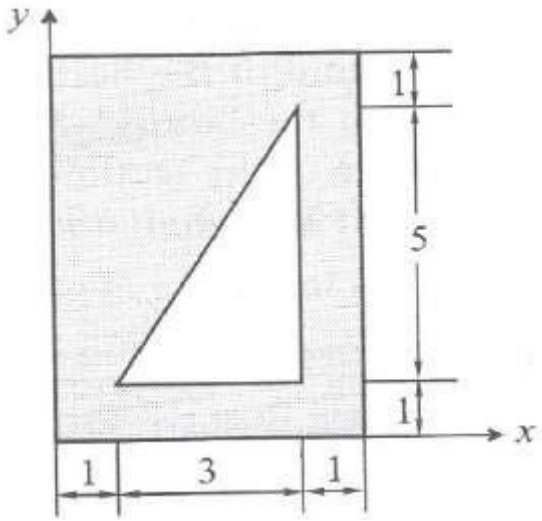


Figure 3

4. a. State and prove transfer formula for product of inertia. [8M]

b. Find the mass moment of inertia of an aluminum pipe of 120mm outer diameter and 90mm inner diameter and 2.5m height about its longitudinal axis. (density,=2560 kg/m3). [7M]

(OR)

c. An elevator weighs 10000 N when fully loaded. It is connected to 7500 N counter weight C and is powered by an electric wire as show in the Figure 4. Determine the power required when (i) the elevator is moving upward at constant speed of 20 m/s; (ii) the elevator is moving downward at a constant speed of 20 m/s and (iii) the elevator has an instantaneous velocity of 20 m/s upward and an upward acceleration of 3 m/s2. [15M]

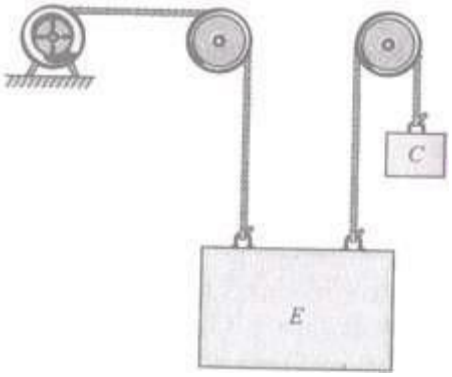


Figure 4

SECTION– B

Answer any FIVE **5x3=15M**

5. a. Define Equilibrium of motion. Write the equations for Equilibrium.

b. State the Laws of Friction.

c. Define Centroid and centre of Gravity.

d. State D'Alembert Principle giving Equations.

e. Define the term Radius of gyration. Write the units.

f. What is fixed axis rotation? Explain.

g. State Work-Energy theorem for a system of particles.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
I BTech CE (2020-21 AB) II Semester
MC-CE209: ENVIRONMENTAL SCIENCE (MODEL QUESTION PAPER)

Time: 3hrs **Max. Marks: 75**

SECTION – A

Answer ALL questions **4x15=60M**

1. a) What is Environmental Science? Define its Scope and Importance

(OR)

b) Define Ecosystem. Explain

2. a) Discuss in detail about the water resource of earth. Add a note on the conflicts of Water usage

(OR)

b) Explain in detail about the forest resources and their exploitation

3. a) What is Biodiversity? Explain about the services the biodiversity offers to mankind

(OR)

b) Why should conversation of biodiversity be done. What are the different conversation methods of biodiversity?

3. a) Discuss in detail about the issues involved in environmental ethics. Add a note on their solutions

(OR)

b) What is EIA? Explain.

SECTION – B

5. Answer any FIVE questions **5 X 3=15M**

a. Rio Summit

b. Ecological succession

c. Mineral Resources

d. Waste land reclamation

e. Value of Biodiversity

f. Hotpots of Biodiversity

g. Water conversation

h. Ecotourism

Branch/Course: Civil Engineering Semester III (Second year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
BSC-CE301	Probability and Statistics	75	25	100	3	0	0	3
PCC-CE302	Strength of Materials	75	25	100	3	0	0	3
PCC-CE303	Surveying and Geometrics	75	25	100	3	0	0	3
PCC-CE304	Fluid Mechanics	75	25	100	3	0	0	3
PCC-CE305	Building Materials, Construction and Planning	75	25	100	3	0	0	3
LC-CE306	Strength of Materials Lab	50	50	100	0	0	3	1.5
LC-CE307	Surveying Field Work – I	50	50	100	0	0	3	1.5
LC-CE308	Building Planning and Design	50	50	100	0	0	3	1.5
MC-CE309	Essence of Indian Traditional Knowledge	75	50	100	2	0	0	0
MC-CE310	Skill oriented course	--	50	50	1	0	2	2
	Total Credits							**21.5**

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester
BSC-ME-301, BSC-CE-301 PROBABILITY AND STATISTICS
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A
Answer All Questions

1.a) State and prove Bayes' theorem (8M)

b)Find the moment generating function of a random variable X defined by the density function

1f(x) ={3 $-1 < x < 20$ (7M)

(OR)

c)Out of 800 families with 5 children each, how many would you expect to have
(i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys (7M)

d)There are 15 boys and 5 girls in a class. If three students are selected one after the other what is the probability that they are (1) All boys (2) 2 boys one girl (3) All girls. (8M)

2.a) Let X is the random variable with the following distribution. Find E(X), $E(X^2)$ (8M)

b)Binomial distribution approaches poisson distribution as n □∞, prove this statement $E(2X+1)^2$ (7M)

X	-3	6	9
P(X=x)	1/6	½	1/3

(OR)

c) In a distribution exactly normal 7% of the items are under 35 and 89% are under 63. What are the mean and standard deviation of the distribution? (8M)

d)Fit a Poisson distribution for the following data and calculate the expected frequencies, N =200. (7M)

X	0	1	2	3	4
F(x)	109	65	22	3	1

3.a) Explain briefly the following : I) Point Estimation ii) Interval Estimation (7M)

b)A lady stenographer claims that the she can take dictation at the rate of 120 words per minute. Can we reject her claim on the basis of 100 trails in which she demonstrates a mean of 116 words with a S.D of 15 words. (8M)

(OR)

c)Two independent samples of 8 and 7 items respectively had the following values.

Sample 1	11	11	13	11	15	9	12	14
Sample 2	9	11	10	13	9	8	10	-

Is the difference between the means of samples significant? (8M)

d)A manufacturer of electric bulbs claims that the percentage of defectives in his product does not exceed 6. A sample of 40 bulbs is found to contain 5 defectives would you consider the claim justified (7M)

4.a) Fit a second degree parabola to the following data using method of least squares. (8M)

X	0	1	2	3	4
Y	2	3	2.5	2.6	6.5

b) Calculate the correlation coefficient for the following heights (inches) of fathers (x) and their sons (y): (7M)

X : 65 66 67 67 68 69 70 72

c).Find the rank correlation coefficient for the following data (8M)

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

d)Determine the constants '**a**' and '**b**' by the method of least squares such that **y = a** e^{bx} fit the following data (7M)

X	2	4	6	8	10
Y	4.077	11.084	30.128	81.897	222.62

SECTION-B

1. **Answer any five Questions 5X3 = 15M**

a) Two cards are selected at random from 10 cards numbered 1 to 10. Find the probability that the sum is even if the two cards are drawn one after the other with replacement.
b) State and prove addition theorem
c) Define continuous random variable and discrete random variable
d) Use Poisson recurrence formula to find probabilities x = 0 ,1 ,2 with mean 3
e) Explain the types of errors in sampling
f) If we can assert with 95% that the maximum error is 0.05 and P is given as 0.2. Find the size of the sample.
g) Write the normal equations of straight line by using method of least square
h) Define rank and correlation coefficient.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester PCC-CE-302 STRENGTH OF MATERIALS
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions

1.a)The extension in a rectangular steel bar of length 400 mm and thickness 10 mm is found to be 0.21 mm. the bar tapers uniformly in width from 100 mm to 50 mm. if the Young's modulus is 200 GPa, determine the axial load on the bar . (7M)

b) At a point in a strained material, the intensities of normal stresses on two planes at right angles to each other are 35 N/mm2 and 20 N/mm2 both tensile. They are accompanied by shear stress of 15 N/mm^2.Find the principal planes and principal stresses. Find also maximum shear stress. (8M)

(OR)

c) Two vertical rods one of steel and the other of copper are each rigidly fixed at the top and 50cm apart. Diameters and lengths of each rod are 2cm and 4cm respectively. A cross bar fixed to the rods at the lower ends Carries a load of 5000N such that the cross bar remains horizontal even after loading. Find the stress in each rod and position of the load on the bar. Take Es= 2.x $10^5 N/mm^2$, Ec= 1x $10^5 N/mm^2$. (8M)

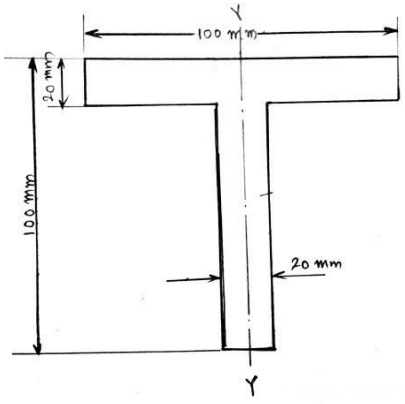
d).Derive equation for the relation between three elastic moduli. (7M)

2. a) A simple supported beam of length 8m rests on supports 6m apart, the right hand end is overhanging by 2 m. The beam carries a uniformly distributed load of 1500 N/m over the entire length. Draw the shear force and bending moment diagrams and find the point of contra flexure, if any? (15M)

(OR)

b) A simply supported beam of span 10 m carry as UDL of 10 KN/m over a length of 3 m from left support and also from right support. Draw SF and BM diagram. (15M)

3.a) The Shear force acting on a section of a beam is 50KN. The section of the beam is T shaped of Dimensions 100mm x 100mm x 20mm as shown in the fig. The moment of inertia about the horizontal neutral axis is 314.221 x 10^4 mm^4. Calculate the shear stress at the neutral axis at the junction of the web and flange. (15M)



b) A steel beam of I-section, 200 mm deep and 160 mm wide has 16 mm thick flanges and 10 mm thick web. The beam is subjected to a bending moment of 200 kN m at a critical section. Determine the maximum bending stress if the web of the beam is kept horizontal. (8M)

c) Show that maximum shear stress in a beam of rectangular section is 1.5 times the average shear stress. (7M)

(OR)

4. a) Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of 8 N/mm^2. Also sketch the radial pressure distribution and hoop stress distribution across the section? (15M)

(OR)

b) A cylinder has an internal diameter of 230 mm, has walls 5 mm thick and is 1 m long. It is found to change in internal volume by 12×10-6 m3 when filled with a liquid at a pressure p. If Young's Modulus= 200 GPa and Poisson's Ratio = 0.25, and assuming rigid end plates, determine: a) The values of hoop and longitudinal stresses; b) The necessary change in pressure p to produce a further increase in internal volume of 15 %. The liquid may be assumed incompressible. (15M)

SECTION-B

5. Answer any five Questions 5X3 = 15M

a) Draw the Stress- Strain diagram for Cast Iron and mention the Salient points?
b) What are the effects of inclined load on the Beam?
c) What is the section modulus and how it will affect the strength of the beam?
d) What is the section modulus and how it will affect the strength of the beam?
e) Define the torsional rigidity of the shaft? What does it represent?
f) State the assumption made in deriving the bending equation.
g) Derive the section modulus expression for a circular cross section.
h) What is hoop-stress and volumetric strain in shells?

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester PCC-CE-303 SURVEYING AND GEOMETRICS'
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions

1. a) What are the different sources of errors in plane tabling? How are they eliminated? (10M)
   b)What is two-point problem? How is it solved? (5M)

(OR)

c) Compare the advantages and disadvantages of plane table surveying with those of chain surveying. (7M)

d) State three-point problem plane tabling and describe its solution by trial method giving the rules which you will follow in estimating position of the point sought. (8M)

2. a) Explain types of levels and methods of levelling? What are the Characteristics and uses of Contours, methods of contour surveying? (15M)

(OR)

b) The following consecutive readings were taken with a level and 3 metres levelling staff on Continuously sloping ground at a common interval of 20 meters:
0.602, 1.234, 1.860, 2.574, 0.238, 0.914, 1.936, 2.872, 0.568, 1.824, 2.722. The reduced level of the first point was 192.122. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points and also the gradient of the line joining the first and the last points. (15M)

3.a) The stadia intercept read by means of a fixed hair instrument on a vertically held staff is 2.250 metres, the angle of elevation being $3^0 42'$. The instrument constants are 100 and 0.4 m. What would be the total number of turns registered on a movable hair instrument at the same station for a 2.0 meters intercept on a staff held on the same point? The vertical angle in this case is $5^0\ 30'$ and the constants 1000 and 0.4 m? (15M)

(OR)

b) The following lengths and bearings were recorded in running the odolite traverse in the counter clockwise direction, the length of CD and bearing of DE having been omitted. (15M)

Line	Length in m.	R.B.
AB	281.4	S $69^0\ 11'$ E
BC	129.4	N $21^0\ 49'$ E
CD	?	N $19^0\ 34'$ W
DE	144.5	?
EA	168.7	S $74^0\ 24'$ W

Determine the length of CD and the bearing of DE.

4. a) Explain Principle and types of E.D.M. Instruments? (15M)

(OR)

b) Explain Aerial triangulation, radial triangulation, methods? (15M)

SECTION-B

5. Answer any five Questions 5X3 = 15M

a) Explain clearly the principle of chain surveying.
b) Compare the advantages and disadvantages of plane table surveying with those of chain surveying.
c) Distinguish between the Curvature and Refraction.
d) Explain how you would take field observations with a theodolite so as to eliminate the Index error of vertical circle.
e) Explain length of the long chord of the simple curve.
f) What is Simpson's one-third rule? Derive expression for it?
g) What is a well conditional triangle? Why is it necessary to use well-conditioned triangles?
h) What is local attraction? How is it detected and eliminated?

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester PCC-CE-304 FLUID MECHANICS
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

PART-A

Answer All Questions

1 a)Define the following properties of fluid with their units: i). Mass Density 7M
ii). Dynamic Viscosity iii). Surface Tension
b)The pressure outside the droplet of water of dia 0.04 mm is 10.32 N/cm^2 .calculate the pressure within the droplet if surface tension is given as 0.0725 N/m of water. 8M

(OR)

c)Define viscosity? Explain the difference between kinetic viscosity and dynamic viscosity? 7
d)If $5m^3$ of a certain oil weighs 4000 N. Calculate the specific weight, mass density and specific gravity of this oil. 8M

2 a)Define the equation of continuity. Obtain an expression for continuity equation for a three dimensional flow? 8M
b)A pipe of 20cm diameter conveying $0.20m^3$ /s of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressures at the inlet and outlet of the bend are $2.3kg/cm^2$ and 2.2 kg/cm^2 respectively. 7M

(OR)

c)Derive Euler's equation of motion for three dimensional steady state incompressible in viscous flow 8M
d)Water under a pressure of 3.924 ×10-3N/m^2 is flowing through a 0.3 m pipe at the rate of 0.25 m^3 /sec. if the pipe is bent 1350 , find the magnitude and direction of the resultant force on the bend. 7M

3 a)Explain the Reynold's experiment to classify the flows 7M
b)A laminar flow is taking place in a pipe of diameter 20cm. The maximum velocity is 1.5m/s. Find the mean velocity and the radius at which this occurs. Also calculate the velocity at 4cm. 8M

(OR)

c)List the minor losses in closed conduit flow and discuss their significance? 7M
d)Two reservoirs with a difference in water level of 15m are connected by a pipe line PQR which includes two pipes of PQ and QR connected in series. Pipe PQ is 10cm in diameter having a length of 15m and has a value of f =0.03. Pipe QR is of 15cm diameter, 25m long and has f=0.016. The junctions with the reservoirs and between the pipes are abrupt. Calculate the discharge considering all minor losses. Consider all losses. 8M

4 a)Define the terms: boundary layer thickness, displacement thickness, momentum thickness and 7M discuss their practical utility.
b)Find the ratio of skin friction drag on the front half and rear half portion of a flat plate kept in 8M a uniform stream of zero incidences. Assume the boundary layer to be turbulent over the entire plate.

(OR)

c)Derive Von Karman momentum integral equation. 8M
d)Find the frictional drag on one side of the plate 250mm wide and 450mm long place 7M longitudinally in a steam crude oil (specific gravity=0.925, kinematic viscosity= 0.8 stoke) flowing with undisturbed velocity of 6.5m/s.

PART-B

5 Answer any five Questions **(5X3 = 15M)**

a) How does the dynamic viscosity of liquid and gases vary with temperature?
b) Define total pressure and centre of pressure.
c) What is minor loss in pipe flow?
d) Explain stream line and streak line
e) What is the difference between laminar flow and turbulent flow?
f) What is meant by boundary layer theory
g) Define boundary layer separation

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech Civil Engineering II-I Semester

PCC-CE-305 Building Materials, Construction and Planning (MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

PART-A

Answer All Questions

1.(a) Explain in detail the classification of Rocks? (15M)

(OR)

(b) Describe in detail with neat sketch, the drying and burning methods in manufacturing of bricks? (15M)

2. (a) Explain with a neat sketch (i) Stretches Bond (ii) Header Bond (iii) English Bond (iv) Flernish Bond (15M)

(OR)

(b) What are the Seasoning methods in timber? (15M)

(OR)

3. (a) Write about various field and laboratory test on cement? (15M)

(OR)

(b) Explain the king post truss and Queen post truss with a neat sketch? (15M)

4. (a) Explain how the specific gravity of aggregates carried out? (7M)

(b)Explain how you determine moisture content of aggregate. (8M)

(OR)

(b) Explain how aggregate toughness can be measured? (8M)

(c) What are the requirements of good formwork? (7M)

PART-B

5 **Answer any five Questions** 5X3 = 15M

a) What do you mean by stone quarrying?
b) What are the types of floors?
c) What is a lintel? Explain
d) Enumerate various types of cement?
e) Distinguish between rubble masonry and caused rubble masonry.
f) What is a vault? Explain with sketches.
g) What is a cavity wall?
h) List out Various ingredients of lime stone?

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-I Semester
MC-CE-309 ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions

SECTION-A (4× 15 = 60 M)

Answer ALL questions

1.a. Define Traditional Knowledge? Explain about its nature, scope and characteristics. **(15M)**

(or)

b. Explain about the historical impact of social change on traditional knowledge system.

2.a. Explain the need of protecting the traditional knowledge significance in detail. **(15M)**

(or)

b. what do you mean by biological diversity? Explain about Biological Acts2002.

3.a. illustrate certain non IPR mechanisms of Traditional knowledge protection. **(15M)**

(or)

b. why do we need to protect Traditional knowledge? What benefits do traditional knowledge bring to the society.

4.a. Explain about Traditional Knowledge in sectors like Engineering and Agriculture. **(15M)**

(or)

b. Illustrate the importance of conservation and sustainable development of Food security of the country and protection of Tk.

SECTION-B

Answer Any FIVE questions **(5x3= 15 M)**

5. a) Define Western knowledge.

b) What are different kinds of traditional knowledge?
c) List out the role of Government to harness in TK.
d) Illustrate different strategies to increase traditional knowledge.
e) Define bio technology
f) Write about indigenous knowledge.
g) Define intellectual property.
h) How TK related to Biodiversity.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-II Semester ESC-CE401: ENGINEERING GEOLOGY
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions. **(4x15=60M)**

1.a) Write an essay on importance of Geology in Civil Engineering. (8M)
b)Write the physical properties of QUARTZ group of mineral. (7M)

(OR)

c)Explain the importance of study of minerals. (7M)
d)What are the Branches of Geology? Explain. (8M)

2.a) What is meant by rock cycle? Discuss the different types of texture of igneous rocks. (8M)
b)What are the common structures of sedimentary rocks? (7M)

(OR)

c)Explain the types of metamorphism. (8M)
d)Distinguish between i) shale and slate ii) limestone and marble iii) granite and quartzite. (7M)

3.a) Define focus and epicenter? What are the tectonic earthquakes, and how are they caused? (7M)
b)What are landslides? Classify landslides and their causes. How landslides can be prevented? (8M)

(OR)

c)Describe the ground water exploration techniques. (7M)
d)What is water table? Where it occurs? Explain the types of waters. (7M)

4.a) What is the importance of geophysical methods, classify and explain their applications. (8M)
b)Describe the geological considerations relating to the construction of gravity and arch type of concrete dam. (7M)

(OR)

c)What are the types of dams and give their purpose? (8M)
d)Write about factors affecting the water-tightness of a dam reservoir. (7M)

SECTION-B

Answer any five Questions. **(5X3 = 15M)**

5.

a) What is meant by weathering?
b) Define the term geology .
c) List out the types of metamorphism.
d) Write a short note on formation of metamorphism
e) What are the causes of the earthquake?
f) Define the terms Strike and Dip.
g) What are the benefits of dam construction?
h) List out the various types of aquifers.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-II Semester PCC-CE-402: Hydraulics and Hydraulic Machinery
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions. (4x15=60M)

1) a) Derive the condition for depth of flow of a most economical circular channel Section subject to the condition for maximum velocity.

b) A Wide channel of uniform rectangular section with a slope of 1/95 has a flow rate of 3.75 m3 /s/m. The Manning constant is 0.013. Suddenly the slope changes to 1/1420. Determine the normal depths for each case. Show that a hydraulic jump has to occur and calculate the downstream flow height.

(OR)

c) Explain the terms specific energy of a flowing liquid, minimum specific energy, critical depth, critical velocity and alternate depths as applied to non-uniform flow.

d) A rectangular channel of 5 m width discharges water at the rate of 1.5 m3 /s into a 5 m wide apron with 1/3000 slope at a velocity of 5 m/s. Determine the height of the hydraulic jump and energy loss.

2) a) Obtain an expression for the depth after the hydraulic jump and the loss of head Due to the jump. Write the assumptions made.

b)Determine the economical cross-section for an open channel of trapezoidal section with side slopes of 1 vertical to 2 horizontal, to carry 10 m 3 /s, the bed slope being 1/2000. Assume Manning coefficient as 0.022.

(OR)

b) Derive dynamic equation for GVF.

c) Explain direct step method.

3) a) What do you mean by dimensional numbers? Name any four dimensional numbers. Define and explain Reynolds's number, Froude's number and Mach number. Derive expressions for any above two numbers.

b) What is meant by geometric, kinematic and dynamic similarities?

(OR)

c) What are the methods of dimensional analysis? Describe the Rayleigh's method for Dimensional analysis.

d) Explain the terms: distorted models and undistorted models. What the use is of distorted Models?

4) a) Define the specific speed of the turbine? Derive an expression for the specific speed. What is the significance of specific speed of the turbine.

b) Two jets strike at bucket of a Pelton wheel, which is having shaft power as 14,715 kW. The diameter of each jet is given as 150 mm. If the net head on the turbine is 500 m, find the overall efficiency of the turbine. Take Cv = 1.0

(OR)

c) What are hydro electric power plants? Also give the advantages and disadvantages.

d) A single acting reciprocating pump running at 50 r.p.m., delivers 0.01m3 /s of water. The diameter of the piston is 200 mm and stroke length 400 mm. Determine the theoretical discharge of the pump, coefficient of discharge, slip and percentage slip of the pump.

SECTION-B

Answer any five Questions. (5X3 = 15M)

a) When do you call the flows as critical, sub critical and super critical flows?
b) Give the advantages of Dimensional analysis.
c) A jet of water strikes with a velocity of 40 m/s a flat plate inclined at 300 with the axis of the jet. If the cross sectional area of the jet is 25 cm2 determine the force exerted by the jet on the plate.
d) What is bondage factor?
e) What are constant head characteristic curves?
f) What does an indicator diagram represent?
g) What is Thomas cavitations factor?
h) Give any three disadvantages of hydroelectric power plants.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-II Semester PCC-CE-403: STRUCTURAL ANALYSIS
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions. (4x15=60M)

1) a) Explain Castigliano's first theorem with application of simple beams. (8M)

b) A simply supported beam of span 'L' carries a uniformly distributed load of 'w' per unit length over the length over entire span .Find the deflection at mid span by Castigliano's theorem-I (EI=C0nstant). (7M)

(OR)

c) Find the vertical deflection of the joint 'C' of a simply supported triangular truss. ABC(Pin-jointed) carrying a point load W at C. All members are of equal length 'L' and EI= Constant. (7M)

d) Explain Maxwell-Betti's reciprocal theorem. (8M)

2) a) Determine the value of maximum positive and negative shear forces and bending moment for a beam carrying a moving uniformly distributed load longer than the span. (15M)

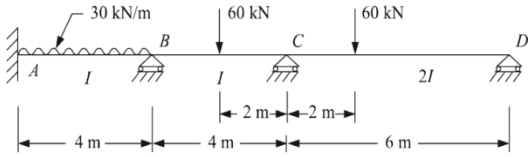
(OR)

b) A Uniform load of 40 kN/m ,6 m long crosses a girder of 25 m span. Calculate the maximum shear force and bending moment at a section 10 m from left hand support. Also find out the maximum shear and the absolute maximum bending moment in the beam.
(15M)

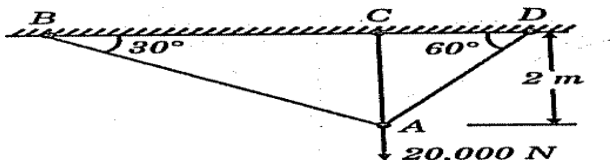
3) a) A fixed beam of 6m span is loaded with point loads of 150 kN at a distance of 2 m from each Support
.Draw the bending moment diagram and shear force diagrams. Find also the maximum deflection. Take E= $2X10^8$ kN/m^2 ,I=$8X10^8$$mm^4$.
(15M)

(OR)

b) Analyze the continuous beam shown in figure, using three-moment equation. Draw S.F and B.M diagrams.
(15M)

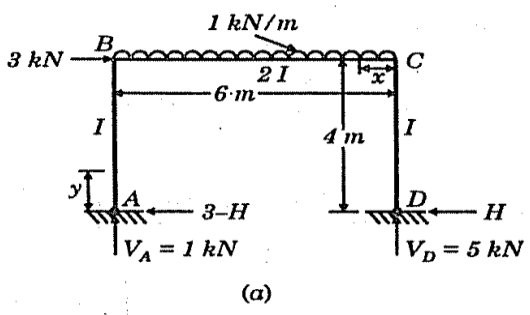


4) a) Analyse the frame shown in figure below member AB and AD have area of 4 cm^2. Determine deflection of 'A'. Take E = 2.1X 10^5 N/mm2. (15M)



(OR)

b) Analyse the hinged based portal frame shown in figure a below by strain energy method?



(15M)

SECTION-B

Answer any five Questions (5X3 = 15M)

a) State the Castigliano's theorem -I.
b) Derive the expression for strain energy in linear elastic system due to bending moment
c) Discuss the effects of moving loads on a simply supported girder.
d) What do you understand by the term 'moving loads
e) Draw the BMD for propped cantilever with prop at free end carrying a point load at centre.
f) List the different types of statically indeterminate beams..
g) Define strain energy .
h) Write a short note on composite structure.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech Civil Engineering II-II Semester
PCC-CE-404: TRANSPORTATION ENGINEERING (MODEL QUESTION PAPER)
Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions. (4× =60M)

1) a). Briefly outline the highway development in India also write it's any two practical examples. **(8M)**

b). Write about various road patterns? **(7M)**

(OR)

c). Compare Nagpur & Bombay Road development plans? What are the differences between good and improper alignment? **(8M)**

d). What are the objects of reconnaissance in engineering surveys? **(7M)**

2) a). Derive an expression for finding the stopping sight distance at level and at grades. **(8M)**

b). Calculate the minimum sight distance required to avoid a head on collision of two cars approaching from opposite direction at 90 and 60kmph.coefficient friction of 0.7 and a brake efficiency of 50%, in either case. **(7M)**

(OR)

c). Calculate the stopping sight distance on a highway at a descending gradient of 2% for design speed of 80 kmph, assume other data as per IRC specification. **(7M)**

d). Explain briefly about highway cross section elements. **(8M)**

3) a). What the objectives and application are of spot speed studies? **(8M)**

b). What are the advantages and disadvantages of traffic signal? **(7M)**

(OR)

c). Write a note on street parking studies? **(7M)**

d).Write the causes and preventive measures of road accidents. **(8M)**

4) a). Enumerate the various methods of flexible pavement design. **(15M)**

(OR)

b).What are the requirements of materials, plants and equipments for CC road construction? Discuss briefly. **(15M)**

SECTION-B

Answer Any FIVE questions. (5×3 = 15 M)

a) What are the salient features of Jayakar Committee report?.
b) What are the various factors affecting highway alignment?
c) What are the objectives of highway geometric design?
d) Write a short note on SSD.
e) Discuss the scope of traffic engineering?
f) Write a short note on road marking.
g) List out various tests conducted for road aggregate.
h) List out various tests conducted for bituminous materials.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech (Common for Mechanical Engineering, Civil Engineering) II-II Semester
HSMC-ME-405, HSME-CE-405: MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions. (4x15=60M)

1. a) What is managerial economics? Explain its nature and significance.

   (OR)

   b) What do you understand by elasticity of Demand? Explain the factors governing it.

2. a) Discuss about different costs in cost analysis.

   (OR)

   b) A hi-tech rail can carry a maximum of 36000 passengers per annum at a fare of Rs.400. the variable cost per passenger is Rs.150 while the fixed costs are 25, 00,000/- per year. Find the break- even point in terms of number of passengers and also in terms of fare collection.

3. a) Explain the advantages and disadvantages of partnership firm.

   (OR)

   b) Discuss the business challenges in the era of globalization.

4. a) What is capital budgeting? Explain the significance of capital budgeting.

   (OR)

   b) What is ratio analysis? Discuss the different types of balance sheet ratios.

SECTION-B

Answer any five Questions. (5X3 = 15M)

5.

a) Explain Law of demand and types of demand
b) Write about Isoquants and Isocosts
c) Explain the objectives of pricing
d) What are the profitable ratios?
e) Write about the joint stock company
f) Explain the features of Monopoly competition.
g) How to determine the demand
h) Explain about the financial statements

Branch/Course: Civil Engineering Semester V (Third year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PCC-CE501	Concrete Technology	75	25	100	3	0	0	3
PCC-CE502	Environmental Engineering	75	25	100	3	0	0	3
PCC-CE503	Geotechnical Engineering	75	25	100	3	0	0	3
OEC-CE504	**Open Elective – I** 1. Construction Management 2. Smart Cities 3. Green Technology	75	25	100	3	0	0	3
PEC-CE505	**Professional Elective – I** 1. Reinforced Soil Structures 2. Railways & Airport Engineering 3. Remote Sensing & GIS	75	25	100	0	0	3	3
LC-CE506	Concrete Technology Lab	50	50	100	0	0	3	1.5
LC-CE507	Environmental Engineering Lab	50	50	100	0	0	3	1.5
MC-CE508	Constitution of India	75	25	100	2	0	0	0
MC-CE509	Skill oriented course	--	50	50	1	0	2	2
Summer Internship 2 Months (Mandatory) after second year(to be evaluated during V semester					0	0	0	1.5
	Total Credits							**21.5**

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

PCC-CE501, CONCRETE TECHNOLOGY

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Write about retarders, accelerators and plasticizers. (7M)

b) Write about gap graded and well graded aggregate. (8M)

(OR)

c) List out various tests conducted for cement. Explain any one test procedure (7M)

d) Bring out a detailed discussion on Alkali Aggregate reaction? Discuss the factors promoting and methods to control. (8M)

2. a) Explain workability of concrete? (7M)

b) Explain the Vee-bee method of determining workability with neat sketches (8M)

(OR)

c) Explain the significance of the tests on concrete at fresh state while we are interested only in concrete at hardened state?. (8M)

d) Discuss the factors affecting bleeding of concrete. (7M)

3. a) Write a brief note on factors affecting modulus of elasticity. (8M)

b) Explain in detail the classification of Shrinkage. (7M)

(OR)

c) Design a concrete mix of M25 grade for a roof slab. Take a Standard deviation of 4MPa. The specific gravities of Coarse Aggregate and Fine Aggregate are 2.75 and 2.58 respectively. The bulk density of coarse aggregate is 1630kg/m3 and fineness modulus of fine aggregate is 2.78. A slump of 60mm is necessary. The water absorption of coarse aggregate is 1% and free moisture in fine aggregate is 2%. Design the concrete mix using IS code method. Assume any missing data suitably. (15M)

4.a) What are the factors affecting properties of fiber reinforced concrete? (8M)

b) Difference between High performance concrete and high density concrete. (7M)

c) Explain the following, i) Light weight aggregate concrete ii) SIFCON iii) Types of polymer concrete (15M)

SECTION-B

2. **Answer any five Questions** **5X3 = 15M**

a) What is alkali aggregate reaction?
b) Write about Hydration of cement.
c) What is water cement ratio?
d) Define workability?
e) What is creep of concrete? What are the factors affecting creep?
f) What is durability of concrete?
g) Write a short note on High performance concrete.
h) What is FRC? What are the different types of fibres?

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

PCC-CE502 ENVIRONMENTAL ENGINEERING

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Explain the importance and necessity of protected water supply system. (7M)
   b) Draw the flow chart of public water supply system and discuss it. (8M)

(OR)

   c) Discus the role of Environmental Engineer. (8M)
   d) Discuss the factors affecting water demand. (7M)

2. a) Explain in detail about the types of water bearing formations. (8M)
   b) Distinguish between gravity well and pressure well. (7M)

(OR)

   c) Discuss the merits and demerits of different kinds of pipes. (8M)
   d) Explain in detail about the various types of wells with the help of sketches. (7M)

3. a) Describe in brief various tests conducted for physical examination of water. (8M)
   b) Discuss the bacteriological analysis of water. (7M)

(OR)

   c) What do you understand by membrane filter technique? Describe. (7M)
   d) Explain in detail the procedure for determination of MPN index of a water sample. (8M)

4. a)Distinguish between Hardy cross method and equivalent pipe method. (8M)
   b)Describe the analysis of distribution networks and its merits and demerits of methods. (7M)

(OR)

c) Explain in detail about the various methods of distributing water system and discuss the advantages and disadvantages of each. (15)

SECTION-B

5. Answer any five Questions **5X3 = 15M**

a**)** What are the objectives of water supply systems?

b) Write about the water borne diseases.

c) Discuss about conveyance of water.

d) What are factors governing the selection of the intake structure.

e)Why alum is commonly used coagulant? Write down the reaction.

f) Discuss the factors effecting sedimentation.

g) Discuss about chlorination.

h) Write a short note on air valves and sluice valves.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

PCC-CE503: GEOTECHNICAL ENGINEERING

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions

1. a) Explain: i) Field compaction control ii) Method of compaction (7M)

b) Derive the relation between bulk unit weight of the soil, specific gravity of soil solids, void ratio, water content, and unit weight of the water. (8M)

(OR)

c) Explain various types of soil classification. (8M)

d) The moist unit weight of a soil is 16.50kN/m3. Given that the water content 15% and specific gravity of soil solids = 2.70, find the dry unit weight, porosity, degree of saturation the mass of water that must be added to reach full saturation. (7M)

2. a) What are the characteristics and uses of flow nets? (8M)

b) The discharge of water collected from a constant head permeameter in a periodof 15 minutes is 400ml. The internal diameter of the permeameter is 6.0cm andthe measured difference in heads between the two gauging points 15.0cm apartis 40.0cm. Calculate the coefficient of permeability? (7M)

(OR)

c) Describe clearly with a neat sketch how you will determine the coefficient of permeability of a clay sample in the laboratory and derive the expression used to compute the permeability coefficient. Mention the various precautions, you suggest, to improve the reliability of the test results. (8M)

d) Define Quick sand condition and Derive the expression for critical hydraulic gradient. (7M)

3. a) Write a brief critical note on 'Newmark's influence chart'. (8M)

b) A reinforced concrete water tank of size 6 m × 6 m and resting on ground surface carries a uniformly distributed load of 200 kN/m2. Estimate the maximum vertical pressure at a depth of 12 metres vertically below the centre of the base. (7M)

(OR)

c) Explain any one method to compute coefficient of consolidation. (7M)

d) A clay layer 5.0m thick has double drainage. It was consolidated under a load of 127.50kN/m^2. The load is increased to 197.50kN/m2. The coefficient of volume compressibility is 5.79 x 10–4 m2/kN and value of k = 1.60 x 10-8 m/min. If the test sample is 2cm thick and attains 100% consolidation in 2hours, what is the time taken for 100% consolidation in the actual layer? (8M)

4. a) Explain the Mohr-Coulomb strength envelope. What is the effect of pore pressure in strength of soils? (15M)

(OR)

b) The flowing test results are obtained from the direct shear test. Compute the shear strength parameters. Dimensions of the sample are 6 cm X 6 cm X 2 cm. (15M)

Normal stress (kg/cm2)	0.3	0.4	0.5	0.6	0.7
Shear Load (kg.)	6.75	9.0	11.25	13.50	15.75

PART-B

5. Answer any five Questions **5X3 = 15M**

a) Explain the compaction curve.
b) Draw a typical grain size distribution curves for different types of soils.Discuss the effects of moving loads on a simply supported girder.
c) Explain quick sand condition.
d) Write short note on uses of flow nets in the seepage analysis.
e) What is the purpose of a Newmark's chart?
f) When we call soil is over consolidated? Explain with the aid of Stress versus deformation diagram.
g) How is the torque determined in a vane shear test?
h) Differentiate between shear strength parameters obtained from total and effective stress considerations.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

OEC-CE504A: CONSTRUCTION MANAGEMENT (ELECTIVE-I)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions

SECTION-A (4× 15 = 60 M)

Answer ALL questions

1.a. What are the different types of floats involved in CPM? **(8M)**

b. Bring out the differences between bar chart and mile stone chart. (**7M)**

(or)

c. Explain in detail project management constructions. **(8M)**

d. Write the applications of critical path method. (**7M)**

2.a. Draw a PERT network, with the three estimates of each activity. Determine

(i)critical path and its standard deviation.

(ii) Probability of completion of projectin 40 days.

(iii) Time duration that will provide 95% probability of itscompletion in time.

Activity	to	tL	tp
1-2	2	5	8
2-3	8	11	20
3-4	0	0	0
2-4	4	7	16
2-5	4	9	20
4-6	7	10	13
5-6	3	7	17
3-7	3	5	13
6-7	2	3	10
7-8	2	4	6

(8M)

b. What are different elements present in PERT network and explain with an example (**7M)**

(or)

c. Differentiate between crashing for optimum cost and crashing for optimum resources (**7M)**

d. Explain about Resource Analysis and Resource Allocation **(8M)**

3.a. Discuss in detail different factors affecting selection of construction equipment **(8M)**

b. Explain about the compaction equipment and various types of rollers (**7M)**

(or)

c. Mention the various types of handling equipment and their uses. (**7M)**

d. Explain about different trucks used in construction field and write about its capacities. **(8M)**

4.a. Write about quality control and safety engineering in construction. **(8M)**

b. Explain the methods of piling and placing of concrete (**7M)**

(or)

c. Describe the different types of concrete mixers and their uses. **(8M)**

d. Briefly explain about batching and mixing equipment . (**7M)**

SECTION-B (5×3 = 15 M)

Answer Any FIVE questions

5. a) What do you understand by critical path?

b) What is project planning?

c) Define activity cost slope.

d) What a short note on cost analysis.

e) How do you find the capacity of trucks? Discuss it..

f) What are the uses of compaction?

g) What are the various types of earthwork equipment? Mention their uses.

h) Write about placing of concrete

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

OEC-CE504B: SMART CITIES (ELECTIVE-I)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Explain basic principles of urban consultation. **(8M)**

b) Explain the components of urban consultation **(7M)**

(OR)

c) Discuss the urban strategic planning. **(8M)**

d)Discuss the civic engagement and citizenship . **(7M)**

2. a)Explain the various factors impact on urban development. **(15M)**

(OR)

b) Explain about the Informal sector briefly. **(15M)**

3. a) Explain briefly about participatory planning process and policies.

(OR)

b) Explain the role of stake holders programmes **(15M)**

4. a) What are the various facilities to be provided to maintain the urban infrastructure. **(15M)**

(OR)

b) What are the measures required for Slum Improvement ? **(8M)**

c) Explain briefly about building regulations. **(7M)**

SECTION-B

5. **Answer any five Questions** **5X3 = 15M**

a. Write a short note on urban consultations

b. Write a short note on urban strategic planning

c. List out various factors impact on urban development.

d. Explain the location characteristics of settlements.

e. Write a short note on participatory planning process.

f. Write a short note on legislation.

g. Discuss the urban disaster management

h. Explain about Innovation economy

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

OEC-CE504C: GREEN TECHNOLOGY (ELECTIVE-I)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Explain the importance of green technology. **(8M)**
   b)What are the various factors affecting green technologies. **(7M)**

   (OR)

   c)Explain the role of industrial ecology in green technology. **(8M)**
   d)What are the advantages and disadvantages of green technologies. **(7M)**

2. a)Explain briefly about clean production project . **(15M)**

   (OR)

   b)Write a short note on wealth from waste. **(8M)**
   c)Explain clean production the assessment steps **(7M)**

3. a)Explain briefly about Cleaner Production Awareness Plan **(15M)**

   (OR)

   b)Explain the elements of life cycle assessment. **(15M)**

4. a)Explain briefly about solar energy principles, working and their application. **(15M)**

   (OR)

   b)Define green fuels. What are the benefits of green fuels. **(8M)**
   c)List out the various types of biomass energy. Explain any one method briefly. **(7M)**

SECTION-B

5. **Answer any five Questions** **5X3 = 15M**

a) Define green technology.
b) Define cleaner production.
c) Write a short note on clean development mechanism.
d) Explain the Environmental Feasibility analysis.
e) Write a short note on carbon trading.
f) Write a short note on life cycle costing.
g) What are the applications of solar energy.
h) Define Green fuels.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

PEC-CE505A REINFORCED SOIL STRUCTURES (ELECTIVE-I)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain the historical applications of the reinforced soil. **(8M)**

b) Briefly define the different types of geosynthetics. **(7M)**

(OR)

c) What are the advantages and dis-advantages of geosynthetics ? **(8M)**

d) Explain the functions and applications of geosynthetics. **(7M)**

2.a) Explain briefly about creep and long-term performance of geosynthetics. **(15M)**

(OR)

b) Explain the physical properties of geosynthetics. **(8M)**

c) List out the various factors affecting the performance and behaviour of reinforced soil **(7M)**

3. a) Explain the construction methods of reinforced retaining walls. **(15M)**

(OR)

b) What are the benefits of using Geo-synthetics in pavements? **(7M)**

c) Check the RE wall of 6m height for external stability. The allowable bearing pressure is 300kPa.

Wall fill	Back fill
$\Phi=35^{\circ}$	$\Phi=30^{\circ}$
$\Upsilon= 20\ kN/m^3$	$\Upsilon =18\ kN/m^3$

The RE wall carries a surcharge load of 24kPa. Assume $\delta= 26^{\circ}$ **(8M)**

4. a)Explain briefly about improvement of bearing capacity by using soil reinforcement. **(8M)**

b) Explain the different types of erosion control products. **(7M)**

(OR)

c) Explain Tie back wedge analysis and Coherent gravity analysis with detailed figures. **(8M)**

d) List the advantages and disadvantages of natural geotextiles. **(7M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a) List out various types of geosynthetics.

b) Write a short note on geo-grids.

c) Write a short note on properties of geosynthetics.

d) Explain the pseudo cohesion concept.

e) Write a short note on external stability of vertically faced reinforced soil retaining walls.

f) Write a short note on internal stability of vertically faced reinforced soil retaining walls.

g) Write a short note on short term stability of embankments on soft soils by using geosynthetics.

h) What are the advantages of natural geotextiles?

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM
B Tech (Civil Engineering) III-I Semester
PEC-CE505B: RAILWAYS & AIRPORT ENGINEERING (ELECTIVE-I)
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain various theories of creep of rails. **(8M)**
b) Explain briefly about functions of ballast. **(7M)**

(OR)

c) Explain briefly about functions of sleepers. **(8M)**
d) Determine the length of transition curve and draw the offsets at every15m.Given that the design speed of the train on curve is 90 kmph on a B.G track. **(7M)**

2.a) How do you define the super elevation? What are the objects of providing super elevation on curves of a railway track? **(15M)**

(OR)

b)What is meant by crossing? Discuss the various types of crossings. **(8M)**
c) Explain briefly a bout classification of signals. **(7M)**

3. a). Explain structural functions of airport pavement layers with a typical sketch showing component layers of the pavement. **(15M)**

(OR)

b) Draw a neat sketch to show how lighting is done on a runway. What are the advantages of narrow gauge of lighting pattern? **(8M)**
c)What are the various factors to be considered in the selection of site for airport. **(7M)**

4. a) What are the requirements of good ports? Discuss the function of each component of harbour . **(8M)**
b) What is a transit shed? List the important factors influencing the size of transit shed? **(7M)**

(OR)

c) Suggest the remedies to reduce siltation and erosion in harbour layout. **(8M)**
d) Explain the different types of temporary breakwaters with neat sketches. **(7M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a) Describe about grade compensation on curves.
b) Outline the essential objectives of the various surveys need to be under taken for the construction of new railway line.
c) Write a short note on diamond crossing..
d) Draw a neat sketch of line diagram of left hand turn out.
e) What are the various Aircraft characteristics considered for Airport planning?
f) Explain the factors which effect the location of exit taxiway?
g) What are the requirements of harbours?
h) Write a short note on dredging.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

PEC-CE505C: REMOTE SENSING & GIS (ELECTIVE-I)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Discuss about different types of sensors used in the remote sensing **(8M)**

b) Explain wave model of electromagnetic radiation. What is electromagnetic spectrum? **(7M)**

(OR)

c) Discuss the following

(i) Band interleaved by pixel (ii) Band interleaved by line **(15M)**

2.a) Explain the term 'visual image interpretation'. Discuss the various image interpretation elements **(8M)**

b) Explain the following Image Enhancement Techniques

i) Image reduction & magnification

ii) Contrast enhancement **(7M)**

(OR)

c) Define GIS. Describe the key components of GIS. **(7M)**

d) Explain the importance and applications of GIS. **(8M)**

3. a) Define proximity and what do you mean by optimal path. **(8M)**

b) What is raster overlay? Explain with suitable examples. **(7M)**

c) What do you mean by Vector overlay? Explain Point -in –polygon overlay, Line on-polygon overlay, Polygon-on-polygon overlay. **(15M)**

(OR)

4. a) Explain the remote sensing application in land use and land cover studies. **(8M)**

b) Explain the use of RS GIS techniques in Forestry applications. **(7M)**

(OR)

c) Discuss the methodology with flowchart RS and GIS application to ground water prospects studies. **(15M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a. Write a short note on In situ data and Electromagnetic Radiation.

b. What are the ideal atmospheric conditions for remote sensing?

c. What are the image processing techniques

d. List out the key components of Geographic Information system.

e. Write a short note on Spatial data analysis.

f. Comparison between spatial data and non spatial data

g. Write a short note on land use and land cover.

h. What the main objectives of watershed management program?

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-I Semester

MC-CE508: CONSTITUTION OF INDIA

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Describe the silent features of the constitution of India **? (8M)**

b) Explain briefly about fundamental rights of the citizens ? **(7M)**

(OR)

c) Discuss the following

(i) Constitutional history

(ii) Citizenship **(15M)**

2.a) Explain the central state relationship **(15M)**

(OR)

b) Discus the role and powers of president **(15M)**

3. a) Discus the role of mayors municipalities **(15M)**

(OR)

b) Explain briefly about the Importance of grass root democracy **(15M)**

4. a) Explain the Role of Chief Election Commissioner and Election Commissionerate State Election Commission . **(15M)**

(OR)

b) Explain the various functions of women welfare commission briefly **(15M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a) List out the various duties of citizens.
b) Write a short note on principles of state policy
c) Write a short note on Federalism.
d) List out any four functions of supreme court.
e) What is the role of district administration head.
f) Explain the role of elected officials role in panchayat.
g) List out any four functions of women welfare commission.
h) List out any four functions of OBC commission.

Branch/Course: Civil Engineering Semester VI (Third year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PCC-CE601	Design & Drawing of Reinforced Concrete Structures	75	25	100	3	0	0	3
PCC-CE602	Water Resources Engineering	75	25	100	3	0	0	3
PCC-CE603	Design & Drawing of Steel Structures	75	25	100	3	0	0	3
PEC-CE604	**Professional Elective-II** 1. Prestressed Concrete 2. Estimation, Specifications and Contracts 3. Foundation Engineering	75	25	100	3	0	0	3
OEC-CE605	**Open Elective-II** 1. Disaster Management 2. Elements of Coastal Engineering 3. Project Management	75	25	100	3	0	0	3
LC-CE606	Geotechnical Engineering Lab	50	50	100	0	0	3	1.5
LC-CE607	CAD Lab	50	50	100	0	0	3	1.5
LC-CE608	Surveying Field Work – II	50	50	100	0	0	3	1.5
MC-CE609	Skill oriented course				1	0	2	2
	Total Credits							**21.5**

Summer Internship 2 Months (Mandatory) after third year (or) Miniproject (to be evaluated during VII semester

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-II Semester

PCC-CE601: Design & Drawing of Reinforced Concrete Structures

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) What are the assumptions made in the elastic theory of reinforced concrete sections? Explain. (7M)

b) Explain clearly the concept of assigning different safety factors for different type of loads. (8M)

(OR)

c) Neatly sketch and define the stress block parameters of reinforced concrete element. Also mention the limiting values of neutral axis (Xu) of rectangular R/C section ifFe415 and Fe500 grade steel used. (7M)

d) Find the cross sectional area of concrete and steel for a R.C simply supporte rectangular beam of effective span4m, carrying dead load 2kN/m and live load 4kN/m. Use concrete grade M20 and HYSD steel Fe415.(Use working stress method).Assume the following data. Steel young's modulus Es=2.1x105MPa, modular ratio m=13, clear cover=40mm. (8M)

2. a)Determine the minimum effective depth required and the corresponding area of tension reinforcement for a rectangular beam having a width of 200 mm to resistant ultimate moment of 200 kN-m. Using M-20 grade concrete and Fe-415 HYSD bars. (15M)

(OR)

b) A simply supported rectangular R.C beam300x450mm depth, consist 4nos 16mmdiameter tension reinforcement and 2nos 12mm diameter compression reinforcement at 30mm clear cover. Find out the moment capacity of beam if concrete grade M25 and HYSD steel Fe500 used. (15M)

3.a) Design a R.C slab of effective size 3mx8m simply supported on four edges and carrying live load 6kN/m2. Assume the corners are restrained at ends. Design the slab for shear, bending and torsion (use I.S code method). Use M20 grade concrete and Fe415 steel. (15M)

(OR)

b) Design a continuous slab 8 m x 16 m resting on 250 mm wide monolithic casted beams that are spacing at 4 m center to center and arranged in short span direction. Assume the super imposed load 10 kN/m^2 and use concrete M25, steel Fe415. (15M)

4.a) Design an isolated square footing to carry column load 600 kN and moment 30 kN- respectively. Assume safe bearing capacity of soil 120 kN/m2 and use concrete grade M25 and Steel reinforcement Fe415. Apply relevant design checks for strength and serviceability conditions. (Use Limit State Method). (15M)

b) Design the reinforcement of R.C square column 300x300mm size fixed at both ends over a clear height of 6m .The column carrying axial load 30kN and moment2kN-m .Apply relevant design checks and

neatly detail the reinforcement. Use concrete grade M25 and HYSD steel Fe500. (15M)

SECTION-B

5.Answer any five Questions **5X3 = 15M**

a. What are the assumptions made in the Limit state method.
b. What are the assumptions made in the working stress method .
c. What are the major factors which influence the crack width in flexural members?
d. Define double reinforced beams.
e. Are the nominal detailing requirement of the code adequate for ensuring crack width control? Comment.
f. Why it is necessary to limit deflection in reinforced concrete flexural member?
g. What are the advantages of providing pedestal to column.
h. Under what circumstance is a trapezoidal shape preffered to a rectangular shape for a two columns combined footing.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-II Semester

PCC-CE602: WATER RESOURCES ENGINEERING

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Discuss with a neat sketch the Hydrological cycle indicating different components and their significance. (8M)

   b) Explain step by step the procedure adopted for preparing the depth-area-duration curve for a particular storm, in a basin having a number of recording rain gauges. (7M)

(OR)

   c) Describe various types and forms of precipitation. (8M)

   d) Thiessen polygons constructed for a network of 10 rain gauges in a river basin yielded Thiessen weights of 0.10, 0.16, 0.12, 0.11, 0.09, 0.08, 0.07, 0.11, 0.06 and 0.10. The rainfalls recorded at these gauges during a cyclonic storm are 135, 115, 160, 140, 208, 150, 135, 160, 170, and 150 mm respectively. Determine the average depth of rainfall by Thiessen mean and Arithmetic mean methods. Also determine the volume of surface runoff at the basin outlet if 35% of the rainfall is lost as infiltration. Take the area of the basin as 5000 Km^2 and express your answer in million cubic metres (7M)

2. a) Define Hydrograph. What are the components of Hydrograph? Explain any one method of base flow separation (8M)

   b) Explain the use of unit hydrograph in the construction of flood hydrograph resulting from two or more periods of rainfall. (7M)

(OR)

   c) Table below gives ordinates of 6-hr Unit Hydrograph. Derive ordinates of 3-hr Unit Hydrograph for the same catchment?

Time(Hrs)	0	3	6	9	12	15	18	21	24
Ordinates of 6-Hr UH (m3/sec)	0	10	20	30	40	30	20	10	0

(8M)

   d)Explain in detail about the various types of wells with the help of sketches. (7M)

3. a) Describe step by step procedure that you will adopt for flood routing computations required for reservoirs under trial and error method. (8M)

   b) Discuss the various problems encountered during the operation of flood control reservoirs. (7M)

(OR)

c) For a date of maximum recorded flood of a river, the mean and standard deviation are 4500m3/s and 1700m3/s, respectively. Using Gumbel's extreme value distribution, estimate the return period of a design flood of 9500m3/s. Assume an infinite sample size.. (7M)

d) Derive Muskingum equation and incidentally determine the coefficients there in. What is the sum of the coefficients. (8M)

4. a) Write a short note on the following:
(i) storage coefficient and (ii) yield of a open well-recuperation (8M)

b) A 30 cm well completely penetrates an unconfined aquifer of depth 40 m. After along period of pumping at a steady state of 1580 lpm, the drawdown in two observation wells 25 m and 75 m from the pumping well were found to be 3.5 m and2.0 m respectively. Determine the transmissibility of the aquifer. What is the drawdown at the pumping well?. (7M)

(OR)

c) Discuss different types of aquifers and Explain the various aquifer parameters. (8M)

d) What are the steps involved in rainfall-runoff modeling? (7M)

SECTION-B

5.Answer any five Questions **5X3 = 15M**

a**)** Disuses the factor affecting infiltration.

b) List out various factors affecting evaporation.

c) Explain Unit Hydrograph with sketch.

d) Differentiate between total runoff and surface runoff.

e) Define design flood, standard project flood and probable maximum flood.

f) List out the objectives of flood mitigation methods.

g) Enumerate the factors affecting the safe yield and specific yield.

h) State the advantages of hydraulic model studies.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-II Semester

PCC-CE603: DESIGN & DRAWING OF STEEL STRUCTURES

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions

1. a Design a splice using bolts for a beam column 5 m high subjected to a factored axial load of 600 kN at an eccentricity of 125 mm along the minor axis. Assume that the ends of the beam column are milled for complete bearing. The section of the beam column is HB 400. (15M)

(OR)

b) Design a connection to joint two plates of size 200 mm x 10 mm of grade Fe 410 to mobilize full plate tensile strength using shop fillet welds if (i) a lap joint is used
(ii) a double cover butt joint is used (15M)

2. a) Design a continuous beam of span 5.0 m, 6 m and 5.0 m carrying a total uniformly distributed load of 30 kN/m and laterally unrestrained with a bearing length of 100 mm (15M)

(OR)

c) Design a laterally restrained simply supported beam section of 6 m clear span and carrying factored UDL: 30 kN/m. Assume stiff bearing length 125 mm. Apply necessary design checks. (15M)

3. a) An upper storey column ISHB 300 @577N/m carries a factored load of 1200kN and a factored moment of 12kN-m. It is to be spliced with lower storey column ISHB400@806N/m. Design a suitable splice.. (15M)

(OR)

b) Design a bridge truss diagonal subjected to a factored tensile load of 400 kN. The length of the diagonal is 3.0 m. The tension member is connected to a gusset plate 16 mm thick with one line of 20 mm diameter bolts of grade 8.8. (15M)

4.a) Design a welded plate girder for a simply supported bridge deck beam with a clear spaof 18 m. Dead Load including self weight = 20 kN/m and imposed load = 10 kN/m. Two moving loads of 100 kN each spaced 2 m apart. Assume the top compression flange of the plate girder is restrained laterally and prevented from rotating. Design as an unstiffened plate girder with thick welds. Draw the plan and sectional elevation. (15M)

(OR)

b) Design a gantry girder for an industrial building to carry an electric overhead traveling crane with the following data. Crane capacity is 300 kN. Weight of crane excluding crab is 200kN. Weight of crab is 5 kN. Span of crane between rails is18 m. Minimum hookapproach is 1.0 m. Wheel base is 3.0 m. Span of gantry girder is 9 m. Weight of rail section is 30 kg/m. Assume any missing data. Draw to scale the cross section and longitudinal section. (15M)

PART-B

5. Answer any five Questions **5X3 = 15M**

a. What is lap joint? What are the different types of lap joints?
b. Define slenderness ratio?
c. What are the different types of beam sections?.
d. What is the maximum deflection that is to be allowed in steel beams ?
e. What are purlins ? Write its use.
f. What is roof truss? What are the different parts of roof truss?
g. What is the maximum spacing of vertical stiffener in plate girder
h. What is the purpose of providing bearing stiffener in plate girder.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-II Semester

PEC-CE604A: PRESTRESSED CONCRETE (Professional Elective-II)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **(4× 15 = 60 M)**

2.a) A prestressed concrete pile 250 mm square, contains 60 pre-tensioned wires, each of 2mm diameter,

1.a)Define Prestressed concrete and bring out the differences between RCC and PSC. **(8M)**

b)What is the necessity of using high-strength concrete and high tensile steel in prestressed concrete?. (**7M)**

(or)

c) What is Pre-stressing and explain different types of Prestressing. **(7M)**

d) Explain with sketches Freyssinet system of post-tensioning. (**8M)**

uniformly distributed over the section. The wires are initially tensioned on the prestresssing bed with a total force f_o 300 kN. Calculate the final stress in concrete and the percentage loss of stress in steel after all losses, given the following data :

Es = 210 kN/mm2 & Ec = 32 kN/mm2

Shortening due to creep = 30 x 10-6 mm/mm per N/mm2 of stress

Total shrinkage = 200 x 10-6 per unit length

Relaxation of steel stress = 5 per cent of initial stress

Prestressing force, P = 300 kN **(15M)**

(or)

b) List out the various types of losses in pre tensioning and post tensioning. (1**5M)**

3.a) A concrete beam having a rectangular section 100 × 300 mm is prestressed by parabolic cable with an initial prestressing force of 240 kN. The cable has an eccentricity of 50 mm at the centre and concentric at the supports. If the span of the beam is 12 m and subjected to a live load of 5 kN/m. Calculate the short term deflection at midspan. Assume Ec = 38 kN/mm2, creep coefficient = 2, loss of prestress = 20%. Estimate the long-term deflection. (**8M)**

b) Discuss the various methods of predicting long term deflections (**7M)**

(or)

c) What are the factors influencing the short term and long term deflection. (**8M)**

b)A pretensioned T-section has a flange which is 300 mm wide 200 mm thick. The rib is 150 mm wide by 350 mm deep. The effective depth of the cross section is 500 mm. Given Ap = 200 mm2, fck = 50 N/mm2 and fp = 1600N/mm2, estimate the ultimate moment capacity of the T-section using the Indian standard code regulations. **(8M)**

4.a) Explain the various modes of failure encountered in prestressed concrete beams subjected to bending, shear and torsion. **(8M)**

b) What are the codal provisions for design of shear and torsion? (**7M)**

(or)

c) A pretensioned girder having a T-section is made up of a flange 200 mm width and 60 mm thick. The overall depth of the girder is 600 mm. The thickness of web is 60 mm. The Horizontal prestressed at a point 300 mm from the soffit is 10 N/mm2. The shear stress due to Transverse load acting at the same point is 2.5 N/mm2. Determine the increase in the principal Tensile stress at this point if the T-section is subjected to a torque of 2 kN-m. **(8M)**

SECTION-B **(5×3 = 15 M)**

Answer Any FIVE questions

a. What are the applications of prestressed concrete?
b. Discuss the basic assumptions in analysis of prestressed.
c. Why loss due shrinkage is more for pre tensioned member compared to post tensioned member and describe about friction loss in a post tensioned member?
d. What are the different types of flexural failure modes observed in prestressed concrete beams?
e. List the factors influencing the short term and long term deflections of prestressed concrete members.
f. What type of stress blocks are adopted in Indian code specifications of flexural strength computations?
g. Explain the ways by which shear resistance of structural concrete members can be improved.
h. Describe the shear and principal stresses.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-II Semester

PEC-CE604B: ESTIMATION, SPECIFICATIONS AND CONTRACTS

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain principle units for various items of work in building. **(8M)**

b) Write clear note abstract estimates. **(7M)**

(OR)

c) What is approximate estimate and explain about the importance of approximate estimate and item rate also? **(15)**

(OR)

2. a) Find the rate of one cubic metre for the following as per the rate analysis
(i) Plastering 1:4
(ii) R.C.C work 1:2:4 **(15)**

(OR)

b) Give the rate analysis for
(i) Earthwork excavation for 1.cu.m
(ii) 1: 3: 6 Cement Concrete **(15)**

3. a) Calculate the quantity of earthwork in embankment for a portion of channel with the following data:
Bed width = 3.75 m, Free Board = 40 cm , Side slope of banking = 1:1
Full supply depth = 1 m

Distance (m)	0	30	60	90
Ground Level (m)	225.24	224.8	224.43	224.12
Proposed bed leve(m)	224	223.94	223.88	223.82

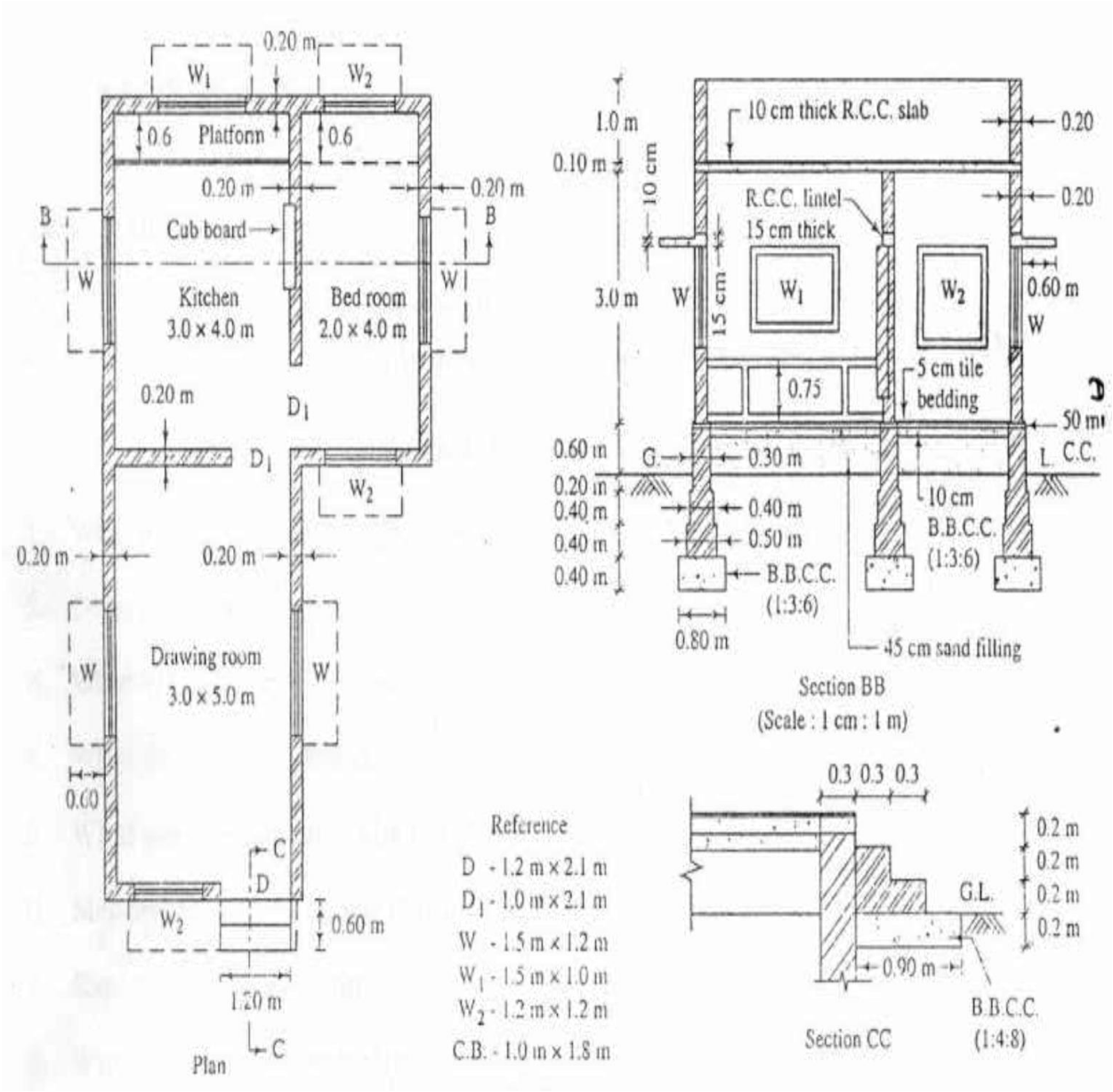
(OR)

b)Estimate the quantity of steel for a foundation with column and tabulate the bar bending schedule with neat sketch. **(15M)**

4. a) What do you understand about the contracts and a contractor and explain? **(7M)**
b) What are the different types of contracts and explain in brief? **(8M)**

(OR)

c) Prepare detailed estimate for the building using center line method as shown in figure below.
Assume necessary data if needed. **(15M)**



SECTION-B

5. **Answer any five Questions** **5X3 = 15M**

a. Write a short note on detailed estimates.
b. Write a short note on approximate method of Estimating.
c. List out and discuss various features involved in fixing the rate per unit of an item.
d. Write a short note on detailed estimates.
e. Write a short note on approximate method of Estimating.
f. List out and discuss various features involved in fixing the rate per unit of an item.
g. List out various types of contracts.
h. Write a short note on specifications.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-II Semester

PEC-CE604C: FOUNDATION ENGINEERING

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain briefly about general bearing capacity equation **(15M)**

(OR)

b) Explain briefly about Settlement analysis. **(15M)**

2.a)Explain different types of isolated and combined footings **(15M)**

(OR)

b)Discuss the allowable bearing capacity of mats founded in clays and granular soils. **(15M)**

3. a) Explain briefly about Davisson and Gill method **(15M)**

(OR)

b)Discuss about fixed and free earth support methods **(8M)**

c)List out various types of piles. Explain any one with neat sketch. **(7M)**

4. a) Define swell potential. What are the various factors affecting swell potential . **(8M)**

b) Write a short note on under-reamed piles **(7M)**

(OR)

c) Define swelling pressure. What are the various factors affecting swelling pressure. **(8M)**

d) Write a short note on foundations in expensive soils. **(7M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a. Describe bearing capacity of Layered Soils.

b. Explain Bearing capacity of foundations at the edge of the slope.

c. List out various types of Isolated footings.

d. Write a short note on combined footing.

e. Write a short note on negative skin friction

f. List out various types of piles .

g. Define swelling pressure.

h. What are the various factors affecting swell potential.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-II Semester

OEC-CE605A: DISASTERMANAGEMENT (OPEN Elective-II)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain the classification of environmental hazards. **(8M)**

b) Explain the various disasters affecting the environment. **(7M)**

(OR)

c) Define disaster and list out the important perceptions on disasters **(8M)**

d) What are the different types of drought? Suggest relief and rehabilitation measures for any two types of drought. **(7M)**

2.a) Describe the different type of man induced hazards. **(8M)**

b) Discuss in detail the fire hazards **(7M)**

(OR)

c)Explain the climate change risk rendition. **(8M)**

d) Explain the emerging infectious diseases. **(7M)**

3. a) Explain the role of multimedia technology in disaster risk management and training. **(8M)**

b) Explain the various methods of mitigation of earthquake hazards. **(7M)**

(OR)

c) Explain briefly about role of technology in disaster management. **(15M)**

4. a) Explain the Impact of disaster on poverty and deprivation. **(8M)**

b) Explain the necessity of education in disaster risk reduction. **(7M)**

(OR)

c) Discuss the Forest management and disaster risk reduction **(15M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a. What is disaster management?

b. Write a short note on post tsunami hazards along the Indian coast

c. Write down the different types of man induced disasters.

d. Write a short note on fire hazards.

e. Write a short note on agriculture drought assessment by using geospatial information .

f. Explain the role of multimedia technology in disaster risk management

g. Write a short note on community based disaster management.

h. Write a short note on climate change.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) III-II Semester

OEC-CE605C: PROJECT MANAGEMENT (OPEN Elective-II)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) What are the different types of floats involved in CPM?. **(8M)**

b) Describe various phases of project management **(7M)**

(OR)

c) Bring out the differences between bar chart and mile stone chart **(8M)**

d) Show the differences between Critical Path Method and PERT technique **(7M)**

2.a) Explain briefly about Project evaluation and review technique **(15M)**

(OR)

b) What do you understand by updating? Why is it essential? Illustrate the method of updating a network during its execution period. **(15M)**

3. a) List out various types of compaction rollers. Explain any three **(15M)**

(OR)

b) Explain in detail about the trucks and hauling equipment. **(8M)**

c) Discuss in detail different factors affecting selection of construction equipment. **(7M)**

4. a) On what basis cranes are classified. Explain it. Discuss their applications. **(8M)**

b) Write about mixing and placing of concrete . **(7M)**

(OR)

c) Name the equipments needed for compacting concrete and explain their uses in detail? **(8M)**

d) Explain different types of Formwork. **(7M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a) What are the steps involved in project planning?
b) What do you understand by critical path?
c) Discus the advantages of using software's in project management .
d) Write a short note on cost analysis.
e) What is the use of rear dump truck?.
f) What are economical considerations for earthwork equipment?
g) Discuss the merits and demerits of scrapers.
h) Write short note on placing of concrete

Branch/Course: Civil Engineering Semester VII (Fourth year) Curriculum

Code	Course Title	Max Marks		Total Marks	Hours per week			Credits
		Ext	Int		L	T	P	
PEC-CE701	**Professional Elective-III** 1. Finite Element Methods 2. Earth & Rock fill Dams 3. Building Services	75	25	100	3	0	0	3
PEC-CE702	**Professional Elective-IV** 1. Solid Dynamics and Machine Foundations 2. Air Pollution & Control 3. Bridge Engineering	75	25	100	3	0	0	3
PEC-CE703	**Professional Elective-V** 1. Urban Hydrology 2. Ground Improvement Techniques 3. Low-Cost Housing	75	25	100	3	0	0	3
OEC-CE704	**Open Elective-III** 1. Environmental Impact Assessment 2. Earth Retaining Structures 3. Airport Planning and Design	75	25	100	3	0	0	3
OEC-CE705	**Open Elective-IV** 1. Watershed Management 2. Travel Demand Analysis 3. Traffic Safety	75	25	100	3	0	0	3
HSMC-CE706	Industrial Management and Entrepreneurship	75	25	100	3	0	0	3
MC-CE707	Skill oriented course				1	0	2	2
Summer Internship 2 Months (Mandatory) after third year (or) Mini project (to be evaluated during VII semester								3
	Total Credits							**23**

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

PEC-CE701 A: FINITE ELEMENT METHOD (Elective-III)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Discuss about different weighted residual methods with the help of an example? (7M)
   b) Briefly explain the concept of plane stress and plane strain with examples? (8M)

   (OR)

   c) Using the stress-equilibrium equations, derive the governing differential equation for a prismatic bar subjected to body load and traction force? (7M)
   d) Consider the rod as shown in figure 1, where the strain at any point is given by $\in = 1+ 2x2$. Find the tip displacement δ. (8M)

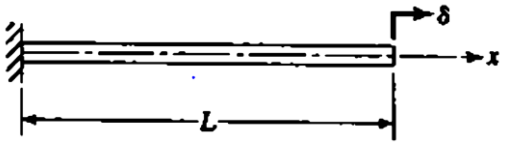


Figure 1

2. a) For the three-bar truss shown in Figure. 2, determine the displacements in node 1 and the stress in element 3.Take A=250 mm2, E =200 GPa. (8M)

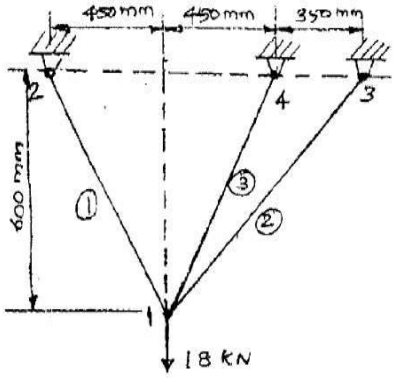


Figure. 2

   b) Derive an expression for stiffness matrix for 2D-truss element? (7M)

   (OR)

   c) For the beam shown in the figure 3, determine the slopes at node 2 and node 3 and vertical deflection at the midpoint of the distributed load. (8M)

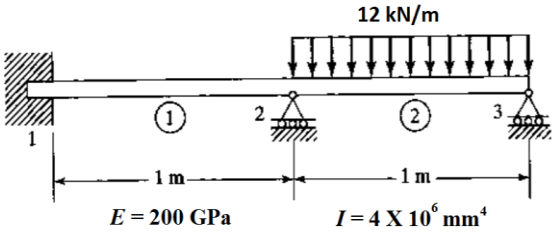


Figure. 3

   d) For two nodded beam element, determine Hermite functions and plot them. Also obtain element stiffness matrix? (7M)

3. a) Explain in detail the applications of iso-parametric elements in two and three dimensional stress analysis? (8M)

b) Use Gaussian quadrature rule (n=2) to numerically integrate. (7M)

$$\int_{-1}^{1}\int_{-1}^{1} xydxdy$$

(OR)

c) Calculate the stiffness matrix for the element shown in figure 4? Co-ordinates are given in mm. Assume plane stress conditions. Take E=2.1X10^5 N/mm^2, υ=0.25, t=10mm. (8M)

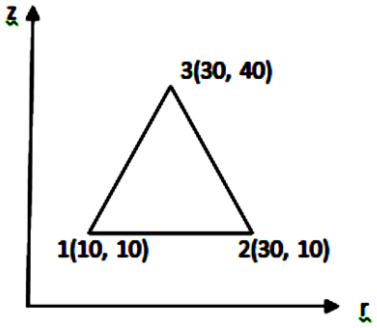


Figure. 4

d) Derive the constitutive matrix for an axisymmetric element? (7M)

4. a) Determine the Eigen values and Eigen vectors of the bar shown in figure 5, Take E=200 GPa, ρ = 2800 kg/m^3, A=0.258 m^2, and L=0.4 m. (15)

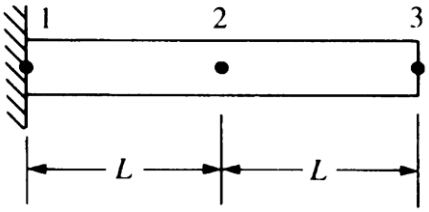


Figure 5

(OR)

b) Derive stiffness matrix for 1-D heat conduction problem? (7M)

c) Explain the following (i) Consistent mass matrix (ii) Lumped mass matrix? (8M)

SECTION-B

5. Answer any five Questions **5X3 = 15M**

a) What boundary conditions are imposed for 1 Dimensional bar element?
b) Write the advantages and applications FEM?
c) Define Eigen value and Eigen vector?
d) List out the assumptions made in the derivation of stiffness matrix?
e) What is the difference between static and dynamic analysis with suitable Examples?
f) Discuss about consistent mass matrix and lumped mass matrix?
g) Write down the governing differential equation for the steady state one dimensional conduction heat transfer?
h) What are shape functions and what are their properties?

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

PEC-CE701 B: EARTH & ROCK FILL DAMS (Elective-III)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

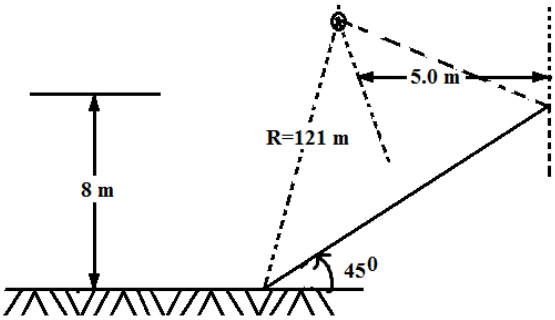
Answer All Questions **4x15=60M**

1. a) Explain general features & types of earthen dam with a neat sketch? (8M)

b) Explain the methods of construction with neat sketches? (7M)

(OR)

c) An excavation to a depth of 8mwith a slope of 1:1 was made in a deep layer of saturated clay having Cu=70kN/m2 and □=0. Determine the factor of safety for a trial slip circle passing through the toe of the cut and having a center as shown in figure. The unit weight of the saturated clay is 15kN/m3. (15M)



2. a) What are the causes of failure of earthen dams? (7M)

b) Write briefly on the slope protection measures? Explain Terzaghi criteria for design of transition filters? (8M)

(OR)

c) Explain about methods of seepage control through embankments? (8M)

d) Explain the design criteria for filters in earth dams? (7M)

3. a) Explain in detail with steps the 'Simplified Bishops' method for stability analysis of Earth dams. Support your answer with necessary equations and calculations? (8M)

b) Write step-by-step computational procedure for factor of safety for an embankment by Using the Ordinary Method of Slices? (7M)

(OR)

c) Explain the various methods of slope stability? (7M)

b) An embankment is inclined at an angle 350 and its height is 15m. The angle of shearing Resistance is 150 and the cohesion intercept is 40kN/m2. The unit weight of soil is 18kN/m3. Examine the factor of safety with respect to cohesion. Consider Taylor's stability number= 0.06. (8M)

4. a) Explain the Stability of Earthen Slopes.

b) Explain the Stability of Downstream Slope during Steady Seepage. (7M)

(OR)

c) Explain the factors affecting shear strength of Rock fill? What are the advantages of upstream impervious membrane over earth core? (8M)

d) What are the basic design requirements for the design of rock fill dam to ensure safety against overtopping, stability and internal erosion? (7M)

SECTION-B

5. Answer any five Questions 5X3 = 15M

a) What is the shear strength as per Coulomb's Law?
b) What are 'earthen dams' and under what circumstances are they preferred?
c) Distinguish between embankment and foundation?
d) Explain the term Phreatic Line in Earth Dams?
e) State the measures for surface protection?
f) What are the possible modes of failure of a soil-reinforcement system?
g) What is the purpose of relief well?
h) Explain the purpose and types of cut-offs?

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

PEC-CE701 C: BUILDING SERVICES (Elective-III)
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Explain - various systems of mechanical Ventilation? (8M)
   b) List four factors affecting selection of artificial lighting? (7M)

   (OR)

   c) What is building management system? Explain its functions & applicability to different services?
   d) How refuge is collected from commercial and residential buildings? (8M+7M)
2. a) Briefly explain the importance of electrical services and its implication on building design? (7M)
   b) Explain the importance of lightening protection system in the buildings. Explain the constraints, procedure and rules governing the same? (8M)

   (OR)

   c) Enlist various disadvantages of building management system? (7M)
   d) Explain importance of earthing system in the buildings. Explain the plate earthing system in detail? (8M)
3. a) Discuss air conditioning with respect to its role & importance along with the principles Govern the air conditioning? What is cooling load & air cycle? (8M)
   b) Explain different types of air conditioning systems with their parts. Also explain where are they used? (7M)

   (OR)

   c) What are the classifications and types of lifts? What are the lift codes and rules? (7M)
   d) Write the main features of fireman's lift? Specify the provisions made for fire safety in National Building Code? (8M)
4. a) What do you understand by absorbtion of sound? How does this take place? Name various absorptive surfaces? (8M)
   b) What are the important criteria for classification and selection of acoustical materials for auditorium schools? (7M)

   (OR)

   c) What is a Green Building? Discuss the ways of energy conservation in green buildings?
   d) What is RAIN Water Harvesting? How is it useful to us? Draw a typical sketch of Rain Water Harvesting system for residential building? (7M+8M)

SECTION-B

5. **Answer any five Questions** **5X3 = 15M**

   a) What are Water supply requirements?
   b) What are the Arrangements of lifts?
   c) What are Fire Safety norms?
   d) What is Mechanical Ventilations?
   e) What is Co-efficient of sound absorption?
   f) Electrical wining in buildings?
   g) Write two necessities of ramp?
   h) Define smart building?

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
B Tech (Civil Engineering) IV-I Semester

PEC-CE702 A: SOLID DYNAMICS AND MACHINE FOUNDATIONS
(Elective-IV)
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) What is 'Logarithmic Decrement'? Derive expressions for its determination? (7M)
   b) What is viscous damping? Explain the effect of damping on amplitude of Vibrations? (8M)

   (OR)

   c) Write a note on Free Vibrations and Forced Vibrations. Starting from fundamentals, discuss the equations of motion for over damped, critically damped and under damped systems? (15M)
2. a) Write a note on Barkan's approach for determination of natural frequency? (7M)
   b) Using Barkan's approach determine the coefficient of uniform compression, if a vibration test on a block 1.5mx0.75mx0.7m gave a resonance frequency of 20 Hz in the vertical direction. The mass of the oscillator used was 100 kg. The mass density of the test block material is 2400 kg/m3? (8M)

   (OR)

   c) Describe the Pressure bulb concept used in determination of mass of co-vibrating soil for determination of natural frequency of foundation-soil system? (8M)
   d) Explain Pauw's analogy of foundation soil system? (7M)
3. a) Describe the methods of determining the damping factor? (7M)
   b) The following data refer to vertical vibration test conducted for a compressor foundation of size 10m X 8m in contact with soil. Size of M15 concrete block used in 1.5m X 0.75m X 0.7m. $fm\gamma$ = 35Hz, $Xm\gamma$ = 0.06375m, ν= 0.3. Find E. (8M)

   (OR)

   c) What do you understand about wave propagation in elastic half space? Discuss the characteristics of body waves and surface waves with neat sketches. (15M)
4. a) What are the different methods of vibration isolation? (8M)
   b) Describe different materials used for vibration isolation. Discuss relative merits and demerits. (7M)

   (OR)

   c) Discuss the general design requirements of machine foundations with suitable remarks. (8M)
   d) Write briefly about the following
   (i). types of machines, and (ii). Types of machine foundations. (7M)

SECTION-B

5. **Answer any five Questions** **5X3 = 15M**

a) What is vibration isolation?
b) What is passive isolation?
c) Write the properties of steel and cork?
d) What is coefficient of elastic uniform compression?
e) What is Free Vibrations and Forced Vibrations?
f) What is dynamic bearing capacity theory of soils?
g) What is natural frequency of a machine foundation?
h) Determine the damping factor?

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
B Tech (Civil Engineering) IV-I Semester

PEC-CE702 B: AIR POLLUTION & CONTROL

(Elective-IV)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Explain the classification of air pollutants. Give Example? (7M)
   b) Explain effects of air pollutants on plants? (8M)

   (OR)

   c) Write definition of Air Pollution. Explain the various sources of Air Pollution? (7M)
   d) Discuss the effects of following pollutants on human and vegetation.
   i) Carbon Monoxide ii) Oxides of Nitrogen iii) Sulphur dioxide iv) Hydrocarbons (8M)
2. a) Explain with neat sketches, how different atmospheric conditions give rise to different kinds of plumes? (8M)
   b) Explain the terms: i) Environmental Lapse Rate (ELR) ii) Adiabatic Lapse Rate (ALR) iii) Wind Rose (WR) iv) Inversions. (7M)

   (OR)

   c) With a neat sketch, explain the wind speed recorder and wind direction recorder devices used in measuring meteorological variables?
   d) Obtain an expression for particulate concentration at any coordinate and distance by Gaussian plume dispersion model.
3. a) Explain with neat sketch construction, working of ESP? (7M)
   b) A thermal power plant installed an ESP with 5000m^2 of collector plate area. The ESP is 95% efficient in treating 200m3/s of flue gas. Estimate how large the plate area should be tp achieve 98-99% efficiencies for the ESP? (8M)

   (OR)

   b) With a neat sketch, explain the working of cyclones in particulate removal? (8M)
   c) Calculate the settling velocity of fog with a particle size of 1 µm? (7M)
4. a) Describe the sampling methods adopted for collecting gaseous pollutants. (8M)
   b) List out control measures for the Automobile Air Pollution. (7M)

   (OR)

   c) Assess the adverse effects of vehicle exhausts. Explain the types of emissions due to automobiles.
   d) Define acid rain. Explain the sources and effects of acid rain. (8M+7M)

SECTION-B

5. **Answer any five Questions** **5X3 = 15M**
   a) What is Photochemical smog?
   b) List the air pollutants Control Acts.
   c) Define DALR and ELR.
   d) Define Adsorption and Absorption.
   e) What is combustion?
   f) Define air quality standards.
   g) What is the principle of cyclone separator?
   h) Define air Pollution.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
B Tech (Civil Engineering) IV-I Semester
PEC-CE702C: BRIDGE ENGINEERING
(Elective-IV)
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) What is meant by economical span of a bridge? Derive the equation for economical span. List the assumptions made. (8M)
   b) What are various load to be considered for design of road & bridge based on IRC standard? (7M)

(OR)

   c) What do you understand by piers? What is the function of piers? Explain different types of piers constructed for bridge and their shapes. Explain the various components of a bridge. (15M)

2. a) Distinguish between Pigeauds method and Hendry- Jaegar method. (7M)
   b) Describe how load distribution in Bridge Decks is made for a bridge having 3 longitudinal girders, using Courbons method. List the assumptions and limitations of this method. (8M)

(OR)

   c) Explain the different type of forces and their combinations in the design of box culverts. (8M)
   d) Discuss about the stability analysis of abutments. (7M)

3. a) Design the intermediate longitudinal girder of a T beam and slab bridge for the following data:
   Effective span = 10 m
   Carriage way width = 7.5m
   Kerb = 600mm width on either side
   Provide three longitudinal beams.
   Loading = IRC Class A vehicle
   Adopt M30 concrete and Fe 415 grade steel. Shear check is not required. (15M)

(OR)

   b) Design a solid slab bridge required for a highway road having the following data.
   Width of carriage way = 7.5 m
   Clear Span = 5m
   Loading = IRC Class A
   Width of Kerb = 600 mm
   Materials = M 30 concrete and Fe 415 grade steel.

4. a) Design an elastomeric bearing at the sliding end of a bridge for the following data. Maximum Normal load 1000 kN, Minimum-normal load 200 kN, Transverse lateral load 40 kN, Longitudinal load 60 kN, Total longitudinal translation 15 mm, Rotation at support 0.0025 radians. Shear modulus of elastomeric bearing = 1.2 N/mm2. Allowable compressive stress for concrete = 7 N/mm2. Allowable compressive stress for elastomer = 10 N/mm2.

(OR)

b) What is a bearing? What are the main functions of bearings in bridge? (7M)

c) Describe the various type of end bearings used commonly is steel bridge and hence describe roller bearings and sliding bearings. (8M)

SECTION-B

5. **Answer any five Questions** **5X3 = 15M**

a) Hydraulic factor in bridge design.
b) Strip seal joint and modular joint
c) Write IRC specifications for road bridges.
d) What are the longitudinal forces acting on bridges?
e) What is the bridge inspection important?
f) Write a short note on Grip Length of well foundation
g) Write a short note on Wing wall and approaches
h) Write a short note on truss bridge.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
B Tech (Civil Engineering) IV-I Semester

PEC-CE703A: URBAN HYDROLOGY
(Elective-IV)
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Describe the step by step procedure involved in the analysis for developing intensity-frequency-duration relationships. Sketch a typical setoff these curves. (15M)

(OR)

b) Write the application of hydrology in the Engineering problems. (8M)
c) Describe the hydrologic cycle with a neat sketch. (7M)

2. a) Explain different methods to determine mean precipitation over an area and presentation of rain fall data.
b) Explain a procedure for supplementing the missing rainfall data.

(OR)

c) Explain briefly about the run-off quality and quantity? (15M)

3. a) What are the various storm models available for storm water management? Explain any one briefly.(15M)

(OR)

b) List out the various appurtenances used in drainage system and explain its necessity. (8M)
c) Explain various Elements of drainage systems. (7M)

4. a) Explain the types and objectives of planning in master drainage system. (15M)

(OR)

b) Write about typical urban drainage master plan and explain its interrelation between water resources investigation. (15M)

SECTION-B

5. **Answer any five Questions** **5X3 = 15M**

a) Methods to control reservoir evaporation.
b) What do you mean Run-off?
c) What is catchment area?
d) Write a short note on wet Lands?
e) Define storm water network.
f) List out any three uses Model planning.
g) Write a short note on Open channel.
h) Write a short note on swales.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
B Tech (Civil Engineering) IV-I Semester
PEC-CE703B: GROUND IMPROVEMENT TECHNIQUES
(Elective-IV)
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Explain the importance of stone column technique. (7M)
   b) Explain the objectives of densification in cohesion less soils. (8M)

(OR)

   c) Describe the vibro flotation technique of densifying granular soil. (7M)
   d) Explain the impact at ground surface method of densifying granular soils. (8M)
4. a) Describe with neat sketches about dewatering by sumps and ditches. (8M)
   b) Explain the principle of electro-osmosis method of dewatering. (7M)

(OR)

   c) Explain the open sumps and vacuum well dewatering systems. (8M)
   d) What are the filter requirements of a filler material around the drains? (7M)
3. a) Discuss the mechanisms of Bituminous Stabilization of in-situ soils and also write the factors affecting bituminous Stabilization of soils. (8M)
   b) Discuss the design mixture and construction techniques of Bituminous Stabilization. (7M)

(OR)

   c) Why grouting is important in soil engineering? Explain in detail the methods of grouting. (7M)
   d) Discuss the process of soil improvement by suspension and solution grouting. (8M)
4. a) Explain in detail the function of geotextile used as a separator. (8M)
   b) Explain the properties of geotextiles. (7M)

(OR)

   c) What are the components of reinforced earth wall? Discuss the load transfer mechanisms of reinforced earth walls. Also discuss the requirements of soil which can be used in reinforced earth wall constriction. (15M)

SECTION-B

5. **Answer any five Questions** **5X3 = 15M**
   a) Discuss the importance of soil nailing.
   b) What is electro osmosis?
   c) Write the benefits of geosynthetics in landfill construction
   d) Explain about post grout test.
   e) Discuss about multistage well points.
   f) What is Dynamic Compaction?
   g) What are the components of reinforced earth?
   h) List various admixtures used in soil stabilization.

ADIKAVI NANNAYA UNIVERSITY: RAJAMAHENDRAVARAM
B Tech (Civil Engineering) IV-I Semester
PEC-CE703C: LOW-COST HOUSING (Elective-IV)
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1. a) Explain the situation prevailing in urban housing. (7M)
   b) Explain the impacts of science and technology on housing need. (8M)
   (OR)
   c) Explain the financial assistance for housing development by government organizations. Explain briefly the housing finance system in India. (8M)
   d) What are the economic and rural aspects responsible for housing needs? (7M)
2. a) Explain how to make shelter for the homeless in slum areas. Explain the need for National Housing Policy. (8M)
   b) Explain shelter upgradation technology relating to improvements in housing of poor families. (7M)
   (OR)
   c) Explain various methods of improving squatter settlements. (7M)
   d) What are the policy measures be taken to produce good quality of materials? (8M)
3. a) Explain briefly the innovative technique followed in walling and roofing with concrete hollow bricks.
   b) Explain the casting of cellular concrete by fly ash and laterite bricks. (8M+7M)
   (OR)
   c) Explain briefly the laying of roofing with precast RC plank and joist system. (8M)
   d) Explain briefly the precautionary measures to be taken for fire resistant houses. (7M)
4. a) Write the various precautions to be taken for construction of cyclone resistant houses. (8M)
   b) Explain (a) flood resistant houses and (b) cyclone resistant houses. (8M)
   (OR)
   c) Explain the inexpensive techniques for protection of mud–thatch houses. (7M)
   d) What are the measures to be taken while constructing houses in earthquake-prone areas? (8M)

SECTION-B

5. Answer any five Questions **5X3 = 15M**

a) What is housing disaster mitigation?
b) Explain asphaltic roofing sheets
c) State any three measures to prevent water borne disease.
d) Write a brief note on how the potable water is supplied in rural area.
e) State three measures to be taken for flood resistance houses.
f) Write shorts notes on recycling waste.
g) Define (a) Disinfectant (b) Sterilization.
h) Sanitation of drinking water wells

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

OEC-CE704A: ENVIRONMENTAL IMPACT ASSESSMENT (OPEN Elective-III)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain the role of stakeholders in the EIA preparation. **(8M)**

b) What are the various factors affecting EIA. **(7M)**

(OR)

c) Explain about the preparation of Environmental Base map. **(15M)**

2.a) Write about quality index method for carrying out EIA. **(15M)**

(OR)

b) Present the Leopold matrix method in EIA and highlight its strengths and applicability. **(15M)**

3. a) What type of soil quality parameters to be studied to assess the impact of project activity on soil environments? **(15M)**

(OR)

b) Provide an example of an activity that can adversely impact the air environment and suggest an appropriate mitigation action. **(15M)**

4. a) Explain Risk assessment and treatment of uncertainty. **(8M)**

b) Explain assessment of Impact of development activities on Vegetation and wildlife. **(7M)**

.

(OR)

c) Explain about the environmental impact of deforestation. **(8M)**

d) Explain the -advantages of Environmental Risk Assessment. **(7M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a) What is EIS?
b) Write on life cycle analysis.
c) List out various EIA methods..
d) Write a short note on delineation of study area.
e) Write on procurement of soil quality.
f) What is Impact prediction?
g) What is deforestation.
h) Write short note on placing of concrete.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

OEC-CE704B: EARTH RETAINING STRUCTURES (OPEN Elective-III)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) What are the assumptions in coulomb's theory? Explain in detail. **(8M)**

b) Derive an expression for active pressure when the ground surface is inclined. **(7M)**

(OR)

c) Explain briefly about various type of backfill. **(15M)**

2. a) Explain briefly about various type of retaining walls. **(15M)**

(OR)

b) Discuss the procedure for checking the stability of a cantilever sheet pile wall. **(15M)**

3. a) Explain a bout Rowe's Theory of moment reduction. **(15M)**

(OR)

b) Explain design of Anchored Sheet Pile Walls by Free and Fixed Earth Support Methods **(15M)**

4. a) Sketch a typical section of a braced cut and show the various components. **(15M)**

(OR)

b) How the design of a cellular coffer dam on rock differs from that on a soil bed. **(15M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a) Define passive earth pressure.
b) Write a short note on active earth pressure.
c) List out the various uses of retaining walls.
d) Write a short note on sheet pile walls.
e) Write on anchored sheet pile walls.
f) Write a short note on fixed earth support method.
g) List out various types of sheeting and bracing systems.
h) Write short note on stability of cellular cofferdams.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

OEC-CE704C: AIRPORT PLANNING AND DESIGN (OPEN Elective-III)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain in brief the growth of domestic air traffic in India. **(8M)**

b) write the characteristics aircraft. **(7M)**

(OR)

c) Explain briefly about history of air transport. **(15M)**

2.a) List out various points to be consider in the selection of airport site. **(15M)**

(OR)

b) Explain with neat sketches the limiting heights of objects in the approach and turning zone of an instrumental runway. **(15M)**

3. a) The runway length required for landing at sea level in standard atmospheric conditions is 3km. Runway length required for take-off at sea level in standard atmospheric condition is 2.5 km. Aerodrome reference temperature is 25 degree centigrade and that of the standard atmosphere at aerodrome elevation of 150 m is 14.025 degree centigrade. If the effective runway gradient is 0.5 percent, determine the runway length to be provided. **(15M)**

(OR)

b) Discuss the principles of design of runway intersection area. Draw a typical sketch showing the gradation of the intersection area **(15M)**

4. a) Explain in detail the need of air traffic control. **(8M)**

b) Write a short note on optimum air traffic control network.. **(7M)**

(OR)

c)Explain briefly about air traffic control aids. **(15M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a) List out various component parts of aero plane.
b) Write a short note on airport characteristics.
c) Explain classification of Obstructions.
d) Write a short note on zoning laws.
e) Write a short note on airport capacity.
f) Define taxi way..
g) Explain the necessity of air traffic control.
h) Write short note on landing aids.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

OEC-CE705A: WATERSHED MANAGEMENT (OPEN Elective-IV)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Give a brief explanation on hydrology and socio-economic characteristics of watershed. **(15M)**

(OR)

b) Explain the significance of knowledge of watershed management based on the present day scenario. **(15M)**

2. a) Explain types of erosion in detail. **(8M)**

b**)** Explain in detail the Contour techniques to control Erosion. **(7M)**

(OR)

b) By means of neat sketch, explain the principle s of process involved in ploughing and trenching as a soil control measure. **(15M)**

3. a) What are harvesting structures? Explain any three in detail with figures. **(15M)**

(OR)

b) Differentiate between the process involved in surface and subsurface flow harvesting **(8M)**

c) What are the various limitations applicable and assumptions required for proper application of rain water harvesting ? **(7M)**

4. a) Explain in detail about various methods of artificial recharge. **(15M)**

(OR)

b) Explain briefly about reclamation of saline soils. **(15M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a. What do you mean by watershed management?
b. What are the important watershed factors to be considered in watershed management?
c. List out the climatic factors that influence the Erosion. Explain them.
d. Enumerate the limitation and advantages of Gabion as a control measure of erosion.
e. Write a short note on roof top rainwater structures.
f. List out the techniques adopted for rain -water harvesting.
g. Write a short note on micro farming.
h. Write a short note on biomass management on the farm.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

OEC-CE705B: TRAVEL DEMAND ANALYSIS (OPEN Elective-IV)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain briefly a bout PMS functions and Function of Pavement evaluation. **(15M)**

(OR)

b) Explain the various components of pavement management systems. **(15M)**

2. a)Discus IRI -modeling techniques. **(15M)**

(OR)

c) List out deterioration models. Explain ant one briefly. **(15M)**

3. a) List out unevenness prediction models. Explain any one briefly. **(15M)**

(OR)

b) Explain the destructive structural analysis and mention its applications. (**15M)**

4. a) Explain the role of computers in pavement management. **(15M)**

(OR)

b) What are the equipment's used for rehabilitation and maintenance of structures**.** **(15M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a. Define travel demand analysis?
b. List out various components of pavement management system.
c. Write a short note on empirical models.
d. List out various roughness components..
e. Write a short note on structural evaluation.
f. List out various deterioration models.
g. Write a short note on life cycle costing.
h. Explain the priority programming methods.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

OEC-CE705C: TRAFFIC SAFETY (OPEN Elective-IV)

(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Give a brief explanation on Traffic Engineering studies. **(15M)**

(OR)

b) Explain the significance of traffic control devices. **(15M)**

2. a) Discuss the importance data collection in road safety analysis. **(15M)**

(OR)

b Give a detailed account of factors affecting road traffic crashes. **(15M)**

(OR)

3. a) Explain the role of vehicle and human characteristics in road safety. **(15M)**

(OR)

b) Explain briefly a bout post-accident care. **(15M)**

4. a) Explain in detail various mitigation measures to prevent the road accidents. **(15M)**

(OR)

b) Briefly describe the objectives of Road Safety Audit. **(8M)**

c**)** Explain the procedure for conducting Road Safety Audit. **(8M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a. Define Highway capacity.
b. List out the applications of traffic control devices.
c. Explain the causes of accident.
d. List out the methods to identify and prioritize hazardous locations and elements.
e. Explain the necessity of road maintenance in road safety.
f. Write a short note on protective devices.
g. Write a short note on grade separated intersections.
h. Write a short note on road safety law.