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

III & IV YEAR
(*For the admitted batch of* 2019-20)

Board of Studies

University College of Engineering

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	--	50	50	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	--	50	50	1	0	2	2
	Total Credits							**21.5**

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**

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	--	50	50	1	0	2	2
	Total Credits							**21.5**

Summer 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 Management and Entrepreneurship	75	25	100	3	0	0	3
MC-CE707	Skill oriented course	--	50	50	1	0	2	2
Summer Internship 2 Months (Mandatory) after third year (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					
Project	Project Work	200	100	300				12
	Total Credits							12

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**

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 able to

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 physical 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, New Delhi

References:

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

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

IS 10262-2009 Code book is permitted to use in the examinations.

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 IS Codes.
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, Lok Sabha, Rajya Sabha, 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 PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO ZilaPanchayat: 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 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	-	50	50	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 Kulandaiswamy 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:0
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: CE607

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 levelling Staffs (4m)
2. Total Station with tripod stand & prism, ranging pole.
3. Tape, chain, arrows, pegs, rangingrods.

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	Skill oriented course	-	50	50	1	0	2	2
Summer Internship 2 Months (Mandatory) after third year (to be evaluated during VII semester								1.5
	Total Credits							**21.5**

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,
Fire fighting 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 Liquifaction 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.

OEC-CE705C: TRAFFIC SAFETY
(Open Elective-IV)

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.

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 NANNAYAUNIVERSITY

RAJAMAHENDRAVARAM

UNIVERSITY COLLEGE OF ENGINEERING

Model Question Papers

B.Tech Civil Engineering

(For the admitted batch of 2019)

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) Discuss 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. (15M)

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 period of 15 minutes is 400ml. The internal diameter of the permeameter is 6.0cm and the measured difference in heads between the two gauging points 15.0cm apart is 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 197.50 kN/m^2. The coefficient of volume compressibility is 5.79 x 10–4 kN/m^2 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 **(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 (**8M)**

(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

Answer Any FIVE questions **(5×3 = 15 M)**

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 thecivic 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. **(15M)**

(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

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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 onwealth 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

1. 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	Hours 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) Mini project (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 supported rectangular beam of effective span4m, carrying dead load 2kN/m and live load4kN/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 imposedload10 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 gradeM25 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, 208150, 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
ıates 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 **4x15=60M**

1. aDesign 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. Twomoving 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)**

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)**

2.a) A prestressed concrete pile 250 mm square, contains 60 pre-tensioned wires, each of 2mm diameter, 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 Indianstandard 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 widand 60 mm

thick. The overall depth of the girder is 600 mm. The thickness othe web is 60 mm. The horizontal prestress 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 ifthe 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 prestress.
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 prestresse 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 flexura strength computations?
g) Explain the ways by which shear resistance of structural concrete members can beImproved.
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? **(15M)**

(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 **(15M)**

(OR)

b) Give the rate analysis for

(i) Earthwork excavation for 1.cu.m

(ii) 1: 3: 6 Cement Concrete **(15M)**

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)

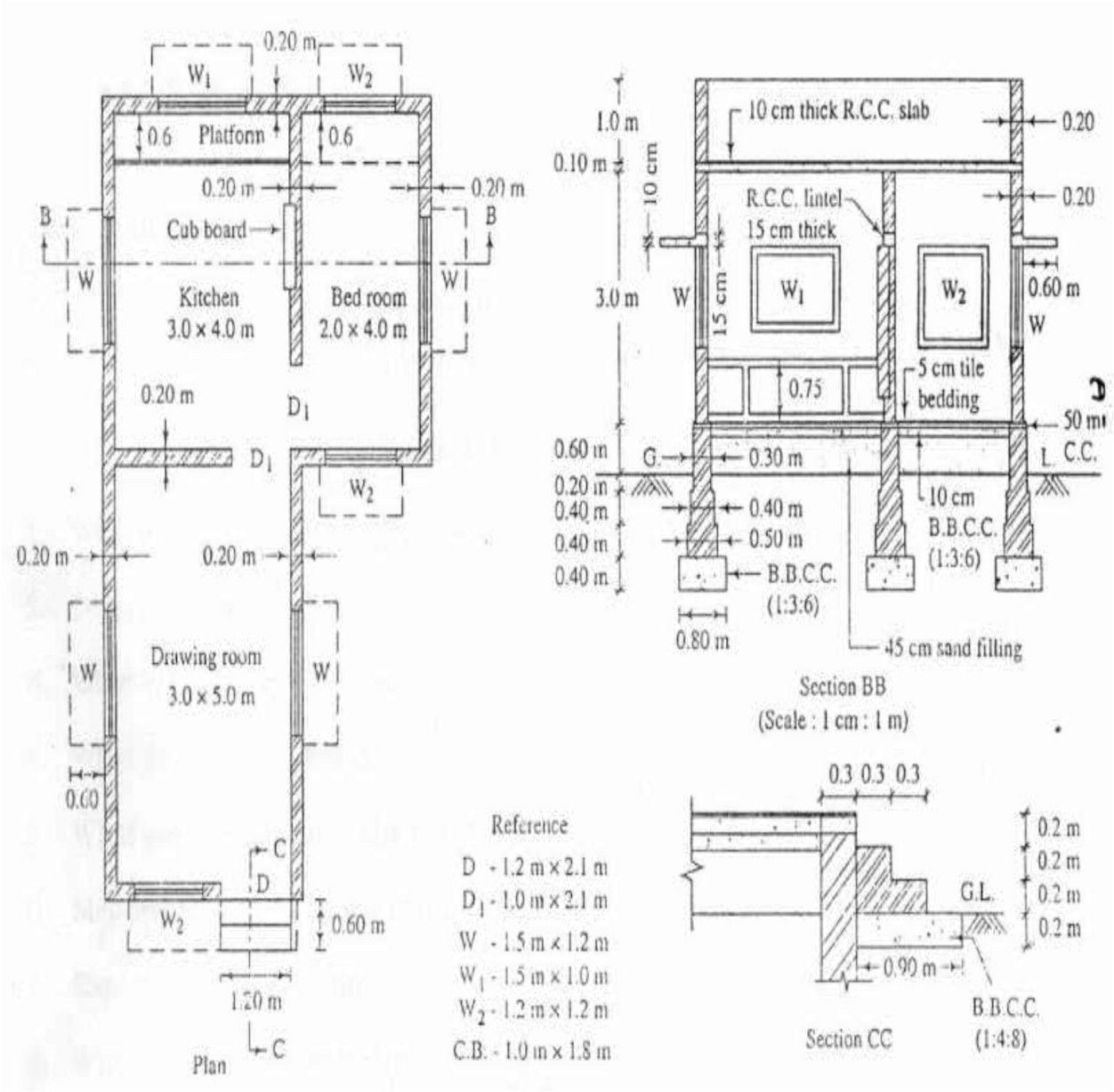
b)Estimate the quantity of steel for a foundation with column and tabulate the bar bending schedule with neat sketch. **(15M)**

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: DISASTER MANAGEMENT(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		TotalMarks	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) Miniproject (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 beam 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)

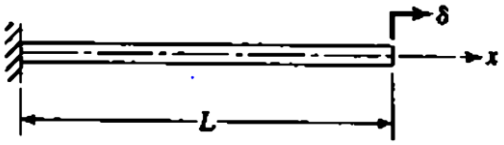


Figure 1

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)

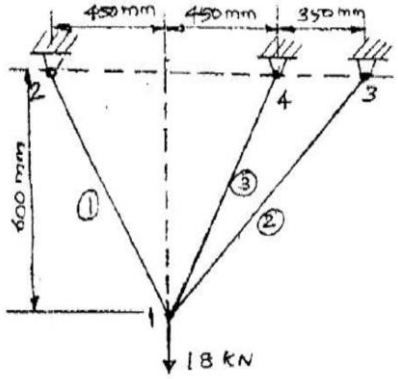


Figure. 2

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)

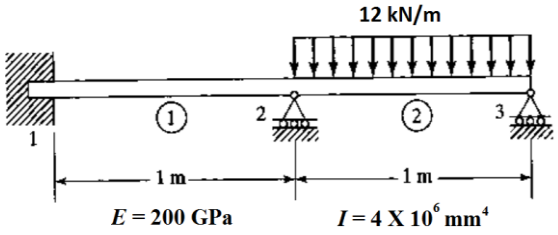


Figure. 3

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=2.1X105 N/mm2, υ=0.25, t=10mm. (8M)

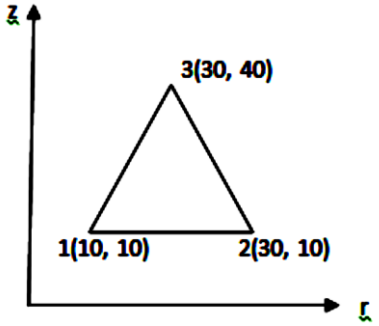


Figure. 4

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/m3, A=0.258 m2, and L=0.4 m. (15M)

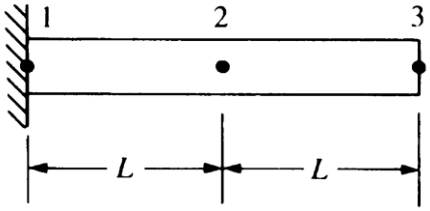


Figure 5

(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

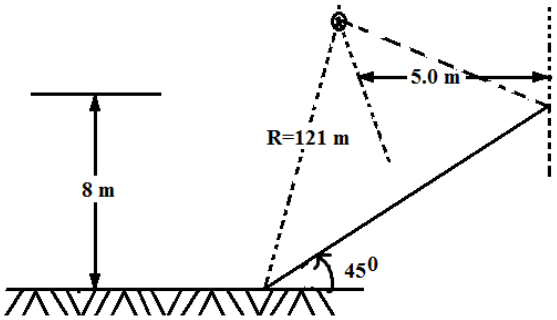
Answer All Questions **4x15=60M**

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. (8M)

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 = 15**

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? (8M)
d) How refuge is collected from commercial and residential buildings? (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 absorption 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? (7M)
d) What is RAIN Water Harvesting? How is it useful to us? Draw a typical sketch of Rain Water Harvesting system for residential building? (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?
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, $Xm\gamma = 0.06375$m, $\nu = 0.3$. 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: AIRPOLLUTION & CONTROL
(Elective-IV)
(MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

a) 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?

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? (8M)

d) Obtain an expression for particulate concentration at any coordinate and distance by Gaussian plume dispersion model. (7M)

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)

2a) 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)

2. 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. (15M)

3. 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. (15M)

(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. (8M)

(OR)

3.a)Explain briefly about the run-off quality and quantity? (8M)

b)What are the various storm models available for storm water management? Explain any one briefly.(7M)

(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)
2.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)
c) 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)

c) 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 up gradation 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 joistsystem. (8M)

d)Explain briefly the precautionary measures to be taken for fire resistanthouses. (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. (7M)

(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)**

b) Provide an example of an activity that can adversely impact the air environment and suggest an appropriate mitigation action. **(15M)**

(OR)

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 ANDDESIGN (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)**

b) Discuss the principles of design of runway intersection area. Draw a typical sketch showing the gradation of the intersection area. **(15M)**

(OR)

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)

c)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 DEMANDANALYSIS (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 outunevenness prediction models. Explain any one briefly. **(15M)**

(OR)

b) Explain thedestructive structural analysisand 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)

bGive 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.

ADIKAVI NANNAYA UNIVERSITY:: RAJAMAHENDRAVARAM

B Tech (Civil Engineering) IV-I Semester

HSMC-CE706: INDUSTRIAL ENGINEERING & MANAGEMENT (MODEL QUESTION PAPER)

Time: 3Hours **Max.Marks:75**

SECTION-A

Answer All Questions **4x15=60M**

1.a) Explain the significance of directing and coordinating in the management functions. **(15M)**

(OR)

b) Explain briefly a bout Industrial dispute act 1947. **(15M)**

2. a) Give a comparison between process layout and product layout.. **(8M)**

b) Discuss about preventive and break down maintenance.. **(7M)**

(OR)

c)List out various types of layouts and explain any two briefly. **(15M)**

3. a) Explain the procedure to conduct work sampling. **(15M)**

(OR)

b) Why allowances are taken in calculation of standard time discuss different types of allowances **(15M)**

4. a) Explain about zero defect concepts in Total Quality Management. **(15M)**

(OR)

b) Explain briefly about Single and Double sampling plans. **(15M)**

SECTION-B

5. **Answer any five Questions** **5X3 =15M**

a. Mention the functions of management.
b. What are differences between production and productivity?
c. Give the advantages and disadvantages of process layout.
d. What do you understand by function layout.
e. Briefly give a note on zero defect.
f. Write the applications of belt conveyors.
g. Write a short note on control charts.
h. List out the objectives of purchasing department.