

Sixth Semester Syllabus

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	PCC	CEC617	Construction Engineering & Management	2	1	0	3
2	PCC	CEC618	Estimating & Costing	2	1	0	3
3	PEC	CED---	Discipline Specific Elective	-	-	-	3
4	PEC	CED---	Discipline Specific Elective	-	-	-	3
5	PEC	CED---	Discipline Specific Elective	-	-	-	3
6	PEC	CED---	Discipline Specific Elective	-	-	-	3
7	GSC	ESPCE601	Essential Studies for Professional - VI	0	1	0	0.5
8	GSC	SDP681	Skill Development for Professionals-VI	0	1	0	0.5
9	PCC	CEC698	Estimating & Costing Lab	0	0	4	2
10	MC	MC002	Disaster Management	0	0	0	0
11	MOOCs	MOOCs	Massive Open Online Courses	-	-	-	-
12	IFC	IFC	Industry and Foreign Certification	-	-	-	-
13	MAR	MAR681	Mandatory Additional Requirement	-	-	-	-
14	PROJ	PWCE681	Mini Project-IV	-	-	-	-
Total							27

Suggestive Choice Based Subjects

Sl No.	Type	Subject Code	Topic	L	T	P	Credit Points
1	DE	CED601	Engineering Hydrology	3	0	0	3
2	DE	CED602	Hydraulic Engineering	3	0	0	3
3	DE	CED603	Solid and Hazardous Waste Management	3	0	0	3
4	DE	CED604	Advanced Highway and Transportation Engineering	3	0	0	3
5	DE	CED605	Structural Analysis - II	3	0	0	3

Construction Engineering & Management

CEC617

L-T-P: 2-1-0

Credits: 3

Pre-requisite: Principle of Management, Economics for Engineering, Concrete Technology

Introduction: The course revolves around the various activities encountered during the life cycle of a civil engineering project. It introduces the basic learning requirements for the civil engineer project manager and makes the appreciation for the qualitative nature of the construction project management. The philosophy of the course is more on system approach contrary to majority of mechanics based subject systems under different loading and soil conditions.

Course Outcomes (CO):

CO1: An idea of how structures are built and projects are developed on the field

CO2: An understanding of modern construction practices

CO3: A good idea of basic construction dynamics- various stakeholders, project objectives, processes, resources required and project economics

CO4: A basic ability to plan, control and monitor construction projects with respect to time and cost.

CO5: An idea of how to optimise construction projects based on costs

CO6: An idea how construction projects are administered with respect to contract structures and issues.

CO7: An ability to put forward ideas and understandings to others with effective communication processes

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

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

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Basics of Construction- Unique features of construction, construction projects- types and features, phases of a project, agencies involved and their methods of execution.

Module 2: Construction project planning- Stages of project planning: pre-tender planning, preconstruction planning, detailed construction planning, role of client and contractor, level of detail. Process of development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts. Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks. PERT- Assumptions underlying PERT analysis, determining three-time estimates, analysis, slack computations, calculation of probability of completion.

Module 3: Construction Methods basics: Types of foundations and construction methods; Basics of Formwork and Staging; Common building construction methods (conventional walls and slabs; conventional framed structure with blockwork walls; Modular construction methods for repetitive works; Precast concrete construction methods; Basics of Slip forming for tall structures; Basic construction methods for steel structures; Basics of construction methods for Bridges.

Module 4: Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities.

Module 5: Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control; Equipment: basic concepts of planning and organizing; Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling- Bar chart, line of balance technique, resource constraints and conflicts; resource aggregation, allocation, smoothening and leveling, Common Good Practices in Construction.

Module 6: Project Monitoring & Control- Supervision, record keeping, periodic progress reports, periodical progress meetings. Updating of plans: purpose, frequency and methods of updating, Common causes of time and cost overruns and corrective measures. Basics of Modern Project management systems such as Lean Construction; Use of Building Information Modelling (BIM) in project management; Quality control: concept of quality, quality of constructed structure, use of manuals and checklists for quality control, role of inspection, basics of statistical quality control. Safety, Health and Environment on project sites: accidents; their causes, effects and preventive measures, costs of accidents, occupational health problems in construction, organizing for safety and health.

Module 7: Contracts Management basics: Importance of contracts; Types of Contracts, parties to a contract; Common contract clauses (Notice to proceed, rights and duties of various parties, notices to be given, Contract Duration and Price, Performance parameters; Delays, penalties and liquidated damages; Force Majeure, Suspension and Termination, Changes & variations, Dispute Resolution methods.:

Module 8: Construction Costs: Make-up of construction cost: Classification of costs, time-cost trade-off in construction projects, compression and decompression.

Text Books

1. Varghese, P.C., “Building Construction”, Prentice Hall India, 2007.
2. National Building Code, Bureau of Indian Standards, New Delhi, 2017.
3. Chudley, R., Construction Technology, ELBS Publishers, 2007.
4. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
5. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
6. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015
7. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

NPTEL/MOOCs Links

<https://www.linkedin.com/learning/paths/procore-construction-management-professional-certificate>

NPTEL: <https://nptel.ac.in/courses/105103206>

Estimating & Costing

CEC618

L-T-P: 2-1-4

Credits: 5

Pre-requisite: Basic Mathematics, Building Planning and Construction, Building Drawing.

Introduction: This course provides the student with the ability to estimate the quantities of item of works involved in buildings, water supply and sanitary works, road works and irrigation works, and also equip the student with the ability to do rate analysis, valuation of properties and preparation of reports for estimation of various items.

Course Outcomes (CO):

CO1: Understand the preparation of an Abstract Estimate and detailed estimate of building.

CO2: Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure

CO3: Design bar bending schedule for reinforcement works

CO4: Understand preparation of Notice to invite tender document for bidding, tendering process and rate analysis of civil works.

CO5: Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3													
CO2	3													
CO3	3													
CO4	3													
CO5		3												

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Estimation /Measurements for various items- Introduction to the process of Estimation; Use of relevant Indian Standard Specifications for the same, taking out quantities from the given requirements of the work, comparison of different alternatives, Bar bending schedules, Mass haul Diagrams, Estimating Earthwork and Foundations, Estimating Concrete and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipment costs; labour costs; rate analysis; Material survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost, cost sensitive index, market survey of basic materials. Use of Computers in quantity surveying

Module 2: Specifications-Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures.

Module 3: Rate Analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity.

Module 4: Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process management.

Module 5: Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights.

Text/Reference Books:

1. M Chakravarty, Estimating, Costing Specifications & Valuation
2. Joy P K, Handbook of Construction Management, Macmillan
3. B.S. Patil, Building & Engineering Contracts
4. Relevant Indian Standard Specifications.
5. World Bank Approved Contract Documents.
6. FIDIC Contract Conditions.
7. Acts Related to Minimum Wages, Workmen's Compensation, Contract, and Arbitration
8. Typical PWD Rate Analysis documents.
9. UBS Publishers & Distributors, Estimating and Costing in Civil Engineering: Theory and Practice including Specification and Valuations, 2016
10. Dutta, B.N., Estimating and Costing in Civil Engineering (Theory & Practice), UBS Publishers, 2016

Estimating & Costing Lab

CEC698

Work Assignments

1. Deriving an approximate estimate for a multistoried building by approximate methods.
2. Detailed estimate for the following with the required material survey for the same.
 - a) Ground plus three storied RCC Framed structure building with blockwork walls
 - b) bridge with minimum 2 spans
 - c) factory building
 - d) road work
 - e) cross drainage work
 - f) Ground plus three storied building with load-bearing walls
 - g) Cost of finishes, MEP works for (f) above
3. Preparation of valuation report in standard Government form.
4. Assignments on rate analysis, specifications and simple estimates.
5. Detailed estimate of minor structure.
6. Preparation of Bar bending schedule.

NPTEL/MOOCs Links

https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384259295266406419295_shared/overview

Engineering Hydrology

CED601

Pre-requisite: Fundamentals of Mathematics and Physics at XI and XII level are required.

Introduction: The purpose of the course is familiar to hydrological cycle, precipitation, Abstractions from precipitation, runoff, Ground water and well hydrology.

Course Outcomes (CO):

Upon successful completion of this course, students should be able to:

CO1: Understand the interaction among various processes in the hydrologic cycle

CO2: Study types and classes of hydrologic simulation models and design procedures for safe and effective passage of flood flows for design of hydraulic structures

CO4: Understand the basic aquifer parameters and estimate groundwater resources for different hydro-geological boundary conditions.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3	3					3		3				3	
CO2	2	3				3	3		2				3	
CO4	3	2				3	3		3					

Course Contents:

Module 1: Introduction - hydrologic cycle, water-budget equation, history of hydrology, world water balance, applications in engineering, sources of data.

Module 2: Precipitation - forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, depth-area duration relationships, maximum intensity/depth-duration-frequency relationship, Probable Maximum Precipitation (PMP), rainfall data in India.

Module 3: Abstractions from precipitation - evaporation process, evaporimeters, analytical methods of evaporation estimation, reservoir evaporation and methods for its reduction, evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices.

Module 4: Runoff - runoff volume, SCS-CN method of estimating runoff volume, flow-duration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.

Module 5: Ground water and well hydrology - forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests.

Text/Reference Books

1. K Subramanya, Engineering Hydrology, Mc-Graw Hill
2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill

NPTEL/MOOCs Links

<https://nptel.ac.in/courses/105101214>

https://www.linkedin.com/learning-login/share?account=229219690&forceAccount=false&redirect=https%3A%2F%2Fwww.linkedin.com%2Flearning%2Fpractical-engineering%3Ftrk%3Dshare_ent_url%26shareId%3DaRMxYXL1R%252FWx%252BxwmwY CtVQ%253D%253D

Hydraulic Engineering

CED602

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Mathematical Methods, Fluid Mechanics

Introduction: To introduce the students to various hydraulic engineering problems like open channel flows and hydraulic machines. At the completion of the course, the student should be able to relate the theory and practice of problems in hydraulic engineering.

Course Outcomes (CO):

Upon successful completion of this course, students should be able to:

CO1: Apply their knowledge of fluid mechanics in addressing problems in open channels

CO2: Possesses the skills to solve problems in uniform, gradually and rapidly varied flows in steady state conditions

CO3: Have knowledge in hydraulic machineries (pumps and turbines)

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

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

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.

Module 2: Turbulent Flow- Reynold's experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation, Resistance to flow of fluid in smooth and rough pipes, Moody's diagram.

Module 3: Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary layer thickness, displacement, momentum & energy thickness, laminar and turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries, Local and average friction coefficients. Separation and Control.

Module 4: Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem.

Module 5: Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section.

Module 6: Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n". Most economical section of channel. Computation of Uniform flow, Normal depth.

Module 7: Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Measurement of Discharge and Velocity – Venturi Flume, Standing Wave Flume, Parshall Flume, Broad Crested Weir. Measurement of Velocity- Current meter, Floats, Hot-wire anemometer. Gradually Varied Flow Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical, numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method.

Module 8: Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump, Positive and negative surges. Dynamics of Fluid Flow-Momentum principle, applications: Force on plates, pipe bends, and moments of momentum equation.

Module 9: Flow through Pipes: Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes,

nozzles. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures, branching of pipes, three reservoir problems.

Module 10: Computational Fluid Dynamics: Basic equations of fluid dynamics, Grid generation, Introduction to in viscid incompressible flow, Boundary layer flow as applicable to C.F.D. Hydroinformatics: Concept of hydro informatics –scope of internet and web-based modeling in water resources engineering.

Text/Reference Books

1. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard BookHouse
2. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
3. Open channel Flow, K. Subramanya, Tata McGraw Hill.
4. Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill.

Burnside, C.D., “Electromagnetic Distance Measurement,” Beekman Publishers, 1971

NPTEL/MOOCs Links

<https://nptel.ac.in/courses/105105203>

https://www.linkedin.com/learning-login/share?account=229219690&forceAccount=false&redirect=https%3A%2F%2Fwww.linkedin.com%2Flearning%2Fpractical-engineering%3Ftrk%3Dshare_ent_url%26shareId%3DaRMxYXL1R%252FWx%252BxwmwY CtVQ%253D%253D

Solid and Hazardous Waste Management

CED603

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Environmental Engineering

Introduction: Solid Waste Management is defined as the discipline associated with control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economics, aesthetic, engineering and other environmental considerations.

Course Outcomes (CO):

CO1: Identify the physical and chemical composition of wastes

CO2: Analyse the functional elements for solid waste management.

CO3: Understand the techniques and methods used in transformation, conservation, and recovery of materials from solid wastes.

CO4: Identify and design waste containment systems

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1							3						3	
CO2	3					3	3							2
CO3	2				3								3	2
CO4	3		3			3	2							2

3 – High; 2 – Medium; 1 – Low

Course Contents:

Module 1: Generation of Solid Waste: Goals and objectives of solid waste management, Classification of solid waste, Municipal solid waste, Management of Municipal Solid Wastes, Municipal solid waste handling rules, 2000, Industrial solid waste, Commercial solid waste, Agricultural solid waste, Hazardous solid waste, Pathological waste, Solid waste generation, Characteristics of solid waste, Analysis of solid waste.

Module 2: Handling, Storage and Processing: Public health and aesthetics, Onsite handling, Community containers, Container Locations, Numerical on container locations, On-site processing.

Module 3: Recovery and disposal method: Collection systems, Equipment and labour requirement, Collection routes, Land filling, Incineration, Composting, Recycling.

Module 4: Solid waste management and control: Biomedical waste, biomedical waste handling rules, 1998, Hazardous waste, Transportation of hazardous waste, Radioactive waste, Disposal of radioactive waste. Management of: Biomedical, Nuclear, Electronic and Industrial Solid Wastes and the rules and regulations.

Module 5: Environmental audit, Pollution Prevention, Facility Development and operation, Site Remediation: Quantitative risk assessment, site and subsurface characterization, Containment, remedial alternatives.

Text Books

1. Textbook of Solid Wastes Management (Pb 2017), First Edition, I.H. Khan, CBS.
2. Solid Waste Management, Sasikumar and Krishna, Prentice Hall India Learning Private Limited (2009)

NPTEL/MOOCs Links

<https://nptel.ac.in/courses/105103205>

<https://www.coursera.org/learn/solid-waste-management>

Advanced Highway and Transportation Engineering

CED604

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Transportation Engineering

Introduction: Solid Waste Management is defined as the discipline associated with control of generation, storage, collection, transport or transfer, processing and disposal of solid waste materials in a way that best addresses the range of public health, conservation, economics, aesthetic, engineering and other environmental considerations.

Course Outcomes (CO):

CO1: Conduct traffic studies and analyze traffic data and design traffic signal systems.

CO2: Understand the principles of maintenance of highways.

CO3: Identify the factors governing design of railway infrastructures.

CO4: Carryout the geometrical design of the airport infrastructure and prepare structural designs of runway, taxiway, and apron-grate area.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

3 – High; 2 – Medium; 1 – Low

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3		3		3								2	
CO2	3		2		3								2	
CO3	3		3		1								2	
CO4	3		3		3									

Course Contents:

Module 1: Traffic Engineering: Road user and vehicle characteristics; Traffic flow characteristics – Traffic Volume, Speed, Headway, Concentration and Delay; Traffic surveys & studies; Traffic estimation; Statistical applications in traffic engineering analysis; Parking; Road intersections –Basic traffic conflicts, classification of at-grade intersections, channelization, rotaries, traffic signals, signs and marking; Road Safety; Traffic System Management.

Module 2: Transportation planning: Transportation planning at different levels; Transport Project planning– Planning studies and investigation; Elements of Urban Transportation Planning; Transport Demand Analysis; Preparation of Project Report.

Module3: Railway Engineering: Location surveys & alignment, Permanent way components, Gauges, Geometric Design, Points & crossings, Stations & Yards, Signalling, Track Maintenance.

Module 4: Airport Engineering: Functional areas of airports: Runways, Taxiways, Aprons, Terminal buildings; Classification of Airports; Airport site selection; Design of Runway, Runway orientation, Wind Rose diagram; Design of Taxiway and Terminal Building.

Text Books

1. Khanna & Justo N, “High Way Engineering”, Nemchand & Brothers, Roorkee
2. P. Chakraborty & A. Das, “Principles of Transportation Engineering”, Prentice Hall India.

3. Rangawala S C, “Principles of Railway Engineering”, Charotar Publishing House.
4. Subhash C Saxena, “Airport Engineering: Planning and Design”, CBS.

NPTEL/MOOCs Links

<https://nptel.ac.in/courses/105105215>

<https://nptel.ac.in/courses/105107123>

<https://www.coursera.org/specializations/infrastructure-for-transportation-systems>

Structural Analysis - II

CED605

L-T-P: 3-0-0

Credits: 3

Pre-requisite: Solid Mechanics

Introduction: The course includes analysis of indeterminate structures.

Course Outcomes (CO):

Upon successful completion of this course, students should be able to:

CO1: Formulate Equilibrium and compatibility equations for structural members.

CO2: Analysis of statically Indeterminate beams.

CO3: Analysis of Two hinge arches.

CO4: Analyze of statistically indeterminate structures.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

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

3 – High; 2 – Medium; 1 – Low

Module 1: Analysis of statically Indeterminate structures by force method: Theorem of three moments, Energy methods, Force method (method of consistent deformations) [for analysis of propped cantilever, fixed beams and continuous beams (maximum two degree of indeterminacy) for simple loading cases], Analysis of two hinged arch.

Module 2: Analysis of statically Indeterminate structures by displacement method: Moment distribution method - solution of continuous beam, effect of settlement and rotation of support,

frames with or without side sway. Slope Deflection Method – Method and application in continuous beams and Frames. Approximate method of analysis of structures: Portal & Cantilever methods.

Textbook:

1. Statically Indeterminate Structures CK Wang By McGraw Hill Publications.
2. Engineering Mechanics Of Solids E.P. Popov By Pearson Education.

NPTEL/MOOCs Links

<https://nptel.ac.in/courses/105101086>

Disaster Management

MC002

L-T-P: 0-0-0

Credits: 0

Pre-requisite: Basic knowledge about science and society.

Introduction: Disasters are seen as the effect of hazards on vulnerable areas. Hazards that occur in areas with low vulnerability do not result in a disaster. Great damage, loss, destruction and devastation to life and property are the results of Disasters. The immeasurable damage caused by disaster varies with the geographical location. In the concerned areas disasters have the following effects: It completely upsets the normal day to day life. Harmfully persuade the emergency systems Depending on the intensity and severity of the disaster the normal needs and processes are badly affected and deteriorated. Disasters are the effect of hazard on vulnerable or defenseless areas. Hazards that occur in areas with low vulnerability do not result in a disaster.

Course Outcomes (CO):

CO1: Develop an understanding of the key concepts, definitions a key perspective of All Hazards Emergency Management

CO2: Understand the Emergency/Disaster Management Cycle REVISED

CO3: Have a basic understanding for the history of Emergency management

CO4: Develop a basic understanding of Prevention, Mitigation, Preparedness, Response and Recovery.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3	3										3	2	2
CO2	2	3		3								3	2	
CO3	3										3	2		

CO4	3	1								3	3	3	2	2
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3 – High; 2 – Medium; 1 – Low

Course Contents:

Module-I: Introduction

Disaster: Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

Module-II: Repercussions of Disasters and Hazards: Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease And Epidemics, War And Conflicts.

Module-III: Disaster Prone Areas in India: Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

Module-IV: Disaster Preparedness and Management: Preparedness: Monitoring of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness. Module-V: Risk Assessment: Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co- Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival.

Module-V: Disaster Mitigation: Meaning, Concept and Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation and Non-Structural Mitigation, Programs of Disaster Mitigation in India.

Text Book

1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies 'New Royal book Company.
2. Sahni, Pardeep Et. Al.(Eds.)," Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
3. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep & Deep Publication Pvt. Ltd., New Delhi.

NPTEL/MOOCs Links

Essential Studies for Professional - VI

SDP681

L-T-P: 0-1-0

Credits: 0.5

Pre-requisite: Basic concepts in mathematics and English Language.

Introduction: This course examines basic English language and math. The Topics to be covered (tentatively): The course is on GATE exam preparation, logical reasoning, English sentence correction, English, Grammar correction, basic arithmetic, Vocabulary, Verbal Reasoning.

Course Outcomes (CO): In this course we will study the basic components of math and English language. Students are expected to be capable of understanding the better communication, their advantages and drawbacks. To reach this goal, the following objectives need to be met:

CO1: Students would be able to know GATE exam preparation.

CO2: Students would be able to implement verbal and non-verbal communication analyzing the logic of any arithmetic structure able to solve problem.

CO3: By analyzing the logic of any arithmetic structure able to solve problem.

CO4: To become an efficient math and English language.

Mapping of Course Outcomes (CO) and Program Outcomes (PO):

<u>CO</u>	<u>PO1</u>	<u>PO2</u>	<u>PO3</u>	<u>PO4</u>	<u>PO5</u>	<u>PO6</u>	<u>PO7</u>	<u>PO8</u>	<u>PO9</u>	<u>PO10</u>	<u>PO11</u>	<u>PO12</u>	<u>PSO1</u>	<u>PSO2</u>
CO1	3	3	3		3							3		
CO2	3			3								2		
CO3	2	3	3									3		
CO4	3	3	3		1							3		

Course Contents:

Section A: Employment Enhancement Skills-VI

Stream wise GATE Section

Section B: Skill Development for Professional-VI

Module-1 Revision and Advanced Problems in Quantitative Aptitude

- 1) Numbers (+, -, x, etc), Percentages, Ratio, Partnership, Linear Equations, Profit & Loss
- 2) Averages, Mixtures & Allegations, Number System, Time and Work
- 3) Simple & Compound Interest, Other / Misc Quantitative Apt., Indices and Surds, Quadratic Equations
- 4) Permutations & Combinations, Probability, Geometry, Mensuration
- 5) Data Interpretation, Various Charts, Diagrams, Tables

Module-2 Revision and Advanced Problems in Reasoning

- 1) Coding, Series & Numbers, Blood Relations, Analogy
- 2) Cubes, Data Sufficiency, Non-Verbal Reasoning
- 3) Syllogisms, Puzzles, Machine I/Inequality
- 4) Seating Arrangement, Calendar / Clock
- 5) Statements, Other / Misc Logical Reasoning, Decision Making (Ethics)

Module-3 Revision and Advanced Questions in Verbal English

- 1) Grammar,
- 2) Clauses,
- 3) Spotting errors,
- 4) Sentence Correction,
- 5) Blanks,
- 6) Reading Comprehensions,
- 7) Vocabulary

Newspaper reading: The Hindu & Economic Times.

Text Book:

1. Quantitative aptitude for Competitive exam (4th Edition): TATA Mc Graw Hill
2. Quantitative aptitude for Competitive exam (3rd Edition): PEARSON
3. Engineering mathematics-Pearson
GATE Mathematics- Willey/McGrawhill

PROGRAM OUTCOMES (PO)		
PO	Summary	Description
PO1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Problem analysis	Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6

The engineer and society

Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
