

HUMAN VALUES AND PROFESSIONAL ETHICS – II**Paper Code: ETHS-402****Paper : Human Values and Professional Ethics-II**

L	T/P	C
1	0	1

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.
3. Two internal sessional test of 10 marks each and one project report* carrying 5 marks.

Objectives:

1. The main object of this paper is to inculcate the skills of ethical decision making and then to apply these skills to the real and current challenges of the engineering profession.
2. To enable student to understand the need and importance of value-education and education for Human Rights.
3. To acquaint students to the National and International values for Global development

UNIT I - Appraisal of Human Values and Professional Ethics:

Review of Universal Human Values: Truth, Love, Peace, Right conduct, Non violence, Justice and Responsibility. Living in harmony with 'SELF', Family, Society and Nature. Indian pluralism - the way of life of Islam, Buddhism, Christianity, Jainism, Sikhism and Hinduism, Greek - Roman and Chinese cultural values. Sensitization of Impact of Modern Education and Media on Values:

- a) Impact of Science and Technology
- b) Effects of Printed Media and Television on Values
- c) Effects of computer aided media on Values (Internet, e-mail, Chat etc.)
- d) Role of teacher in the preservation of tradition and culture.
- e) Role of family, tradition and community prayers in value development.

Review of Professional Ethics: Accountability, Collegiality, Royalty, Responsibility and Ethics Living. Engineer as a role model for civil society, Living in harmony with 'NATURE', Four orders of living, their inter-correctness, Holistic technology (eco-friendly and sustainable technology).

[T1] [T2] [R1] [R5] [R4][No. of Hrs. 03]

UNIT II – Engineers responsibility for safety:

Safety and Risks, Risk and Cost, Risk benefit analysis, testing methods for safety. Engineer's Responsibility for Safety Social and Value dimensions of Technology - Technology Pessimism – The Perils of Technological Optimism – The

Promise of Technology – Computer Technology Privacy

Some Case Studies: Case Studies, BHOPAL Gas Tragedy, Nuclear Power Plant Disasters, Space Shuttle Challenger, Three Mile Island Accident, etc.

[T1] [T2] [R4] [R2][No. of Hrs. 03]

UNIT III – Global Issues:

Globalization and MNCs: International Trade, Issues,

Case Studies: Kellogg's, Satyam, Infosys Foundation, TATA Group of Companies

Business Ethics: Corporate Governance, Finance and Accounting, IPR.

Corporate Social Responsibility (CSR): Definition, Concept, ISO, CSR.

Environmental Ethics: Sustainable Development, Eco-System, Ozone depletion, Pollution.

Computer Ethics: Cyber Crimes, Data Stealing, Hacking, Embezzlement.

[T1] [T2] [R4][No. of Hrs. 05]

UNIT IV - Engineers Responsibilities and Rights and Ethical Codes:

Collegiality and loyalty, Conflict of interests, confidentiality, occupational crimes, professional rights, responsibilities. To boost industrial production with excellent quality and efficiency, To enhance national economy, To boost team spirit, Work Culture and feeling of job satisfaction, National integration, Examples of some illustrious professionals.

Need for Ethical Codes, Study of some sample codes such as institution of Electrical and Electronics Engineers, Computer Society of India etc., Ethical Audit.

Development and implementation of Codes: Oath to be taken by Engineering graduates and its importance**,

[T1] [T2] [R4][R2][No. of Hrs. 05]

Text Books:

- [T1] Professional Ethics, R. Subramanian, Oxford University Press.
 [T2] Professional Ethics and Human Values: Prof. D.R. Kiran, TATA Mc Graw Hill Education.

References Books:

- [R1] Human Values and Professional Ethics: R. R. Gaur, R. Sangal and G. P. Bagaria, Ecel Books (2010, New Delhi). Also, the Teachers' Manual by the same author
 [R2] Fundamentals of Ethics, Edmond G. Seebauer and Robert L. Barry, Oxford University Press
 [R3] Values Education: The paradigm shift, by Sri Satya Sai International Center for Human Values, New Delhi.
 [R4] Professional Ethics and Human Values – M.Govindrajan, S.Natarajan and V.S. Senthil Kumar, PHI Learning Pvt. Ltd. Delhi
 [R5] A Textbook on Professional Ethics and Human Values – R.S. Naagarazan – New Age International (P) Limited, Publishers New Delhi.
 [R6] Human Values and Professional Ethics- S B Gogate- Vikas publishing house PVT LTD New Delhi.
 [R7] Mike Martin and Roland Schinzinger, "Ethics in Engineering" McGraw Hill
 [R8] Charles E Harris, Micheal J Rabins, "Engineering Ethics, Cengage Learning
 [R9] PSR Murthy, "Indian Culture Values and Professional Ethics", BS Publications
 [R10] Caroline Whitback< Ethics in Engineering Practice and Research, Cambridgs University Press
 [R11] Charles D Fleddermann, "Engineering Ethics", Prentice Hall.
 [R12] George Reynolds, "Ethics in Information Technology", Cengage Learning
 [R13] C, Sheshadri; The Source book of Value Education, NCERT
 [R14] M. Shery; Bhartiya Sanskriti, Agra (Dayalbagh)

*Any topic related to the experience of the B.Tech student in the assimilation and implementation of human values and professional ethics during the past three years of his/her studies in the institute OR A rigorous ethical analysis of a recent case of violation of professional ethics particularly related to engineering profession.

**All students are required to take OATH in writing prior to submission of major project and the record of the same is to be maintained at the college level and/or, this oath may be administered by the head of the institutions during the graduation ceremonies. The draft for the same is available alongwith the scheme and syllabus.

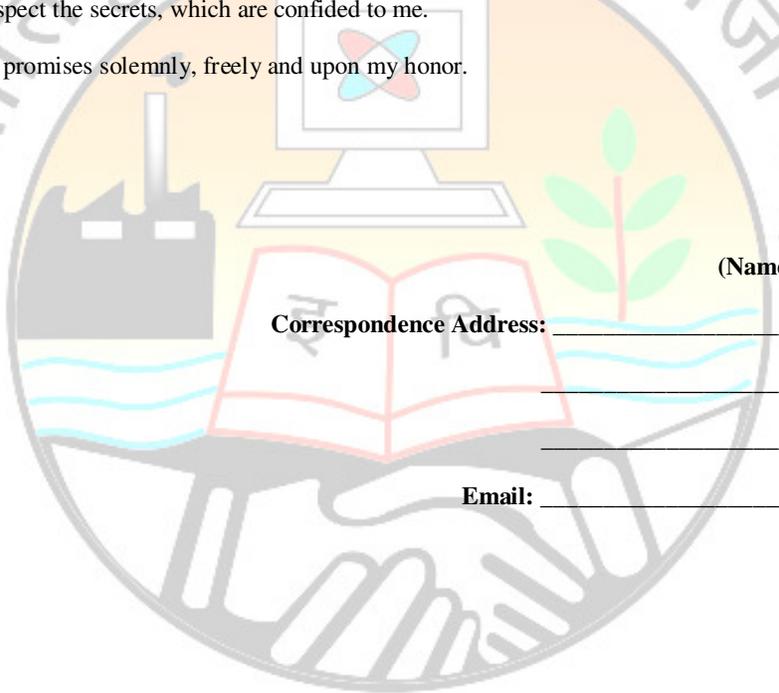
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OATH TO BE TAKEN BY ENGINEERING GRADUATES

In a manner similar to the Hippocratic Oath taken by the medical graduates, Oath to be taken by the engineering graduates is as given below.

1. I solemnly pledge myself to consecrate my life to the service of humanity.
2. I will give my teacher the respect and gratitude, which is their due.
3. I will be loyal to the profession of engineering and be just and generous to its members.
4. Whatever project I undertake, it will be for the good of mankind.
5. I will exercise my profession solely for the benefit of humanity and perform no act for criminal purpose and not contrary to the laws of humanity.
6. I will keep away from wrong, corruption and avoid tempting others to vicious practices.
7. I will endeavor to avoid waste and consumption of non-renewable resources.
8. I will speak out against evil and unjust practices whenever and wherever I encounter them.
9. I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my work, even under threat.
10. I will practice my profession with conscience, dignity and uprightness.
11. I will respect the secrets, which are confided to me.

I make these promises solemnly, freely and upon my honor.



(Name of the Student) _____

Correspondence Address: _____

Email: _____

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PLANNING AND MANAGEMENT OF CONSTRUCTION PROJECTS

Paper Code: ETCE-404

Paper: Planning and Management of Construction Projects

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

***Objective:** This course is aimed at providing both basic and advanced exposure to Construction Project Management so as to enable the manager/ consultant of tomorrow to successfully plan and complete sophisticated projects within the constraints of capital, time and other resources. The course also deals with basic concept of network analysis, O and M works, contract Management etc.*

UNIT-I

Master Plan and Building By laws: Objectives and necessity of Master Plan, Land use features, Building Bylaws, Function of Local Authority. Provision of Building Regulation, Salient features of Land Acquisition, etc

Project Planning: Scheduling, Controlling, Methods of Planning and Programming, Schedules for Labour, Materials and Equipment, Graphical Presentation of Earthwork.

Work Accounts: Muster roll, measurement book, cash book imprest, temporary advance, classification of stores, stock, receipt and issue of stores, authority of use, and materials at site account, Master Test Register-Site Order Book, Dismantle Register, Inspection Register, Hindrance Register, Building Register surplus and shortage, A Sample Case Study.

[T1,T2][No. of Hours: 12]

UNIT-II

Network and Network Analysis: CPM, Activity time estimate, earliest event time, Latest allowable occurrence time, Start and finish time of activity, Float, Critical activities and critical path, updating crashing.

Development of PERT network, Network rules, Graphical guidelines for networks, Work breakdown structure, Time estimates and computations using PERT.

[T1,T2][No. of Hours: 12]

UNIT-III

Contract Management: Scope of work, Detailed Estimate [approved plan], Administrative approval/Estimate Sanction, Notice inviting tenders and its types, Tender, earnest money deposit, security deposit, types of contracts, Essentials of legally valid contract, Contract between Engineer and Employers, Appointment and authority of Engineer for execution of civil construction works, Category of contractors.

Public Works Administration: C.P.W.D. Organization set up, system of accounts, classes of works in PWD, Estimates, Delhi Scheduled Rules [CPWD], Cost adjustment indices sub head, sub works, administrative approval, technical sanction, possession of funds, expenditure sanction, Various methods of executing works.

[T1,T2][No. of Hours: 11]

UNIT-IV

Project Monitoring using PRIMAVERA or MS Project

Construction Equipment: Equipment for excavation and transportation of earth, hauling equipment, hoisting equipment, pile driving equipment, Equipment for pumping water, Dozers and cranes, Scraper, Batching plants, RMC equipment etc.

[T1,T2][No. of Hours: 10]

Text Books:

[T1] Managing Construction Projects by Graham M. Winch, John Wiley and Sons, 2010

[T2] Construction project management: planning and scheduling by Henry F. W. Naylor -Delmar Pub, 1995

References Books:

[R1] Peurifoy-Construction Planning, equipment and methods, Tata Mc Graw Hill

[R2] Joseph Frein- Handbook of Construction Management and Organization, Springer

[R3] CPWD Manual of Works.

[R4] G. K. Hirashan -Fundamentals of Town Planning , Dhanpat Rai Publication

[R5] Essentials of Construction Project Management by Martin Loosemore UNSW press – 2003

- [R6] Punmia and Khandelwal, "PERT and CPM", Laxmi Publications, New Delhi.
[R7] Hinze J., "Construction Contracts", Tata McGraw Hill Education (P) Ltd., New Delhi. (for Unit-IV)
[R8] CPWD, "Delhi Schedule of Rates", New Delhi.



ANALYSIS AND DESIGN OF BRIDGES

Paper code: ETCE-406

Paper: Analysis and Design of Bridges

L	T/P	C
3	0	3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To help students in understanding the various concepts of structural analysis and design of concrete and steel bridges.

UNIT-I

Selection of bridge site, preliminary data to be collected, preliminary drawings, design discharge, linear water way, economical span, location of piers and abutments, vertical clearance, width of carriageway.

Standard Specifications of Bridges, IRC Bridge codes, clearances, Dead load, live loads, application of LL on deck slabs, impact effect of wind load, longitudinal forces, centrifugal forces, Force due to water currents, buoyancy effect, temperature effects, secondary stresses, erection seismic force, specifications for railway bridges, forces due to earthquake on railway bridges.

[T1,T2][No. of Hours: 12]

UNIT-II

Reinforced concrete bridges, box culverts, T-beam bridges, hollow girder bridges, continuous bridges, balanced cantilever bridges, arch bridges, [Illustrative examples of culverts, T-beam bridges, balanced cantilever bridge and arch bridges.

[T1,T2][No. of Hours: 10]

UNIT-III

Steel bridges, plate girder bridges, box girder bridges, cable stayed bridges, suspension bridges [Illustrative examples of plate girder, truss bridge and suspension bridges].

Importance of bearings, and joints, bearings for slab bridges, bearing for girder bridges, expansion bearings, modern trend in bearing designs, joints, expansion joints.

[T1,T2][No. of Hours: 11]

UNIT-IV

Design of prestressed concrete slab deck, post tensioned prestressed concrete, T-Beam and Slab, Bridge deck-structural components, Load distribution methods and design, Assembly of prestressing steel and grouting of ducts, Expansion joints for bridge decks.

Design of two span continuous prestressed concrete bridge deck, Cellular Box girder bridges.

[T1,T2][No. of Hours: 12]

Text Books:

- [T1] Narendra Taly, Design of Modern Highway Bridges, McGraw Hill Companies.
 [T2] O'Connor C., Design of Bridge Super Structure

References Books:

- [R1] D. Johnson Victor, Essentials of Bridge Engineering, Indian Book House Pvt. Ltd.
 [R2] Edward Arnold, The theory of Suspension Bridges, Selperg A, London
 [R3] Troystsky M.S., Cable Stayed Bridges, Crosby Lockwood Staples, London.
 [R4] Libby and Perkins, Modern Pre stressed Concrete Highway Superstructure, CBS.
 [R5] T. R. Jagadeesh, M.S.Jayaram, Design of Bridge Structures, Prentice Hall of India, New Delhi

TRANSPORTATION, PLANNING AND MANAGEMENT**Paper Code: ETCE-410****Paper: Transportation, Planning and Management**

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: This course aims at understanding system approach to traffic planning process based on travel demand and traffic management. Further, exposure to traffic management for accident prevention, smooth highway traffic flow has been dealt. Application of queuing approach to traffic flow, trip generation, trip distribution models have also been used for traffic analysis. The ultimate aim of the course is to develop urgent intelligent transport system based on the experience of ITS in developed world.

UNIT-I

Urban travel characteristics, System approach to Traffic Planning Process, Methods of Measuring Spot Speeds, Radar Speed Meters, Video Camera Method, Moving Observer Method, Presentation of Travel Time and Journey Speed Data, Vehicle Volume Classification and Occupancy Counts by manual methods, combination of manual and mechanical method, Origin-Destination Survey, Parking Surveys, Use of photographic Techniques in Traffic Survey, Analysis and Interpretation of Traffic Study, fitting a Normal Distribution Curve to Observed Speed Data, Accuracy of sampling, Time Mean Speed and Space Mean Speed.

Traffic Forecasting using travel demand function, Traffic and Parking Problems, Parking Space requirement standards, Design standards for on-street and off-street parking facilities. Public transport systems, planning for pedestrians and bicycles.

[T1,T2][No. of Hours: 12]**UNIT-II**

Number and Location of Traffic Signals, Fixed Time Signals and Vehicle Actuated signals, Optimum Cycle Length, Co-ordinated Control of Signals, Delay at Signalized Intersections

Regulation of Vehicle Speed, Regulation concerning the Driver, Traffic Parking Regulations, Enforcement of Regulation,

Introduction to Travel Demand and Traffic Management, Traffic Management measures and their influence on accident prevention, Road Safety Audit. Theory of Traffic Flow, Basic Diagram of Traffic flow, Speed Flow Curves, Vehicular Stream equations and diagrams, Cases of uniform flow, Highway traffic flow, Shock Waves in traffic. Uninterrupted speed flow relationships, Fleet size, Transit Network fleet size, Minimum station headway or interrupted flow, Freeway capacity and level of service, Freeway congestion quantification.

[T1,T2][No. of Hours: 11]**UNIT-III**

Application of Queuing approach to traffic flow, Probabilistic aspects of Traffic flow, Poisson's Distribution of Vehicle Arrivals, Gap and Headway Distribution, Analysis of Traffic delay at uncontrolled intersections using Adam's formula, Trip generation models: Zonal models, Category analysis. Trip distribution models: Growth factor models, Gravity models. Mode split analysis: Mode choice behavior, Mode split curves, Probabilistic models.

[T1,T2][No. of Hours: 10]**UNIT-IV**

Urban Intelligent Transport System, Urban Transportation issues. Transportation Demand Analysis, Sequential Demand Analysis, Development of comprehensive mobility plan, Standards of Intelligent Transportation System [ITS], Experience of ITS in Europe/Japan/North America, Sensors in ITS, ITS applications such as Detector, Traffic Signal systems, Freeway Management, Electronic Road Pricing and Automatic vehicle classification, ITS for traffic law enforcement, Application of GIS in ITS. Simultaneous or direct demand formulation, Model of demand elasticities, Direct and Cross elasticities Comprehensive examples of traffic impact study.

[T1,T2][No. of Hours: 12]**Text Books:**

[T1] Dr. L.R.Kadiyali -Traffic Engineering and Transport Planning, Khanna Publication

[T2] C.S.Papacostas and P.O.Prevedouros - Transportation Engineering and Planning, PHI, New Delhi

References Books:

- [R1] Urban Transport: Planning and Management by Ashok Kumar Jain – 2009, APH pub Corporation, ND.
 [R2] Partha Chakroborty Animesh Das-Principles of Transportation Engineering, PHI, New Delhi.
 [R3] Dicky J.W., Metropolitan Transportation Planning, Tata McGraw Hill
 [R4] Hutchinson B.G., Principles of Urban Transportation System Planning, McGraw Hill
 [R5] Public Transport: Its Planning, Management and Operation by Peter R. White – 2003, Spon press.



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GROUND WATER ASSESSMENT, DEVELOPMENT AND MANAGEMENT

Paper Code: ETCE-412

Paper: Ground Water Assessment, Development and Management

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The course will help students:

1. To apply appropriate methods to groundwater resource evaluation;
2. Use different methods to estimate groundwater recharge;
3. Combine these skills for groundwater resource assessment, Development and Management

UNIT-I

Types of Water-Bearing Formations, Influence of Physiography and Climate on Ground Water availability, Ground Water Investigations, Surface Investigations, Hydrological Investigations, Test Drilling, Geophysical Methods, Resistivity Method, Electric Logging, Gamma-Ray Logging, electrical Resistivity Surveying, Seismic Refraction Surveying, Ground Water Resource Assessment, methods of Artificial Recharge of Ground Water, Ground Water Pollution, Ground Water Quality, Conjunctive Use of Ground Water with Canal Water. Aquifer Characteristics Influencing Yield of Wells, Static Water Level, Transmissibility, Coefficient of Storage, Specific Yield, Hydraulic Resistance, Leakage Factor, Steady State Radial Flow, Theoretical Aspects of Steady State Flow to Cavity Wells.

[T1,T2][No. of Hours: 11]

UNIT-II

Unsteady State Flow to Wells in Unconfined and Confined Aquifers, Procedure for Determining Hydraulic Properties of Confined Aquifers, Cooper-Jacob Method of Solution, Recovery Test, Unsteady State Flow to Cavity Wells, Procedure for Determining Hydraulic Properties of confined Aquifers using Cavity Wells. Pumping Tests, Step Drawdown Test, Significance of Well Loss Coefficient, Pumping Test Procedures, Observation Wells, Well Interference, Interference of Wells in Confined Aquifers. Design of Open Wells, Depth of Well, Thickness of Well Lining, Nomograph for Design of Well Steining, Design of RCC Lining, Weep Holes in Well Lining, Well Curbs, Design of Well Curb, Increasing the Yield of Open Wells, Horizontal Boring in Open Wells, Installation of Radial Filters in Wells in Alluvial Formations, Radial Boring in Open Wells. Pollution Travel in Soil and Aquifers, Location and Design of Wells with Sanitary Protection, Well Location, Well Construction, Disinfection of Wells.

[T1,T2][No. of Hours: 12]

UNIT-III

Multiple-Well System, Radial Wells and Infiltration Galleries, Design of Tube Wells, Design of Housing Pipe and Well Casing, Bore Size and Well Depth, Selection of Strata to be Screened, Design of Well Screen, Design of Gravel Pack, Sanitary Protection of Tube Wells, Common Causes of Contamination and Their Remedies, Design of Skimming Wells. Ground Water Exploration, Geologic and hydrologic methods, Surface geophysical methods, Hydro-geologic well logging, Geophysical well logging, Tracer techniques.

[T1,T2][No. of Hours: 10]

UNIT-IV

Ground Water Modelling using finite difference, use of appropriate software like Modflow etc, Case Study. Pumping of Water, Design of Centrifugal pumps, Design of Impeller, Shaft Impeller inlet and vane angles, Diameter of the Eye of Impeller, Impeller outlet and vane angle, Design of Impeller vanes, Design of Volute, Design of vanes, effect of Suction lift on discharge and efficiency, Centrifugal pump installation in open wells/tube wells, operation and maintenance. Vertical Turbine pumps and their installation, operation and maintenance, submersible pump and their installation, operation and maintenance, propeller pumps and their operating characteristics and installation, Jet pumps, Performance characteristics and installation.

[T1,T2][No. of Hours: 12]

Text Books:

- [T1] Karanth K.R., “Ground Water Assessment Development and Management”, Tata McGraw Hill Education (P) Ltd., New Delhi.
- [T2] Sondhi M.K., “Water Wells and Pumps”, Tata McGraw Hill Education (P) Ltd., New Delhi.

Reference Books:

- [R1] Garg S.K., “Environmental Engineering (Vol. 1), Water Supply Engineering”, Khanna Publishers.,New Delhi.
- [R2] Ramanathan A.L., Bhattacharya P., Keshari A.K., Bundschuh J., Chandrasekharam D., Singh S.K., “Assessment of Groundwater Resources and Management”, I.K. International (P) Ltd., New Delhi.
- [R3] Hiscock K.M., Rivett M.O., Davison R.M., “Sustainable Groundwater Development”, Geological Society Special Publication No. 193, London.



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ADVANCE GEOTECHNICAL ENGINEERING**Paper Code: ETCE-416****Paper: Advance Geotechnical Engineering**

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To introduce the fundamentals of soil dynamics and design of machine foundations as well as introduce the advanced topics of geotechnical engineering, such as, foundation of expansive soils and concepts and applications of geoenvironmental engineering.

UNIT-I

Soil Dynamics: One Dimensional wave propagation, One Dimensional Wave in layered body, impedance ratio, angle of refraction, critical angle of incidence, introduction of attenuation of stress waves, Definitions of Material Damping and Radiation Damping in soil. Measurements of Wave Propagation Velocity, Shear Modulus, Thickness of soil layers etc; Field Tests like Low Strain Test, Seismic Reflection Test, Seismic Refraction Test for Horizontal Layering and inclined or irregular layering, Suspension Logging Test, Steady States Vibration [Raleigh wave] Test, Seismic Cross Hole Test, Seismic Down Hole Test, Seismic Cone Test, Details and interpretation of Standard Penetration Test and Cone Penetration Tests. Laboratory Tests: Cyclic Triaxial Shear Test, Introduction of Centrifuge and Shaking Table Test.

[T1,T2] [No. of Hours: 12]**UNIT-II**

Machine Foundation: Types of Machine Foundations, General Requirements, Design Data, Dynamic Loads induced in simple Crank Mechanism, Permissible Amplitudes and Bearing Pressure, General Theory of Transmissibility of force for Vibrating machines in brief
Analysis and Design of Block Type Machine Foundations: Brief review of Empirical Methods based on considering Soil as a Semi infinite Elastic Solid and Soil as a spring, Barkans Method of Analysis for Block Foundations including Vertical sliding, rocking and yawing of vibrations. Introduction of codes related with Machine Foundations.

[T1,T2][No. of Hours: 12]**UNIT-III**

Foundation on Expansive Soils: Identification of expansive soils by field inspection and Laboratory Tests, general mechanism and characterization of swelling, Types of Damages in Building on expansive clay. Design of foundation on expansive soils like under-reamed piles, Computation of collapse settlement, Retaining walls in expansive soils, Treatment of cracked buildings.

[T1,T2][No. of Hours: 10]**UNIT-IV**

Environmental Geo-technology: Contamination due to landfills, subsurface contamination due to leachate and its effects. One dimensional analysis of contaminant transport, contaminated sites, Containment of solid waste in landfills, Vertical barrier for containment, Geo-technical reuse of construction and industrial waste materials
 Case study of Ash disposal from Thermal power plant, Ash pond and its design with/without geo-textiles, Environmental impact and control.

[T1,T2][No. of Hours: 10]**Text Books:**

- [T1] Fundamentals of Soil Dynamics by B.M. Das, Elsevier Publication
 [T2] Foundation engineering, Varghese, PHI Learning Pvt. Ltd.

References Books:

- [R1] Foundation for Machine: Analysis and Design by S. Prakash and V. K. Puri, John Wiley
 [R2] Geotechnical Earthquake Engineering by Kramer, Pearson publications.
 [R3] Gulati-Datta - Geo-Technical Engineering, Tata McGraw Hill Publishers
 [R4] Waste containment systems, waste stabilization and landfills: design and evaluation, Hari D Sharma, and Sangeeta P.Lewis, John Willey and Sons.

- [R5] V.N.S. Murthy -Advanced Foundation Engineering, CBS Publishers and Distributors.
[R6] Foundation analysis and Design, Bowles, McGraw Hill Education(I) Pvt. Ltd.



FEM IN STRUCTURAL ENGINEERING**Paper Code: ETCE-418****Paper: FEM in Structural Engineering**

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To introduce the concept of the FEM for obtaining solution of ordinary and partial differential equation. The course deals with numerical discretisation as a finite element approach and deals with various methods/problems such as Continuum problems, weighted residual methods, higher order finite element approximation, variational methods, partial discretisation and time-dependent problems and generalized finite elements and error estimates.

UNIT-I

Boundary Value Problems and the Need for Numerical Discretisation: Introduction, examples of Continuum problems, history of finite element method.

Weighted residual methods: Approximation by trial functions, weighted residual forms, piecewise trial functions, weak formulation, Galerkin method, examples of One-, two- and three -dimensional problems.

[T1,T2][No. of Hours: 11]**UNIT-II**

Higher order finite element approximation: Degree of polynomial in trial functions and rate of convergence, the patch test, shape functions for C0 and C1 continuity, one-, two- and three-dimensional shape functions.

Isoperimetric formulation: The concept of mapping, isoperimetric formulation, numerical integration, mapping and its use in mesh generation.

[T1,T2][No. of Hours: 10]**UNIT-III**

Variational Methods: Variational principles, establishment of natural Variational principles, approximate solution of differential equations by Rayleigh-Ritz method, the use of Lagrange multipliers, general Variational principles, penalty functions, least-square method.

Partial discretisation and time-dependent problems: Partial discretisation applied to boundary value problems, time-dependent problems via partial discretisation, analytical solution procedures, finite element solution procedures in time domain.

[T1,T2][No. of Hours: 12]**UNIT-IV**

Generalized finite elements and error estimates: The generalized finite element method, the discretisation error in a numerical solution, measure of discretisation error, estimate of discretisation error

Coordinate Transformation: Transformation of vectors and tensors, transformation of stiffness matrices, degree of freedom within elements, condensation, condensation and recovery algorithm, sub structuring, structural symmetry.

[T1,T2][No. of Hours: 12]**Text Books:**

- [T1] Zienkiewicz, O.C., and Morgan, K., Finite Element Approximation, John Wiley and Sons.
 [T2] Reddy, J.N., An Introduction to the Finite Element Method, McGraw Hill.

References:

- [R1] Huebner, K.H., Thornton, E.A., and Byrom, T.G., The Finite Element Method for Engineers, John Wiley
 [R2] Hutton, D.V., Fundamentals of Finite Element Analysis, McGraw Hill.
 [R3] Kikuchi, N., Finite Element Methods in Mechanics, Cambridge University Press.
 [R4] Cook, R.D., Malkus, D.S., Plesha, M.E., and Witt, R.J., Concepts and Applications of Finite Element Analysis, John Wiley and Sons.
 [R5] Zienkiewicz, O.C., and Taylor, R.L., The Finite Element Method, Vol. I and II, McGraw Hill.

GROUND WATER CONTAMINATION AND MITIGATION MEASURES

Paper Code: ETEN-418

Paper: Ground Water Contamination and Mitigation Measures

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The students will be able to:

1. Describe the human activities that may modify groundwater chemistry;
2. Discuss pollutant classification and the nature of diffuse and point-source pollution, giving examples;
3. Describe the origin and properties of the major organic and inorganic pollutants;
4. Apply the principles of modelling solute transport;
5. Outline the various approaches to remediation of polluted groundwater.

UNIT-I

Ground Water Movement and Contamination: Introduction, Characteristics of Ground Water, Sources and Types of Ground Water Contamination, Principles of Ground Water Movement, General Flow Equations, Unsaturated Flow and Water Table, Ground Water Flow and Well Mechanics, Sustainable Yield, Mass Balance Equations, Specific Storativity, Initial and Boundary Conditions, Boundary Surface, Particular Boundary Conditions, Complete 3-D Mathematical Flow Model, Modeling 2-D Flow in Aquifers, Complete Aquifer Flow Models, Groundwater Maps and Streamlines, Modeling Flow in the Unsaturated Zone.

[T1,T2] [No. of Hours: 12]

UNIT-II

Contaminant transport mechanism: Underground storage tanks, Landfills, Septic Systems, Agricultural Wastes, Return Flow from Irrigation and Sewage, Strategy for Hydrologic Site Investigations, Geologic Data Acquisition, Hydrologic Data Acquisition, Acquisition of Soil and Groundwater Quality Data, Data Evaluation Procedures, Contaminant Transport Mechanism such as Advection, Diffusion and Dispersion, Sorption and Desorption, Biodegradation, Mass Transport Equations, One Dimensional Models, Governing Flow and Transport equations, Analytical Methods, Multi-Dimensional Methods.

[T1,T2][No. of Hours: 11]

UNIT-III

Numerical Modeling of Contaminant Transport: Introduction to Modeling Inorganic and Organic Solute Transport, Numerical Methods, Finite Difference Methods, Numeric Flow Methods, Contaminant Transport Models, Applying Numerical Models to Field Sites, Fate and Transport of organic Substances in Groundwater, Case Studies of Organic and inorganic Groundwater Pollution.

Non-aqueous Phase Liquids (NAPLs): Types of NAPL, Transport, Computational methods, Characterizing NAPLs at Remediation Sites.

[T1,T2] [No. of Hours: 11]

UNIT-IV

Natural Attenuation and Risk Based Corrective Action: General Principles behind Natural Attenuation, Natural Attenuation Protocols and Guidance, Risk Based Corrective Action.

Ground Water Remediation Alternatives: Introduction to Remediation methods, Remedial Alternatives, Contaminant Methods for Source Control, Hydraulic Controls and Pump and Treat Systems. Bioremediation, Remediating NAPL Sites. Emerging Remediation Technologies, Case Studies of Remediation.

[T1,T2][No. of Hours: 11]

Text Books:

- [T1] Bedient P.B., Rifai H.S., Newell C.J., "Groundwater Contamination- Transport and Remediation", Prentice Hall, New York.
- [T2] Bear J. and Cheng A.H.D., "Modeling Groundwater Flow and Contaminant Transport (Theory and Applications of Transport in Porous Media)", Springer, New York.

Reference Books:

- [R1] Cheremisinoff N.P., "Groundwater Remediation and Treatment Technologies", Noyes Publications, New Jersey.
- [R2] Charbeneau R.J., Bedient P.B., Loehr R.C., "Groundwater Remediation", Technomic Publishing Company, Pennsylvania.

- [R3] American Society of Civil Engineers, “Groundwater Contamination by Organic Pollutants- Analysis and Remediation”, Library of Congress Catalogue Card No.: 00-063966, USA.
- [R4] http://www.interpore.org/reference_material/mgfc-course/ [Computer mediated Distance learning course on ‘Modeling Groundwater flow and Contaminant transport’ by Jacob Bear].
Chien C.C., Medina M.A., Pinder G.F., Rieble D.D., Sleep B.B., Zheng C., “Contaminated Groundwater and Sediment-Modeling for Management and Remediation”, Lewis Publishers, Florida



ENVIRONMENT ENGINEERING

Paper Code: ETCE-422
Paper: Environment Engineering

L	T	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: The subject deals with primary and secondary air pollutants, monitoring and standards of various pollutants in ambient air, indoor air pollution and noise measurement, occupational noise, handling and management of municipal hazardous and bio-medical waste.

UNIT – I

Concept of unpolluted air, Gaseous and vapour pollutants in atmosphere, Scales of air pollution, Primary and secondary pollutants, Ambient Air Quality [AAQ], Monitoring for pollutants [SO₂, NO₂, O₃, Particulates and their health effects. Stack monitoring for SO_x, NO_x and CO. Effects of air pollution on materials, structures and Human health. Air quality criteria, National air emission standards and AAQ guidelines, Indoor Air pollution. Control and management of indoor and outdoor Air pollution. Green house gases Green house effect, Global warming.

[T1,T2][No. of Hours: 12]**UNIT – II**

Characteristics and Sources of noise, Legal aspects: Standards of noise, Legislation in India Types of noise: Neighborhood noise, Traffic noise, Occupational noise, Community noise, Health effects of noise, Physiological hazard and Psychological hazard. Occupational noise-exposure, Noise measuring equipments such as Sound Level Meter. Control of Noise pollution in industrial, residential and silent zone.

Sources, Composition and Properties of Municipal solid waste, Handling and Separation of solid waste, Introduction to Municipal Waste [Management and Handling Rules, 2000], Disposal of Municipal Solid Wastes.

[T1,T2][No. of Hours: 11]**UNIT – III**

Solid Waste Collection and Transportation: Types of collection systems [Hauled- container system and Stationary container system], Collection routes and their Layout, Solid waste Transfer Stations. Landfills: Classification, Types and methods, site selection, site preparation. Composition, Characteristics.

[T1,T2][No. of Hours: 11]**UNIT – IV**

Generation and Control of Landfill gases, Composition, formation, movement and control of leachate in landfills, landfill design.

Composting: Theory of composting, manual and mechanized composting, Characterization, Storage and Segregation of hazardous and biomedical waste Techniques of hazardous and biomedical waste management.

[T1,T2][No. of Hours: 11]**Text Books:**

- [T1] M.N. Rao and H.V.N. Rao- Air Pollution, Tata McGraw- Hill
 [T2] Mackenzie L. Davis, David A. Cornwell, "Introduction to environmental engineering, McGraw-Hill- International Edition.

References Books:

- [R1] George Tchobanoglous, Hilary Theisen, Samuel A Viquel-Integrated Solid Waste Management: Engineering and Management issues", McGraw-Hill- International Editions
 [R2] Michael D. LaGrea, Phillip L. Buckingham, Jeffrey C. Evans-Hazardous Waste Management and Environmental Resource Management, McGraw-Hill- International Edition
 [R3] Howard S. Peavy, Donald R. Rowe, George Tchobanoglous-Environmental Engineering, McGraw-Hill- International Editions.
 [R4] Lawrence K. Wang, Norman C. Pereira-Advanced Air and noise pollution control, Humana Press
 [R5] Kenneth Wark, Cecil F. Warner-Air pollution its origin and control, PHI

OFFSHORE STRUCTURAL ENGINEERING**Paper Code: ETCE-424****Paper: Offshore Structural Engineering**

L	T/P	C
3	1	4

INSTRUCTIONS TO PAPER SETTERS:**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

*Objective: To obtain expertise and specialize in Offshore Structures and subsea Engineering.***UNIT I****Concrete/composites:** Underwater concrete, mix design, quick setting compounds, high strength grout, fiber reinforced plastics, special composite materials for under water repairs.**Structural Steel:** Corrosion Mechanism; Types of corrosion; Seawater corrosion; corrosion allowance, cathodic protection design, impressed current method, sacrificial anodes design, protective coatings, splash zone protection, cathodic protection monitoring system.**Underwater repair:** Underwater welding, repair schemes for tubular members, grouted sleeve connections, and stressed – grouted connections for tubular joints.**[T1,T2][No of Hours: 12]****UNIT II****Static Structural Analysis:** Estimation of wave and current loading on framed structures; maximum base shear and overturning methods; Cyclic loads for fatigue analysis.**Dynamic Structural analysis:** Dynamic analysis of framed structures; Mode shapes and Eigen frequency analysis; Wave response; dynamic wave response; frequency and time domain analysis of risers and pipelines.**[T1,T2][No of Hours: 12]****UNIT III****Loads on offshore structures:** Wind Loads; Wave and Current Loads; Calculation based on Maximum base Shear and Overturning Moments; Design Wave heights and Spectral Definition; Hydrodynamic Coefficients and Marine Growth; Fatigue Load Definition and Joint Probability distribution; Seismic Loads.**[T1,T2][No of Hours: 11]****UNIT IV****Foundation for Offshore Structures:** Mud-mats: bearing capacity, sliding stability, over-turning stability, short term and long term settlements, factor of safety; Bucket foundation; Suction anchors; Gravity foundation.**[T1,T2][No of Hours: 10]****Text Books:**

- [T1] Mohamed Abdallah El-Reedy. Offshore Structures: Design, Construction and Maintenance, Elsevier
 [T2] Hydrodynamics of Offshore Structures by S.K. Chakrabarti, Springer-Verlag

References:

- [R1] Handbook of Offshore Engineering by S.K. Chakrabarti, Elseviers, 2005.
 [R2] Structural Stability - Theory and Implementation by W.F.Chen and E.M.Lui by Elsevier
 [R3] Construction of Marine and Offshore Structures by Ben C. Gerwick, CRC Press, 1999.
 [R4] Dynamics of Offshore Structures by James F. Wilson – 2003, John Wiley and Sons
 [R5] Construction of Marine and Offshore Structures by Ben C. Gerwick, Jr – 2007, CRC Press.

ESTIMATION OF PROJECTS USING APPLICABLE SOFTWARE

Paper Code: ETCE-452

L T/P C

Paper: Estimation of Projects using Applicable Software

0 2 1

List of Experiments:

1. Detailed Estimate [Duration and Cost] for a two storey building.
2. Detailed estimate for following projects:
 - [i] a culvert.
 - [ii] stretch of road about 1 Km long including earthwork.
 - [iii] Elevated water tanks.
 - [iv] Manholes, Septic tanks.
 - [v] Water supply Scheme and
 - [vi] Drainage Scheme.
3. Estimate of Electrification Work for a Material Testing Laboratory.
4. Time Estimate by Network Analysis.
5. Estimation of Air Conditioning requirements for a Library.
6. Valuation reports for:
 - [i] A hotel
 - [ii] A Theatre
 - [iii] An Educational Building

Books/References:

1. B.N.Dutta-Estimating and Costing in Civil Engineering, UPSPD
2. Delhi Schedule Rates, C.P.W.D.

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INDRAPRASTHA
UNIVERSITY

LAB BASED ON ELECTIVE I OR II

Paper Code: ETCE-454

L	T/P	C
0	2	1

Paper: Lab based on Elective I or II

Based on theory course 8-10 exercises, designs/experiments.

NOTE:- At least 8 Experiments from the syllabus must be done in the semester.



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MAJOR PROJECTS

Paper Code: ETCE-460
Paper: Major Projects

L	T/P	C
0	12	8

Students may choose a project based on any subject of Civil Engineering. The students will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format.

The project work will be a design project for possible implementation of project including field surveying a computer oriented project on any of the topics of civil engineering interest. It will be a group project. The topic of the project will be different from the minor project.

The assessment of the project will be done at the end of the semester by a departmental committee consisting of 3-4 faculty members/experts specialized in various fields of Civil Engineering. The students will present their project work before the committee. The complete project report is to be submitted prior to the practical exams of 8th semester. However, an interim report based on the work carried out will have to be submitted by the students within two weeks of first mid semester exam of 8th Semester to the Project Guides based on the Assessment after submission of interim report, but prior to commencement of Theory/Practical exams.

*****END*****

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