

UNIVERSITY OF LUCKNOW
FACULTY OF ENGINEERING & TECHNOLOGY

Evaluation Scheme for B.Tech.

Branch: CIVIL ENGINEERING

SEMESTER – VII

S. No.	Subject Code	Subject Name	L-T-P	Evaluation					Credit
				Sessional			ESE	Grand Total	
				CT	TA	Total			
Theory									
01.	CE-701	Design of Steel Structures	3-1-0	20	10	30	70	100	4
02.	CE-702	Engineering Hydrology	3-1-0	20	10	30	70	100	4
03.	CE-703	Water Resource Engineering	3-1-0	20	10	30	70	100	4
04.	CE-704X	Any one from the list (DE – 2)	3-1-0	20	10	30	70	100	4
05.	AS-701/ AS-702	Engineering Economics/ Industrial Management	3-0-0	20	10	30	70	100	3
Practical									
06.	CE-751	Project Phase- I	0-0-3	-	-	150	-	150	2
07.	CE-752	Seminar	0-0-3	-	40	40	60	100	2
08.	CE-753	Industrial Training	0-0-2	-	-	50	-	50	1
09.	GP-701	General Proficiency				50		50	
		Total	15-4-8					800	24

Abbreviations:

CT - Class Test
TA - Teacher's Assessment
ESE - End Semester Examination
DE - Departmental Elective

Departmental Elective (DE-2):

CE-7041 Rural Development Engineering
CE-7042 Environmental Impact Assessment
CE-7043 Air & Noise Pollution Control
CE-7044 Earthquake Resistant Design
CE-7045 Tunnel Engineering

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Evaluation Scheme for B. Tech.

Branch : CIVIL ENGINEERING

SEMESTER – VIII

S. No.	Subject Code	Subject Name	L-T-P	Evaluation					Credit
				Sessional			ESE	Grand Total	
				CT	TA	Total			
Theory									
01.	CE-80XX	Any one from the Open Elective list	3-1-0	20	10	30	70	100	4
02.	CE-801	Construction Technology & Management	3-1-0	20	10	30	70	100	4
03.	CE-802X	Any one from the list (DE – 3)	3-1-0	20	10	30	70	100	4
04.	AS-801/ AS-802	Engineering Economics/ Industrial Management	3-0-0	20	10	30	70	100	3
Practical									
05.	CE-851	Project Phase- II	0-0-12	-	-	100	250	350	8
06.	CE-852	Quantity Surveying and Valuation Lab	0-0-2	-	20	20	30	50	1
07.	GP-801	General Proficiency				50		50	
		Total	12-3-14					800	24

Abbreviations:

CT - Class Test
TA - Teacher's Assessment
ESE - End Semester Examination
DE - Departmental Elective
OE- Open Elective

Departmental Elective (DE-3)

CE-8021 Urban Transportation System
CE-8022 Design of Hydraulic Structures
CE-8023 Ground Improvement Techniques
CE-8024 Concrete Technology

Open Electives: Refer list of Open Electives in APPENDIX.

CE-701
DESIGN OF STEEL STRUCTURES

L T P
3 1 0

UNIT -1

Introduction to steel and steel structures: Advantages and Disadvantages of Steel as a Structural Material, Properties of Steel, Stress strain curve for Mild Steel and High Strength Steel Rolled steel section. Introduction to design: Design loads and load combinations, design philosophies. Introduction to Limit State Design: Limit States of Strength, Limit States of Serviceability, Actions (Loads), Probabilistic Basis for Design. **08**

UNIT - 2

Design of Riveted, Bolted and Pinned Connections: Riveted Connections, Patterns of Riveted Joints, Bolted Connections, Types of Bolts, Types of Bolted Joints, Load Transfer Mechanism, Failure of Bolted Joints, Specification for Bolted Joints, Bearing-Type Connections, Prying Action, Tensile Strength of Plate, Efficiency of the Joint, Combined Shear and Tension, Slip-Critical Connections, Combined Shear and Tension for Slip-Critical Connections, Design of eccentric bolted connections. Simple Welded Connections: Types of Welds, Assumptions in the Analysis of Welded Joints, Design of Groove Welds, Design of Fillet Welds, Fillet Weld Applied to the Edge of A Plate Or Section, Fillet Weld for Truss Members, Design of Intermittent Fillet Welds, Plug and Slot Welds, Stresses Due To Individual Forces, Combination of Stresses, Failure of Welds, Distortion of Welded Parts, Fillet Weld Vs Butt Weld, Welded Jointed Vs Bolted and Riveted Joints, Design of eccentric welded connections. **08**

UNIT -3

Design of Tension Members: Introduction, Types of Tension Members, Net Sectional Area, Effective Net Area, Types of Failure, Design Strength of Tension Members, Slenderness Ratio (λ), Displacement, Design of Tension Member, Lug Angles, Splices, Gusset Plate. **08**

UNIT-4

Design of Compression Members: Introduction, Effective Length, Slenderness Ratio , Types of Sections, Types of Buckling, Classification of Cross Sections, Column Formula, Design Strength, Design of Axially Loaded Compression Members, Built-Up Columns (Latticed Columns), Lacing, Batten, Compression Member Composed of Two Components Back-to-Back, Splices, Design of Column Bases. **08**

UNIT -5

Design of Beams: Introduction, Types of Sections, Behaviour of Beam in Flexure, Section Classification, Lateral Stability of Beams, Lateral-Torsional Buckling, Bending Strength of Beams, Laterally Supported Beams, Laterally Unsupported Beams, Shear Strength of Beams, Web Buckling, Bearing Strength, Web Crippling, Deflection, Design Procedure of Rolled Beams, Built-Up Beams (Plated Beams), Purlins, Beam Bearing Plates, Effect of Holes in Beam, Introduction to Plate Girder , Introduction to Gantry Girder. **08**

NOTE: All designs are to be carried out as per IS: 800-2007

Text Books:

- 1 S. K. Duggal, "Limit State Design of Steel Structures", Tata Mcgraw Hill.
- 2 S. S. Bhavikatti, "Design of steel structure by Limit state method as per IS 800-2007", Tata Mcgraw Hill.
- 3 N. Subramanian, "Design of Steel Structures", Oxford University Press.
- 4 K S Sairam, "Design of Steel Structures", Pearson Education.
- 5 S Ramamurtham, "Design of Steel Structures", Dhanpat Rai Publishing Company.

Reference Books:

- 1 Robert Englekirk, "Steel Structures", John Wiley & Sons inc.
- 2 Lambert tall, "Structural Steel Design", Ronald Press Comp. New York.
- 3 Willam T Segui, "Design of Steel Structures", CENGAGE Learning.
- 4 D. MacLaughlin, "Structural Steel Design", CENGAGE Learning.

CE-702
ENGINEERING HYDROLOGY

L T P
3 1 0

UNIT – 1

Introduction: hydrologic cycle, water budget equation, world water balance, application in engineering. Precipitation: Forms of precipitation, weather systems for precipitation, measurement, raingauge network preparation of data, presentation of rainfall data, mean precipitation over an area, depth-area-duration relationships & maximum intensity- duration-frequency relationships, probable maximum precipitation (PMP). **08**

UNIT – 2

Abstraction from Precipitation: Evaporation and consumptive use – process and affecting factors, estimation and measurement techniques, Reservoir Evaporation and methods for its reduction, transpiration, Evapotranspiration - measurement and estimation; Actual Evapotranspiration (AET), Potential Evapotranspiration (PET), Initial Losses- Interception & Depression storage; Infiltration- process, capacities, Infiltration indices, measurement & estimation **08**

UNIT – 3

Runoff: Components, methods of estimation of runoff volume and peak runoff, runoff characteristics and types of streams, Rainfall-runoff relationship, empirical equations, Soil Conservation System (SCS-CN) method, flow duration curve, Flow-Mass curve, rating curve, runoff characteristics of stream, droughts: definition and its classification. **08**

UNIT – 4

Hydrographs: Classification of hydrographs, components of a flood hydrograph, Factors affecting flood hydrographs, base flow separation, effective rainfall, hyetograph, Direct Runoff Hydrograph,

Unit Hydrograph: Definition, application and limitations of unit hydrographs, derivation of unit hydrograph, method of superposition and S-curve, distribution graph, derivation of synthetic unit hydrograph, and introduction to instantaneous unit hydrographs, SCS dimensionless unit Hydrograph. **08**

UNIT – 5

Flood: Rational method, empirical formulae, unit hydrograph method, flood frequency studies, Gumbel's Method, Long-Pearson type-III distribution, design flood, risk/reliability and safety factor;

Flood Routing: Basic equation, hydrologic storage routing & attenuation, hydrologic channel routing, hydraulic method of flood routing, Clark's method for IUH, Nash's conceptual model, flood forecasting & control **08**

Text Books:

1. K. Subramanya, "Engineering Hydrology", Mc Graw Hill Education.
2. Linsley R. K., Kohler M. A. and Paulhus J. L. H., "Hydrology for Engineers", Mc Graw Hill Education.

3. Raghunath H. M., “Hydrology: Principles, Analysis, Design”, New Age International Publishers.
4. Chow V. T., “Handbook of Applied Hydrology”, Mc Graw Hill Education.

Reference Books:

1. Ojha, “Engineering Hydrology”, Oxford University Press.
2. Viessman & Lewis, “Introduction to Hydrology”, Pearson Publication.
3. Fetter, “Applied Hydrology”, Pearson Publication.
4. Michael A. M., “Irrigation: Theory & Practice”. S Chand Publication

CE-703
WATER RESOURCE AND ENGINEERING

L T P
3 1 0

UNIT – 1

Irrigation Techniques: Definition of Irrigation, Necessity of Irrigation in India, Advantages of Irrigation, Disadvantages and ill-Effects of Irrigation, Types of Irrigation, Techniques of water Distribution in the farms, Quality of Irrigation water.

Water requirements of crops: Crop period and Base period, duty and delta of a crop, relation between duty and delta, factors on which duty depends, importance of duty, crop seasons and Indian agriculture, Kharif-rabi ratio, Paleo irrigation, kor-watering, crash crops, crops rotation, optimum utilization of irrigation water, irrigation efficiencies, Consumptive use or evapo-transpiration, transpiration, transpiration ratio, transpiration measurement, potential and actual evapo-transpiration, effective rainfall, CIR, NIR, factors effecting consumptive use, estimation of consumptive use, soil moisture irrigation relationship, field capacity, readily available moisture, soil moisture-irrigation relationship, field capacity, readily available moisture, soil moisture deficiency, equivalent moisture, estimating depth and frequency of irrigation on the basis of soil moisture regime concept. **08**

UNIT – 2

Canal Irrigation system: alluvial and non-alluvial canals, alignment of canals, distribution system for canal irrigation, curves in channels, gross command area, culturable or cultivable command area, intensity of irrigation, net and gross sown areas, net and grass irrigated areas, area to be irrigated, time factor, capacity factor, full supply coefficient, normal duty, computing the design capacity of an irrigation canal, losses of water in canals, canal regulation.

Sediment transport and design of irrigation channels: Importance of sediment transport, sediment load, bed formation, mechanics of sediment transport, Shield's entrainment method for design of non-scouring stable channels having protected side slopes in alluviums, design of stable channels in India, suspended load and its measurement, bed load and its measurement, cross section of an irrigation canal. **08**

UNIT – 3

Irrigation channels: Types: lined and unlined, silt theories: Kennedy's and Lacey's Design procedure for irrigation channels, longitudinal cross section, Schedule of area Statistics and channel dimensions, use of Garret's Diagrams in channel design, cross sections of an Irrigation channel, Computer programs for design of channels

Lining of Irrigation Canals: Advantages and types, factors for selection of a particular type, design of lined channels, cross section of lined channels, Economics of canal lining

Water Logging: Definition, effects, causes and anti-water logging measures, Drainage of water logged land, Types of drains open and closed, spacing of closed drains. **08**

UNIT – 4

Regulation and control of canal system: Purpose, Types of canal regulation works and their functional aspects Irrigation Outlets: Requirements, types, non-modular, semi-module and rigid module, selection criterion

River Training: Objective and need, classification of rivers, and river training works, meandering, stages, methods of river training, bank protection, Methods for measurement of discharge. **08**

UNIT – 5

Ground Water Hydrology: Zones of underground water, forms of subsurface water, Aquifers and their types, important terms, Determination of discharge through unconfined and confined aquifers with steady flow conditions.

Well hydraulics- Interference among wells, determination of aquifer constants, Well loss and specific capacity, efficiency of a well, recharge, estimation of recharge, Interference among wells, types of water wells, bored and open wells, specific yield of a well, Relative merits of well and canal irrigation, type of tube wells, well surrounding and well development, Suitable site selection for a tube well, Types of open wells, Methods of lifting water, Infiltration galleries. **08**

Text Books:

1. S.K. Garg, “Irrigation Engineering. and Hydraulic Structures”, Khanna Publishers.
2. S.K.Garg, “Hydrology and water resources Engineering”, Khanna Publishers.
3. B.C. Punmia, “Irrigation and water Power engineering”, Laxmi Publications.
4. K. Subramanya, “Engineering Hydrology”, TMH.
5. K.R. Arora, “Irrigation Water Power and Water Resource Engineering”.
6. Ralph A. Wurbs & Wesley P. James, “Water resource engineering”, Pearson Publication.

Reference Books:

1. Larry W. Mays, “Water Resources Engineering”, John Wiley India.
2. Wurbs and James, “Water resources Engineering”, John Wiley India.
3. R. K. Linsley, “Water Resources Engineering”, McGraw Hill.
4. G. L. Asawa, “Irrigation and Water Resources Engineering”, New age International Publishers.
5. A.M. Michel, “Irrigation Theory and Practices”. S.Chand Publication
6. Houghalen, “Fundamental of Hydraulic Engineering System”, Pearson Publication.

CE-7041
RURAL DEVELOPMENT ENGINEERING

L T P
3 1 0

UNIT-1

Rural Development Planning and Concept of Appropriate Technology: Scope; development plans; various approaches to rural development planning; concept of appropriate technology. Rural development programmes/projects. **08**

UNIT- 2

Rural Housing: Low cost construction materials for housing; Architectural considerations for individual and group housing; Composite material: Ferro-cement & fly ash, autoclaved calcium silicate bricks and soil-stabilized un-burnt brick; Plinth protection of mud walls; design consideration and construction of: non-erodable mud plaster, Water-proof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry, rat-trap bond for walls, Panels for roof, Ferro-cement flooring/roofing units, Earthquake resistant measures for low cost houses. **08**

UNIT-3

Water Supply and Rural Sanitation: Sources of water. BIS & WHO water standards. Quality, Storage and distribution for rural water supply works; basic design principles of treatment low cost water treatment technologies; conservation of water; rainwater harvesting; drainage in rural areas, low cost waste disposal systems; septic tank ; Biogas technology; low cost community & individual Garbage disposal systems, Ferro-cement water storage tanks. **08**

UNIT-4

Low Cost Roads and Transport: Broad categories of Pavement Layers, types of Granular Sub-Bases and Bases, Bituminous Construction, Surface Treatments for roads in rural areas. Soil Stabilization, Lime, Lime Fly ash and Cement Treated Course, Crusher-run-Macadam, Use of local materials. Flexible Pavement: Design factors, Basic Principles, Guidelines for Surfacing for Rural Road. **08**

UNIT- 5

Low Cost Irrigation: Consideration of low cost irrigation techniques, drip & sprinkler irrigation systems, Watershed and catchments area development - problems and features of watershed management, watershed structures. **08**

Text Books:

- 1 M.N.Gangrade, N.K. Barwa, “Rural Development”, Nirali Prakashan.
- 2 Rangwala, “Water supply and sanitary engineering”, Charotar publication
- 3 P.Nair, “Rural Infrastructure”, SBS Publication.
- 4 A.G.Madhov Rao, D.S.Ramachandra Murthy, “Appropriate Technologies for low cost Housing”, Oxford and IBH Publishing Co. Pvt .Ltd.

Reference Books:

- 1 “Document on Rural Road Development in India” Volume1 & 2, Central Road Research Institute, New Delhi.
- 2 CBRI, Roorkee, “Advances in Building Materials and Construction”.
- 3 C. Satyanarayana Murthy, “Design of Minor Irrigation and Canal Structures”, Wiley Eastern Ltd.

CE-7042
ENVIRONMENTAL IMPACT ASSESSMENT

L T P
3 1 0

UNIT - 1

History of EIA, Evolution Environmental Laws in World & India, Development of EIA in India, Environmental Clearance Procedure in India, Basic Concept of EIA: Introduction, EIA Procedure, Objective of EIA, Significances Systematic Approach for Using EIA: Introduction, Identification of Study Area, Classification of Environmental Parameters, Terms of References, Preparation of EIA Report, Scoping in EIA, Baseline Studies in EIA, Environmental Monitoring & Management Planning, Draft and Final EIA, Impact Analysis, Final EIA Report. **08**

UNIT - 2

Criteria for The Selection of EIA Methodology, EIA Methods: Ad-hoc Methods, Checklists Methods, Matrices Methods, Networks Methods, and Overlays Methods, Environmental Index Using Factor Analysis, Cost/Benefit Analysis, Predictive or Simulation Methods, Predictive Models for Impact Assessment. **08**

UNIT – 3

Environmental Impact Statement (EIS): Introduction, Basic Concepts behind EIS, Various Stages in EIS Production, Typical EIS Outline, Rapid EIA: Introduction, Procedure, Advantages and Limitation. **08**

UNIT – 4

Prediction and assessment of impacts on the air environment: Introduction, a generalized approach for assessment of air pollution impact, Prediction and Assessment of Impacts on Surface Water Environment: Introduction, Project Which Create Impact Concerns for the Surface-Water Environment, Systematic Methods for Evaluation of Impacts of Various Developmental Activities on Surface Water Environment. **08**

UNIT – 5

Risk Assessment: Introduction, Environmental Risk Assessment, Risk Assessment & Treatment of Uncertainty, Key Steps in Performing an Environmental Risk Assessment (ERA), Advantages and Limitation of Risk Assessment. **08**

Text Books:

- 1 Larry W. Canter, “Environmental Impact Assessment, second edition”, McGraw-Hill International editions.
- 2 Lauren David P., “Environmental Impact AssessmentWilly Interscience”, New Jersey.
- 3 Lalit N. Patnaik, “Environmental Impacts of Industrial & Mining activities”, Ashish Public house.

Reference Books:

1. Trivedi R. K., Sinha M. P., “Impact of Mining on Environment”, Ashish Publication House.
2. Cooper, John R., Randle, Keith, “Radioactive releases in the environment: Impact and Assessment”, John Wiley Sons.

CE-7043
AIR & NOISE POLLUTION CONTROL

L T P
3 1 0

UNIT - 1

Composition of dry ambient air, properties of air, Definition of air pollution, Classification of air pollutants, Units for classification of air pollutants, History of air pollution- global and national, Scope of problem-general, urban, rural and specific. **08**

UNIT - 2

Sources of air pollution: Natural and man-made, Major pollutants from different sources in Indian cities, Emission factors, Effect of air pollution on human health, plants, animals, properties and visibility. **08**

UNIT – 3

Meteorological aspects of air pollution, lapse rate, stability conditions, wind velocity profile, maximum mixing depth, topographic effects and plume patterns. Plume dispersion, Gaussian model for predicting concentration downwind from a single source, line source, area source **08**

UNIT – 4

Control devices: Principles, types, operations of each individual device i.e. Settling Chambers, Baghouse filter, Electrostatic Precipitator, Government of India's air pollution Acts and laws, Indian standards - emission and air quality standards, IS for various ambient air standards for various industries. **08**

UNIT – 5

Noise: Basic concept, measurement, various control methods. Noise standards **08**

Text Books:

- 1 Henry C .Perkins, “Air pollution” , McGraw Hill Publications.
- 2 P.L. Magill, “Air Pollution Handbook”, McGraw Hill Publ. New York.
- 3 A Parker, “Industrial Air Pollution Handbook”, Tata McGraw Hill Publications.
- 4 Wang, Lawrence K., Pereira, Norman C, Yung-Tse, “Advanced Air and Noise Pollution”, Springer.
- 5 Wark and Warner, “Air Pollution its origin and Control”. Pearson
- 6 A.T. Rossano, “Air Pollution Control Guidebook for Management”. Tata McGraw Hill Publications.

Reference Books:

- 1 Government of India's publication of laws related to air pollution. Central Pollution control
- 2 Board's (CPCB) publication of standards IS relevant to air pollution monitoring definitions, standards etc.
- 3 B.G. Liptak(ed.) “Environmental Engineers” Handbook vol. II ‘Air pollution’ Chilton book co. USA.

CE-7044
EARTHQUAKE RESISTANT DESIGN

L T P
3 1 0

UNIT-1

Internal structure of earth, Causes of earthquakes, Seismic waves, Magnitude, Intensity and Energy released, Characteristics of Earthquakes. **08**

UNIT-2

Response of Structure to Earthquake motion, Modelling of structures, Dynamics of single degree of freedom system. **08**

UNIT-3

Dynamics of multi degree of freedom system, Idealization of structure, seismic response **08**

UNIT-4

Introduction to earthquake resistant design, Equivalent lateral force method, Response spectrum method, Time history method, Introduction to earthquake resistant brick and masonry buildings. **08**

UNIT-5

Reinforced Concrete framed buildings, Code provisions, Introduction to machine foundation & its design, Degrees of freedom of a block foundation. **08**

Text Books:

- 1 S.K. Duggal, "Earthquake Resistant Design of structures", Oxford Higher Education.
- 2 Pankaj Agarwal, Manish Shrikhandi, "Earthquake Resistant Design of structures", Prentice-Hall of India Private Limited.
- 3 James M. Kelly, "Earthquake Resistant design with Rubber", Springer-Verlag.
- 4 J.M. Biggs, "Introduction to Structural Dynamics". McGraw Hill Publication
- 5 Jai Krishna and A.R. Chandrasekaran, "Elements of Earthquake Engineering". South Asian Publisher
- 6 IS: 1983 - 1984 Criterion for Earthquake Resistant Design.

Reference Books:

- 1 Mario Paz., "Structural Dynamics - Theory & computation". Springer
- 2 Anil K. Chopra., "Dynamics of Structures Theory and Applications to Earthquake Engineering". Pearson
- 3 Agarwal and Srikhande, "Earthquake Resistant Design of structures". PHI publication

CE-7045
TUNNEL ENGINEERING

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	3	1	0
UNIT -1			
Historical development, tunnel terminology, tunnel cross section and alignment			08
UNIT -2			
Site investigations, Geotechnical Considerations of tunnelling, stages in tunnel construction			08
UNIT -3			
Construction & Excavation methods, Tunnelling in Rock tunnels.			08
UNIT -4			
Soft ground tunnels, hauling of muck, Micro tunnelling techniques, Tunnel support design.			08
UNIT- 5			
Ventilation of tunnels, Lighting of tunnels, Drainage system for tunnels, Environmental and aesthetic considerations, safety aspects, general safety measures, economy of tunnels			08

Text Books:

- 1 B.C.Punamia, "handbook of tunnel Engineering II Basics and additional Services For Design and Construction", Wiley Ernst & Sohn.
- 2 Gary B. Hemphill, "Practical Tunnel Construction", Wiley John Ernst & Sohn INC.
- 3 Z T Bieniawski, "Rock Mechanics Design in Mining & Tunneling".
- 4 J O Bickel & T R Kuesel, "Tunnel Engineering Handbook". CBS Publisher

Reference Books:

- 1 R. Srinivasan, "Harbour & Dock & Tunnel", Charotar publication.
- 2 S.C. Saxena, "Tunnel Engineering".Dhanpat Rai Publication

AS-701
ENGINEERING ECONOMICS

L T P
3 0 0

Unit-1

Introduction of Engineering Economics and Demand Analysis: Meaning and nature of economics, relation between science, engineering, technology and economics; Meaning of demand, determinants of demand, shifts in demand, law of demand, price elasticity of demand & types, income elasticity, cross price elasticity, determinants of elasticity and uses and importance of elasticity. **08**

Unit-2

Concept of Supply: Law of supply, factors affecting supply, and elasticity of supply. Demand forecasting: introduction, meaning and forecasting, methods or techniques of demand forecasting, criteria for good demand forecasting and demand forecasting for a new product. **08**

Unit-3

Cost Analysis: Introduction, types of costs, cost-output relationship: cost function, cost-output relationships in the short run, and cost-output relationships in the long run; Short run and long run, break- even analysis; Production functions: laws of variable proportions, law of returns and economies of scale: internal and external. **08**

Unit-4

Market Structure: Market structure perfect competition, imperfect competition – monopolistic, oligopoly and duopoly salient features of price determination and various market conditions. **08**

Unit-5

Nature and characteristics of Indian economy: Concepts of LPG, elementary concepts of national income, inflation and business cycles ,concept of N.I and measurement, meaning of inflation, types and causes and phases of business cycle investment decisions for boosting economy(national income and per capital income). **08**

Text Books:

1. Premvir Kapoor, "Sociology and Economics for Engineers", Khanna Publishing.
2. D. Salvatore, "Principles of Microeconomics", Oxford University Press.
3. A. Koutsoyiannis, "Modern Microeconomic", Macmillan Education Ltd.

Reference Books:

1. D. N. Dwivedi, "Principles of Microeconomics", Pearson Education.
2. F. A. Cowell, "Microeconomic Principles and Analysis", Oxford University Press.
3. J. L. Riggs, "Engineering Economics", McGraw Hills.

AS-702
INDUSTRIAL MANAGEMENT

L T P
3 0 0

Unit-1

Introduction: Concept and scope of industrial management. **Productivity:** definition, measurement, productivity index, types of production system and industrial ownership. **08**

Unit-2

Functions of Management: Taylor's scientific management theory, Fayol's principles of management, social responsibilities of management, introduction to human resources management: nature of HRM, functions and importance of HRM. **08**

Unit-3

Work Study: Introduction, definition, objectives, steps in work study; **Method study:** Definition, objectives, steps of method study; **Work measurement:** Purpose, types of study: Stop watch methods steps: Allowances, standard time calculations, work sampling, production planning and control inventory control: inventory, cost, models of inventory control: EOQ, ABC, VED. **08**

Unit-4

Quality Control: Statistical quality control, control charts for variables and attributes, acceptance sampling: single sampling- double sampling plans and introduction to TQM. **08**

Unit-5

Project Management: Project network analysis, CPM, PERT and project crashing and resource leveling. **08**

Text Books:

1. Gideon Halevi, "Industrial Management- Control and Profit: A Technical Approach" Springer.
2. A.P. Verma and N. Mohan "A Textbook of Industrial Management" S.K. Kataria & Sons.
3. S. K. Sharma, Savita Sharma "Industrial Engineering and Organization Management", Kataria and Sons.

Reference Books:

1. S.C. Sharma & T.R. Banga, "Engineering Management" (Industrial Engineering & Management), Khanna Book Publishing Co.
2. P. Khanna, "Industrial Engineering and Management", Dhanpatrai publications Ltd.
3. Paneer Selvam, "Production & Operation Management", PHI.

CE-801
CONSTRUCTION TECHNOLOGY & MANAGEMENT

L T P
3 1 0

UNIT-1

Project cycle, organizing, planning, scheduling, monitoring, updating and management, work break down structure, Bar charts, milestone charts, network techniques, fundamentals of network, network rules and errors, Fulkerson's rule, types of networks viz A-O-A & A-O-N. **08**

UNIT-2

Introduction to network techniques, types, comparison of PERT and CPM, central limit theory, critical path, slack & its type, network analysis by PERT, activity times, float & its type, network analysis by CPM, Updating and resource allocation. **08**

UNIT-3

Cost model analysis, Direct Cost, Indirect cost, Total Cost Curve, Cost Slope, Time Value of money, Cash flow diagram, economic comparison, Present Worth method, Annual Equivalent Method, Rate of Return Method, break even cost analysis. **08**

UNIT- 4

Depreciation, Book value, Salvage Value, Scrap Value, methods of depreciation calculation, Construction Equipments: various excavation equipments, compaction equipments, hoisting equipments, Owning Cost, Operational cost. **08**

UNIT- 5

Agreement, contract, essential requirements of a valid contract, various types of contracts and their relative advantages and disadvantages, tender, process of tendering, security deposit, mobilisation advance, BOQ, PPP, BOT, EPC, EIA, DLP. **08**

Text Books:

- 1 Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 2003
- 2 Srinath, L.S., "PERT and CPM Principals and applications" Affiliated East-West Press Pvt. Ltd., New Delhi.
- 3 Patil, B.S., "Civil Engineering Contracts and Estimates" University Press India, Pvt. Ltd. Hyderabad -500 004

Reference Books:

- 1 Ojha, "Construction Management".
- 2 Srivastava, U.K., "Construction Planning and Management", Galgotia Publications Pvt. Ltd., New Delhi.
- 3 Sarkar, "Construction Technology", Oxford.
- 4 S V Deodhar and SC Sharma, "Construction Engineering and Management, Khanna Publishing house.

CE-8021
URBAN TRANSPORTATION SYSTEM

L T P
3 1 0

UNIT-1

Introduction to transportation planning, the planning concept, goals, objective and importance of transportation planning, nature of traffic problems in cities, Present Scenario of road transport and rail transport assets. Role of transportation: Social, Political, Environmental. Transport and Socioeconomic Activities, Historical Development of Transport, Transportation in the Cities, Freight Transportation, Future Developments **08**

UNIT- 2

Urban form and Transport patterns, land use – transport cycle, concept of accessibility. Types of transport systems, evolution of transport modes, transport problems and mobility issues. Public Transport: Intermediate Public Transport (IPT) Rapid and mass transport system like MRTS & bus rapid transit, Transport Planning Process, Problem Definition, Solution Generation. **08**

UNIT- 3

Travel demand: Estimation and fore casting, trip classification, trip generation: factor and methods, multiple regression analysis. Trip distribution methods, modal split, trip assignment. **08**

UNIT- 4

Studying travel behaviour, Analysing urban travel markets, Traffic and transportation surveys and studies, traffic and travel characteristics, urban transport planning process – stages, study area, zoning, database. **08**

UNIT-5

Evaluation of transport planning proposals: Land Use Transport Planning, Economic Evaluation methods like Net present Value methods, Benefit Cost method. Transport system management: Long term and short term planning. **08**

Text Books:

- 1 Hutchinson, B.G., “Principal of Urban Transport System planning”, McGraw Hill Book Company, New York.
- 2 Vukan R. Vuchic, “Urban Transit, Operations, Planning and Economics”, John Wiley & Sons, Ltd.
- 3 Khanna S. K., Justo C.E.G, & Veeraragavan, A. “Highway Engineering”, Nem Chand and Bros., Roorkee- 247 667.
- 4 Kadiyali L. R., & Lal, N.B. “Principles and Practices of Highway Engineering (including Expressways and Airport Engineering)”, Khanna Publications, Delhi – 110 006

Reference Books:

- 1 William W. Hay., “An Introduction to Transportation Engineering”.Krieger Publication
- 2 E.K.Mortak., “Introduction to Transportation Engineering planning”.
- 3 J.W.Dickey.,” Metropolitan Transportation planning”.CRC Press
- 4 L.R. Kadiyali, “Traffic Engineering”.Khanna Publication
- 5 Hutchinson, B.G.(1974), “Principles of Urban Transport Systems Planning”, Mc Graw Hill Book Company, New York.
- 6 John W.Dickey.(1975), “Metropolitan Transportation Planning”, Mc Graw Hill Book Company, New York.

CE-8022
DESIGN OF HYDRAULIC STRUCTURES

L T P
3 1 0

UNIT – 1

Types of Head works: Component parts of a diversion headwork, Failure of hydraulic structures founded on permeable foundations, Principles of design, Bligh's theory, Khosla's theory for determination of pressure and exit gradient.

Regulation Works: Falls, Classification, Introduction to design principle of falls, Design of Sarda type and straight glacis fall.

Principle & Design of distributary head regulator and cross regulator, canal escape, Bed bars. **08**

UNIT – 2

Canal head works: Functions, Location, Layout of head works. Weir and Barrage, Canal head Regulator, Introduction to the design principles of Weirs on permeable foundations, Design of vertical drop and sloping glacis weir.

Cross drainage works: Necessity and types, Aqueduct, Siphon Aqueduct, super passage, canal siphon, level crossing, Introduction to design principles of cross drainage works. **08**

UNIT – 3

Flood routing: Types, methods of reservoir routing, channel routing by Muskingham Method. Investigation and planning of dams and Reservoirs: Zones of storage, Estimation of storage capacity, Reservoir losses, Reservoir sedimentation and its control, life of a reservoir. Dams: classification and selection criteria. Earth Dams: Classification, causes of failure Phreatic line, and its determination Introduction to stability analysis. **08**

UNIT – 4

Gravity dams: Forces method of analysis, modes of failure and factor of safety, Elementary profile, stability analysis, galleries, joints, control of cracks. **08**

UNIT – 5

Spillways: Spillway capacity, types of spillways, Design of ogee spillway, Energy dissipation below spillway, Design criteria for Hydraulic Jump type stilling basins with horizontal and sloping aprons, spillway gates.

Hydro-Electric Power: assessment of potential specially in reference to India, classification of power plants, important terms, types of turbines and their suitability, Power House layout and important structures of a powerhouse. **08**

Text Books:

1. S. K. Garg, "Irrigation Engineering. And Hydraulic Structures", Khanna Publishers.
2. Larry W Mays, "Water Resources Engineering", John Wiley India.
3. Wurbs and James, "Water resources Engineering", John Wiley India.

Reference Books:

1. R.K. Linsley, "Water Resources Engineering ", McGraw Hill.
2. G L Asawa, "Irrigation and Water Resources Engineering", New age International Publishers.
3. B. C. Punimia & Pande B.B. Lal, "Irrigation and Water Power Engineering".Laxmi Publication

CE-8023

GROUND IMPROVEMENT TECHNIQUES

L T P
3 1 0

UNIT -1

Introduction, Review of compaction theory, effect of compaction on surface behaviour, Field methods of compaction, Quality Control, Design of soil-lime, soil-cement, soil-bitumen and soil-lime-fly ash mixes. **08**

UNIT -2

In-situ densification methods in granular soils, Deep compaction: Introduction, Terra-Probe, Vibro-flotation techniques, Ground Suitability for Vibro-flotation, Advantages, Mueller Resonance Compaction, Dynamic Compaction, Depth of Improvement. **08**

UNIT -3

In-situ densification methods in cohesive soil: Introduction, Pre-loading and de-watering, Vertical drains, Electrical method, Thermal method. **08**

UNIT – 4

Grouting: introduction, suspension grout, solution grout, grouting equipments and methods, Grouting design and layout Granular Piles: Ultimate bearing capacity and settlement, method of construction, load test. **08**

UNIT -5

Underpinning of foundations: importance and situations for underpinning, methodology, typical examples. Geotextiles: types, functions, specifications, precaution in transportation & storage. **08**

Text Books:

- 1 Purshotham Raj , “Ground Improvement”, Laxmi Publication Pvt. Ltd.
- 2 S. K. Garg, “Soil Mechanics & Foundation Engineering”. Khanna Publication
- 3 A. K. Samadhiya, “ Ground Improvement Techniques”.
- 4 Gopal Ranjan and A. S. R. Rao, “Basic and Applied Soil Mechanics”, New Age International Pvt. Ltd.

Reference Books:

- 1 J. N. Mandal, “ Geosynthetics World”. New Age International Private Limited
- 2 Bergado et. al., “Soft Ground Improvement”. America Society of Civil Engineers
- 3 Koerner, R. M., “Designing with Geosynthetics”. Xlibris Publication

CE-8024
CONCRETE TECHNOLOGY

L T P
3 1 0

UNIT -1

Concrete Materials-I -Cement: introduction, manufacturing, composition of cement, clinker composition, hydration of cement, testing of cement properties, types of cement (OPC & non OPC both), quality of mixing water for use in concrete. **08**

UNIT -2

Concrete Materials-II -Aggregates: introduction, classification, characteristics, deleterious substances in aggregates, Alkali-aggregate reaction, grading of aggregate, sieve analysis, fineness modulus, bulking of sand, testing of aggregates. **08**

UNIT -3

Concrete Materials-III -Chemical Admixtures: introduction, functions of chemical admixtures, study of accelerators, retarders, air-entrainers, plasticizers & their properties.
Mineral supplementary Additives: introduction, study of supplementary cementing materials & their properties like fly ash, GGBS (ground granulated blast furnace slag), silica fume. **08**

UNIT -4

Properties of fresh & hardened concrete: workability, factors affecting workability, measurement of workability, segregation, bleeding, rheology by modified slump, measurement of strength of concrete, Mix design (IS 10262), production & curing of concrete, acceptance of concrete. **08**

UNIT -5

Non Destructive Testing of Concrete: surface hardness method, ultrasonic pulse velocity method. Special concretes & concreting techniques: hot weather concreting, cold weather concreting, ready mix concrete, light weight concrete, ferrocement, fibre reinforced concrete, shotcrete. **08**

Text Books:

- 1 Gambhir, M.L, "Concrete Technology", Tata McGraw Hill Publishing Company Ltd, 2004.
- 2 Shetty, M.S, "Concrete Technology, Theory and Practice", S. Chand and Company Ltd, 2008.
- 3 Santhakumar, A.R , "Concrete Technology", Oxford University Press, New Delhi, 2007.

Reference Books:

- 1 IS 10262:2009 "Guidelines for concrete mix design proportioning", Bureau of Indian Standards, New Delhi, 2000.
- 2 IS 456:2000 "Plain & Reinforced Concrete- Code of Practice, Bureau of Indian Standards, New Delhi, 2000.
- 3 Neville, A.M. and Brooks, J.J., "CONCRETE TECHNOLOGY", ELBS.
- 4 Gupta B.L., Amit Gupta, "Concrete Technology", Jain Book Agency, 2010.
- 5 Newman, K. "CONCRETE SYSTEMS in COMPOSITE MATERIALS" Elsevier Publishing Company. 1966.

- 6 P. K. Mehta & Paulo J. M. Monteiro, "Concrete: microstructure, properties and materials", The Mc Graw Hill Companies.
- 7 Jayant D. Bapat (2013), "Mineral admixtures in cement & concrete", Taylor and Francis group.
- 8 M.C. Nataraja and Lelin Das, "Concrete mix proportioning as per IS 10262:2009".

AS-801
ENGINEERING ECONOMICS

L T P
3 0 0

Unit-1

Introduction of Engineering Economics and Demand Analysis: Meaning and nature of economics, relation between science, engineering, technology and economics; Meaning of demand, determinants of demand, shifts in demand, law of demand, price elasticity of demand & types, income elasticity, cross price elasticity, determinants of elasticity and uses and importance of elasticity. **08**

Unit-2

Concept of Supply: Law of supply, factors affecting supply, and elasticity of supply. Demand forecasting: introduction, meaning and forecasting, methods or techniques of demand forecasting, criteria for good demand forecasting and demand forecasting for a new product. **08**

Unit-3

Cost Analysis: Introduction, types of costs, cost-output relationship: cost function, cost-output relationships in the short run, and cost-output relationships in the long run; Short run and long run, break- even analysis; Production functions: laws of variable proportions, law of returns and economies of scale: internal and external. **08**

Unit-4

Market Structure: Market structure perfect competition, imperfect competition – monopolistic, oligopoly and duopoly salient features of price determination and various market conditions. **08**

Unit-5

Nature and characteristics of Indian economy: Concepts of LPG, elementary concepts of national income, inflation and business cycles ,concept of N.I and measurement, meaning of inflation, types and causes and phases of business cycle investment decisions for boosting economy(national income and per capital income). **08**

Text Books:

1. Premvir Kapoor, "Sociology and Economics for Engineers", Khanna Publishing.
2. D. Salvatore, "Principles of Microeconomics", Oxford University Press.
3. A. Koutsoyiannis, "Modern Microeconomic", Macmillan Education Ltd.

Reference Books:

1. D. N. Dwivedi, "Principles of Microeconomics", Pearson Education.
2. F. A. Cowell, "Microeconomic Principles and Analysis", Oxford University Press.
3. J. L. Riggs, "Engineering Economics", McGraw Hills.

AS-802
INDUSTRIAL MANAGEMENT

L T P
3 0 0

Unit-1

Introduction: Concept and scope of industrial management. **Productivity:** definition, measurement, productivity index, types of production system and industrial ownership. **08**

Unit-2

Functions of Management: Taylor's scientific management theory, Fayol's principles of management, social responsibilities of management, introduction to human resources management: nature of HRM, functions and importance of HRM. **08**

Unit-3

Work Study: Introduction, definition, objectives, steps in work study; **Method study:** Definition, objectives, steps of method study; **Work measurement:** Purpose, types of study: Stop watch methods steps: Allowances, standard time calculations, work sampling, production planning and control inventory control: inventory, cost, models of inventory control: EOQ, ABC, VED. **08**

Unit-4

Quality Control: Statistical quality control, control charts for variables and attributes, acceptance sampling: single sampling- double sampling plans and introduction to TQM. **08**

Unit-5

Project Management: Project network analysis, CPM, PERT and project crashing and resource leveling. **08**

Text Books:

1. Gideon Halevi, "Industrial Management- Control and Profit: A Technical Approach" Springer.
2. A.P. Verma and N. Mohan "A Textbook of Industrial Management" S.K. Kataria & Sons.
3. S. K. Sharma, Savita Sharma "Industrial Engineering and Organization Management", Kataria and Sons.

Reference Books:

1. S.C. Sharma & T.R. Banga, "Engineering Management" (Industrial Engineering & Management), Khanna Book Publishing Co.
2. P. Khanna, "Industrial Engineering and Management", Dhanpatrai publications Ltd.
3. Paneer Selvam, "Production & Operation Management", PHI.

CE-852
QANTITY SURVEING AND VALUATION LAB

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0 0 2

1. Estimation of quantities by Centre Line method.
2. Estimation of quantities by Long & Short wall method.
3. Analysis of rates.
4. Preparation of BOQ.
5. Introduction to MS Project /Primavera Software.
6. Study of Tender Documents.
7. Concrete Mix Design (IS 10262).