Course Name : WATER RESOURCES ENGINEERING
Course Code : CE 434 Credits : 4 Design Point : 2 LTP : 4 0 0
Pre-requisite : IRRIGATION ENGINEERING
Lecture wise breakup No. of lectures

INTRODUCTION: (8)

Importance of hydrological data in Water Resources Planning, The Hydrological Cycle, Measurement of precipitation, Hyetograph, Averaging depth of precipitation over the basin, Mass rainfall curves, intensity duration frequency curves, DAD curves.

INTERCEPTION & INFILTRATION: (4)

Factors effecting interceptions, factors effecting infiltration rate, infiltration capacity & its determination, evapo-transpiration.

RUNOFF & PEAK FLOWS: (10)

Factors effecting runoff, runoff hydrograph, unit hydrograph theory, use of unit hydrograph, S-curve hydrograph, synthetic unit hydrograph, estimation of peak flow, frequency analysis, Gumble's method, design flood, flood routing.

GRAVITY DAMS: (10)

Choice of type of dams, site selection and investigation, non over flow and over flow types of gravity dam, forces acting & stability criteria, stresses on the faces of dam, elementary profile of the gravity dam, method of zoning.

EARTHEN DAMS: (6)

Components of earthen dams and there functions, determination of seepage flow through isotropic and in-isotropic soil mass of earthen embankment, phreatic line determination by analytical and graphical methods, failure criteria of earthen dam, basic design criteria of earthen embankment, seepage control.

ARCH & BUTTRESS DAMS: (5)

Classification of arch dams, cylinder theory, expression relating central angle and cross sectional area of arch, types of buttress dam, advantages of buttress dam.

SPILLWAYS & ENERGY DISSIPATERS: (7)

Type of spillways; discharge characteristics of spillways, general principals of design of ogee spillways.

Types of energy dissipation devices, hydraulic design of stilling basin.

BOOKS:

1. R.K.Linsley and I.L.H. Paulhus; Water Resources Engineering, McGraw Hill Book Co. 1992

2. W.P. Creager, J.D. Justin and J.Hinds, Engineering for Dams, Wiley Eastern Pvt. Ltd.

REFERENCES:

1. Cedergen, H.R., Seepage, Drainage and Flownets, John Wiley & Sons Inc. USA, 1967

2. K. Subramanya, Engineering Hydrology Tata Mcgraw Hill and Publishing Co. New Delhi

3. P.N. Modi; Irrigation with Resources and with Power Engineering, Standard Book House, New Delhi 1990

CE 434 H: WATER RESOURCES ENGINEERING

In addition to contents of CE 434 the additional topics to be taken up are:

1. Rainfall data procurement and its analysis
2. Use of Unit Hydrograph and rooting of reservoir for a peak flow.
3. Suitability Analysis of Gravity & Earth Dams.
4. Design of Arch & Buttress Dam
5. Design of Energy Dissipaters

Course Name : TRANSPORTATION ENGINEERING – II
Course No.: CE 435 Credits : 4 LTP : 4 0 0
Pre-requisite : TRANSPORTATION ENGG-I
Lecture wise breakup No. of lectures

RAILWAY ENGINEERING

INTRODUCTION & PERMANENT WAY COMPONENTS (07)

Different types of gauges in India & abroad, loading and construction gauges. Requirements of ideal permanent way, detailed study of different components of permanent way, rails, Sleepers, Ballast, Formation, Rail Joints, Track-fillings.
Indian Railway Track - different gauges, cross sections, coning of wheels; Tractive resistances and stresses; Track components - rails, rail failures, sleepers, rail fixtures and fastenings and ballast; Geometric design of the railway track; Design of Points and crossings, Track junctions; Design of turn outs.

POINTS AND CROSSING (04)

Layout plans of simple cross overs, turnouts, diamond crossing.

STATIONS & YARDS & PERMANENT WAY CONSTRUCTION & MAINTENANCE (08)

Site selection of stations & yards, different types of stations and their layout, junctions and terminals with relative positions of passengers and goods platforms. Marshalling Yards. Level crossing, laying of track, maintenance of tracks, rail creep, rail and sleeper renewals. Common defects found in rail track.

SIGNALLING & INTERLOCKING (06)

Objects of signaling, different types of signals and their location in station yards, Interlocking- Requirements of good interlocking system, mechanical devices used in interlocking.

AIRPORTS

INTRODUCTION (05)

History of air transportation, preliminary requirements to airport planning, Airport classification, Effect of aircraft of aircraft characteristics and airport size. Airport Regional Planning. Aircraft characteristics; Site selection, obstructions and zoning laws, runway orientation; Geometric design of the airfield, air travel demand forecasting;

AIRPORT TERMINOLOGY SITE SELECTION & INVESTIGATION (05)

Approach surface, Approach area, Bean fort scale conical surface fuselage load classification number. Airport Site Selection , requirements. Desirable properties of sub grade soil classification of soil.

AIRPORT PLANNING (06)

Types of runway patterns, Runway layout conditions, Wind rose, specifications for runway clearances apron area, taxiways, Airport capacity terminal area, hangers, long range planning estimation of future air traffic, Airport and makings.

AIRPORT PAVEMENT DESIGN, GRADING AND DRAINAGE (09)

Airport grading general considerations. Drainage- Purpose & data required, drainage structure & materials, Factors affecting pavement design, CBR method of flexible pavement design, rigid pavement design westerguaards analysis, joints in concrete pavements.

BOOKS:

1. Horonjeff, R. Mckelvey, F. X., Planning & Design of airports, Mc Graw Hill, New York.
2. Aggarwal, M. M., Indian Railway Track, Sachdeva Press, Mayapuri, New Delhi.

REFERENCES:

1. Khanna, S. K. Arora, M. G. and Jain, S. S., Airport Planning and Design- Horon Jett, Nemchand Bros., Roorkee.
2 . Airport Engineering- Khanna & Arora.

COURSE CODE: CE 435 H TRANSPORTATION ENGINEERING – II,
In addition to CE 435 the following additional topics are to be taught:

AIR TRAFFIC CONTROL

Need of Air Traffic Control
Air Traffic Control Aids.

Course Name : DEPARTMENTAL LAB-VI
Course Code : CE 436 Credits : 2 Design Point : 2 LTP : 0 0 3
Pre-requisite : --
R.C.C. & STEEL (DESIGN & DRAWING)
R.C.C.:

1 Reinforcement details of a typical RCC floor, beam, column connection as per latest IS codal provision of ductility detailing.
2. Reinforcement details of staircase.
3. Drawing showing the reinforcement of different types of footings: Isolated footing, combined footing, raft foundation, strap beam foundation.
4. To prepare drawings showing the reinforcement details in cantilever retaining wall, counterfort retaining wall.

STEEL:

1. Detailed working drawings for:
   i) A Steel Roof Truss
   ii) Plate Girder (Welded)
2. Fully dimensional sketches for:
   i) Stanchion beam connections
   ii) A Grillage foundation

Course Name : DEPARTMENTAL LAB-VII
Course Code : CE 437 Credits : 2 Design Point : 2 LTP : 0 0 3
Pre-requisite : --

FLUID MECHANICS-II & HYDRAULICS DESIGN:

Study of a boundary layer development on a flat plate in a wind tunnel. Drag on circular cylinder. Application of Hele-shaw Model to compute seepage, flow past a circular cylinder and flownet studies. Free and force vortex motion. Verification of stokes law. Verification of Darcy's law. Determination of Manning Rugosity Coefficient of cemented bed of Hydraulic flume. Determination of elements of Hydraulic jump. Discharge and flow profiles of a broad crested weir.

Course Name : CAPSTONE PROJECT-II
Course Code : 499

Course Name: HUMANITIES III (BUSINESS ENVIRONMENT& INDUSTRIAL LEGISLATION)

Course Code: HU 402 Credits: 4 L T P : 4-0-0

Pre Req:

Lecture Wise Breakup **No. of Lectures**

1. **INTRODUCTION** **(07)**
   Scope of business, Characteristics of business and its forms.
2. **BUSINESS ENVIRONMENT**
   Economic, Political and Technological. **(07)**
   Ecological and Global Environment and their relevance in present scenario. **(08)**
3. **SOCIAL RESPONSIBALITY OF BUSINESS** **(05)**
   Concept, Social Responsibility toward different interest groups and Business Ethics.
4. **GLOBALIZATION** **(07)**
   Meaning, Rationale for globalization, features of current globalization, Pros and Cons of globalization.
5. **WTO** **(07)**
   Functions of WTO. WTO structure, and Implications for India.
6. **CORPORATE GOVERNANCE** **(05)**
   Concept, Essentials of good Corporate Governance, One case study.
7. **CONTRACT ACT** **(05)**
   Concept of Contract, types and its essentials.
8. **SALE OF GOOD ACT** **(05)**
   Essential of sale of goods Act.

BOOKS:

1 Francis Cherunilam, Business Environment, Himalaya Publications.
2 K.C.Garg,V.K.Sareen,MukeshSharma andR.C.Chawla, Commercial & Labour Laws, Kalyani Publishers.

REFERENCES:

1. K Aswathappa, Essential of Business Environment, Himalaya Publication.
2. S.S.Gulshan, Mercantile Law, Excel Books.
3. S.S. Gulshan & G.K. Kapoor, Business Law, New Age International (p) Ltd.,Publisher.
4. S Singh, Corporate Governance – Global Concepts & Practices, Excel Books.
5. Roger Benett, International Business, Addison Wesley Longhran, Delhi.
6. Y K Bhushan, Business Organization & Management, Sultan Chand & Sons.

HU402H (Humanities III) -In addition to the contents of HU402, additional topics:

Cluster Growth Model Vs SEZ
Innovative Dynamics of the Company
Foreign Market Entry Strategies
Competition Policy and Law
Corporate Social Responsibility-Two Case Studies

Course Name: HUMANITIES III (CORPORATE FINANCE)

Course Code : HU 404 Credits-4 : L T P: 4-0-0
Pre Req:
Lecture wise breakup No. of Lectures

1. **INTRODUCTION** **(07)**
   Finance, Financial Decisions, Objectives of Corporate Financial Decisions and factors influencing financial decisions.
2. **INDIAN FINANCIAL SYSTEM** **(07)**
   Nature and role of financial system in Indian Economy.
3. **FINANCIAL MARKETS** **(08)**
   Concepts, Type of markets and their relevance in present scenario.
4. **FINANCIAL INSTRUMENTS AND FINANCIAL SERVICES** **(08)**
   Capital and Money Market Instruments, Services.
5. **WORKING CAPITAL** **(05)**
   Types and factors affecting the requirements of working capital.
6. **SOURCES OF FINANCE** **(05)**
   Short term and long term.
7. **TIME VALUE OF MONEY AND CAPITAL BUDGETING** **(05)**
   Concept of Compounding and Discounting, Nature of Investment Decisions, Investment, Evaluation Criteria: Pay Back Period Method, Accounting Rate of Return Method, Internal Rate of Return Method and Net Present Value Method.
8. **FINANCIAL LEVERAGE** **(03)**
   Meaning (trading on equity) and measures.
9. **DIVIDEND POLICY** **(05)**

   Objectives of Dividend Policy, factors influencing firm's dividend policy.

10. **CAPITAL STRUCTURE** **(03)**

    Essentials of Capital Structure, Approaches to establish target capital structure.

BOOKS:

1. Pandey I.M., Financial Management, Vikas Publishing House Pvt.Ltd.

2. Khan M Y, Indian Financial System, Tata McGraw Hill.

3. Bhole LM and Mahakud Jitendra, Financial Institutions and Markets,

Tata McGraw Hil

REFERENCES:

1. Chandra Prasanna, Financial Management Theory and Practice, Tata McGraw Hill
2. Lasher William R., Practical financial Management, Thomson
3. Van Horne J.C., Financial Management and Policy, Prentice Hall
4. Apte, P.G., International Financial Management, Tata McGraw Hill

HU404H (Humanities III) -In addition to the contents of HU404, additional topics:

Capital Market Intermediaries and their Regulation.
Functions and Operations of Money Market.
Foreign Exchange Market –From FERA to FEMA.
Role of Banks and Financial Institutions in Economic Development.

Course Name : ADVANCED STRUCTURAL DESIGN
Course Code :CE 443 Credits : 4 L T P : 4 0 0
Pre-requisite : STRUCTURAL MECHANICS-II, REINFORCED CONCRETE DESIGN

Lecture Wise detail **No. of Lectures**

1. **Concrete Technology:** **(4)**
   Durability of concrete, Testing of hardened concrete, high performance concrete, admixtures in concrete
2. **Yield Line Analysis of Slabs:** **(8)**
   Assumptions, yield line pattern for different slabs, isotropic and orthotropically reinforced slabs, ultimate load carrying capacity of orthotropically reinforced slabs, triangular slabs, circular slab
3. **R.C.C. Pipes:** **(6)**
   Design of underground RCC pipes
4. **Bunkers & Silos:** **(8)**
   Design of RCC bunkers, Design of RCC silos.
5. **Prestressed Concrete:** **(8)**
   Design of prestressed concrete sections in flexure, limit state design concept, prestressed concrete pipes
6. **Circular Chimney:** **(6)**

Design of RCC circular chimney

7. **Shell Structures:** **(6)**
   General theory of cylindrical shells
8. **Plates:** **(8)**
   Pier bending of plates, bending of circular plates, rectangular plates

BOOKS

1. Concrete Technology : M.S. Shetty
2. Advanced R.C. Design : Krishna Raju
3. Limit State Design : A.K. Jain.

Course Name : FLOOD CONTROL & RIVER ENGINEERING
Course Code: CE 444 Credits : 4 LTP : 4 0 0
Pre-requisite : IRRIGATION ENGINEERING

Lecture Wise detail **No. of Lectures**

INTRODUCTION:

River Engineering **(10)**

Flood forecasting **(5)**

Sediment load, Resistance to flow **(10)**

Regime theories **(3)**

River Training **(2)**

River Modeling **(5)**

Channel improvements; cut offs **(5)**

River control structures **(6)**

Social and environmental impacts. **(6)**

BOOKS:

1. R.J. Garde, K.G. Ranga Raju, 1. Mechanics of Sedement Transportation and Alluvial Stream problems, Wiley Eastern Ltd.
2. V.A. Vanoni , Sedimentation Engg.

REFERENCES

1. A. Raudkivi, Loose Boundary Hydraulics
2. P.N. Modi, Irrigation Water Resources and Water Power Engineering, Standard Book House, New Delhi

Course Name : WATER RESOURCES PLANNING & MANAGEMENT
Course Code : CE 445 Credits : 4 LTP : 4 0 0
Pre-requisite : IRRIGATION ENGG. & WATER RESOURCE ENGG

Reservoir planning **(6)**

Water Resources Conservation Techniques **(8)**

Water Resources Economics **(8)**

Optimization in Water Resources Engineering (Linear and Dynamics Programming) **(12)**

Reservoir Management **(6)**

Stream flow Generation **(5)**

Environmental Impact Assessment of Water Resources Projects **(5)**

BOOKS:

1. Linsley, F. & Freberg, Water Resources Engineering 4th Edition TMH Int. 1992
2. Arthur Mass etal, Design of Water Resources Systems Macmillian 1962

REFERENCES:

1. L.D. James & R.R. Lee, Economics of Water Resources planning McGraw Hill, New York
2. Hall & Dracup Water Resources Systems Engineering, McGraw Hill, New York
3. H. Taha, Operation Research – an introduction.

Course Name : INDUSTRIAL WASTE MANAGEMENT
Course Code : CE 446 Credits : 4 LTP : 4 0 0
Pre-requisite : WATER SUPPLY & WASTE WATER ENGG

Industrial effluent characteristics and implications in their disposal **(6)**
Waste management in industries **(8)**
Different strategies for treatment of industrial effluent streams **(6)**
Treatment of specific pollutional parameters of industrial effluents like color, acids, alkalis, heavy metals, high BOD wastes, wastes rich in oil & grease **(10)**
Case studies of various industries e.g. Dairy, fertilizer, Distillery, Sugar, Pulp and Paper. **(20)**

BOOKS:

1. S.E. Jorgensen, Industrial Waste Water management, Elsevier Publications

REFERENCE:

1. W.W. Eckenfolder, Mc Graw Hill Pub, 1966

Course Name : ADVANCED WATER AND WASTE WATER TREATMENT
Course Code : CE 447 Credits : 4 LTP : 4 0 0
Pre-requisite : WATER SUPPLY & WASTE WATER ENGG

Advances in settling of water and wastewater, tube settlers, dual media, multimedia filters, micro filters, removal of taste, odor and colour, activated carbon treatment, modern methods of disinfection, chlorine disinfection **(20)**

Stream sanitation: causes and effects of river pollution **(2)**

Kinetics of stabilization **(6)**

Zones of pollution in a stream, self purification natural waters **(10)**

Advances, in wastewater treatment, extended aeration, biofiltration, tertiary treatment **(12)**

BOOKS:

1. Metcalf & Eddy, Waste water Engineering, Tata Mc Graw Hill , Int Ed
2. G.M. fair, J.C. Geyer, D.A Okan, Elements of Water Supply & Waste Water Disposal, John Wiley & Sons.1971

REFERENCES:

1. Unit Operations of Sanitary Engg, by L.G. Rich, John Wiley & Sons
2. Clark, Viessman, hammer, water Supply & Pollution Control, Harper Int Ed

Course Name : HYDRAULIC ANALYSIS & DESIGN
Course Code : CE 448 Credits : 4 LTP : 4 0 0
Pre-requisite : WATER RESOURCE ENGG.

Introduction, Hydrologic cycle **(4)**

Statistical analysis of hydrologic data **(12)**

Time Series **(4)**

Synthetic Data **(3)**

Precipitation-Depth, Area, duration frequency analysis **(10)**

Catchments Characteristics **(10)**

Stream flow hydrograph analysis and synthesis **(10)**

BOOKS:

1. Linsley, F. & Freberg, Water Resources Engineering 4th Edition TMH Int. 1992

2. K. Subramanya, Engineering Hydrology Tata Mcgraw Hill and Publishing Co. New Delhi

REFERENCES:

1. C.V.Davis; Hand Book of Applied Hydraulics
2. R.K.Linsley and I.L.H. Paulhus; Water Resources Engineering, McGraw Hill Book Co. 1992

Course Name : TRANSPORTATION PLANNING AND MANAGEMENT
Course No. : CE 449 Credits : 4 LTP : 4 0 0
Pre-requisite : TRANSPORTATION ENGINEERING I & II

Lecture wise breakup **No of lectures**

Hierarchical Levels of Planning, Passengers and Goods Transportation, General Concept and Process **(5)**

Urban Travel characteristics, Private & Public Travel Behaviour analysis, **(6)**

Travel demand Estimation, Forecasting methods and Models, Trip Generation methods, Model Split analysis, Trip Distribution- Growth factor method, Gravity models, Intervening opportunity and competing models (**17)**

Intermodel mix network optimization theories and techniques, Network assignments, Capacity Restrained and simultaneous distribution, Direct demand models **(10)**

Land-use Transport Planning, Statewide and Regional Transportation Planning **(7)**

Transport and energy, transport and environment, Transport management (policy, organisation, legal provisions), integration and coordination,

BOOKS:

1. Kadiyali, L.R., " Traffic Engineering and Transport Planning," Khanna Publishers, 1997
2. Vukan R. Vuchic, Urban Public Transportation Systems and Technology, Prentice Hall Inc., N.J., 1981.

REFERENCES:

1. Hutchinson,B.G., Introduction to Urban Transportation Systems Planning, McGraw Hill. New York 1974

Course Name : MASS TRANSPORTATION SYSTEM
Course No. : CE 450 Credits : 4 LTP : 4 0 0
Pre-requisite : TRANSPORTATION ENGINEERING I & II

Lecture wise breakup **No of lectures**

History and role of Transit, Recent Trends in Transit, Mass Transportation Characteristics **(6)**

Urban mass Transportation Planning, Demand projection, Mass Transportation System Performance **(8)**

Economic Evaluation methods, Terminals and their functions, design, Typical requirement, scheduling **(9)**

Vehicle dispatch policy, Spacing of bus stops, route spacing and performance, reserved bus lanes, **(12)**

Operational and management issues in Transit planning, Rail transit systems, Underground Transportation **(15)**

BOOKS:

1. Hutchinson,B.G., Introduction to Urban Transportation Systems Planning, McGraw Hill. New York 1974
2. Kadiyali, L.R., " Traffic Engineering and Transport Planning," Khanna Publishers, 1997

REFERENCE:

1. Vukan R. Vuchic, Urban Public Transportation Systems and Technology, Prentice Hall Inc., N.J., 1981.