

ANNAMALAI UNIVERSITY
CIVIL ENGINEERING
FOR SEMESTER VII
AND
SEMESTER VIII
LIST OF ELECTIVES
Appendix – I

Objective

Apart from core subjects, some specialized subjects are introduced in electives with a motive to specialize in a particular field having field applications.

1. URBAN AND RURAL PLANNING

UNIT-I

Development of urban planning-ancient and modern planning-industrial contribution to modern planning-stages, types of survey, collection of data-objects and principles of zoning-role of density and floor space index-planning of residential neighborhoods. Industrial areas, Parks and play grounds, schools-Master plan.

Urban renewal-Conservation, re-establishment and redevelopment-slum clearance.

UNIT-II

Development of new town-urban, modern and satellite towns.

UNIT-III

Levels of planning review and preparation of regional and national planning development control-building byelaws-zoning-town and country planning acts-land acquisition acts.

UNIT-IV

Rural Planning-rural urban differences-Principles of rural planning-urbanisation-integral rural development programme.

UNIT-V

Rural housing-grouping of houses-Principles and design environmental sanitation-usage of low cost materials.

2. DRAINAGE AND FLOOD CONTROL ENGINEERING

UNIT-I

Drainage-importance-land drainage by open channels economics of land drainage-flood ways-under drainage-action of the drains-locations of outlet-tile drain systems - drainability of soils-Highway drainage –airport drainage.

UNIT-II

Flood protection by channel improvements-roughness of channel-effect of cut-off pile dykes-tree retardation-revetment.

UNIT-III

Flood protection by levees.

UNIT-IV

Drainage of levees-maintenance of levees.

UNIT-V

Flood Protection by reservoirs-effect of natural reservoirs artificial reservoirs-flood routing-through rivers –through reservoirs.

REFERENCE BOOK:

1. Flood Control and Drainage Engineering - S.N.Ghose, Oxford and IBH Publishing Co. Pvt. Ltd., 1986.

3. INDUSTRIAL WASTE WATER TREATMENT AND DISPOSAL

UNIT-I

Effects of industrial waste on streams, land and air-Waste water treatment plants-water quality criteria-effluent standards-process modification-methods and material changes, house keeping etc to reduce waste discharge and strength of the waste-established recovery methods for by products within the plant operations.

UNIT-II

Characterization of major industrial wastes - chemical manufacturing industries.

UNIT-III

Conventional methods of treatments and disposal of industrial waste water-separation of solids, Sedimentation, Ponding and filtration.

UNIT-IV

Removal of organic contents-biological treatment methods-stabilization ponds-activated sludge process-aerobic and anaerobic digestion-oxidation ditch.

UNIT-V

Physico Chemical Treatment Methods: Neutralization, coagulation, flocculation, absorption-Municipal wastes.

4. CIVIL ENGINEERING SYSTEMS ANALYSIS AND DESIGN

UNIT – I

Introduction to systems engineering - four distinct phases of civil engineering projects: planning, design, construction and operation - design methodology - the notion of a system - functions of the systems engineer - Mathematical decision - making models - statement of mathematical model - classification - methods of finding an optimal solution.

Unit – II

Linear programming - general form of an LP problem - solution techniques - graphical method - simplex method -solution procedures for minimization problem, maximization problem - excess and artificial variables - Degeneracy – Duality.

Special forms of LP problems - transportation problems - obtaining initial feasible solution - assignment problems - integer programming.

Unit – III

Non-linear programming - introduction and scope - optimum - seeking strategies - gradient methods - direct search methods -unconstrained function - constrained functions.

Unit – IV

Dynamic programming - DP terminology - the principle of optimality - allocation process.

Unit – V

Economic aspects of systems engineering - cash flow - interest and equivalence of time - compound interest factors - non-uniform series cash flows -depreciation and salvage value - project appraisal techniques.

REFERENCE BOOKS:

1. Civil engineering systems analysis and design - Alan A. Smith, Ernest Hinton and Roland W. Lewis, John Wiley & Sons, 1983 edition.
2. Civil engineering systems - Andrew B. Templeman, The Macmillan Press Ltd. 1982 edition.
3. Civil and Environmental Systems Engineering - Charles S. Revelle, E.

4. Earl Whitlach and Jeff. R. Wright, Pearson Prentice Hall Inc., New Jersey, 2004 edition.

5. ADVANCED HYDROLOGY

UNIT-I

Hydrologic cycle, space and time scale, classification of hydrologic models, Precipitation: mechanisms, types, spatial and temporal variation, use of I-D-F and D-A-D curves, design storm, probable maximum precipitation. Infiltration: Process description, measurement, modeling - Richard's equation, Green-Ampt model, SCS model.

UNIT-II

Evaporation: process description, modified Penman equation, evaporation control. Evapotranspiration: process description, measurement, Penman - Monteith Equation

UNIT-III

Drainage basin characteristics, stream networks laws. Stream flow: factors affecting base flow, Hydrograph analysis, UH theory, IUH. Watershed modeling: discrete and continuous simulation models.

UNIT-IV

Design flood estimation: PMF estimation, regional flood frequency analysis. Flood routing: reservoir routing, channel routing - Muskingum - Cunge method, Droughts: indicators, classification, forecasting and management.

UNIT-V

Hydrologic Design: uncertainty concepts, first order reliability method (FORM), risk based design of culverts, storm sewers, reservoirs. Basics of stochastic modeling of hydrologic processes.

REFERENCE BOOKS :

1. Applied Hydrology - Ven Te Chow, David R. Maidment and Larry W.Mays, Mc Graw Hill Book Company, 1988.
2. Stochastic Water Resources Technology - N.T.Kottegoda, Macmillan Press, London, 1980.

6 - ARCHITECTURE

Objective

To make the students to know about the basic principles and influences on architecture, history of architecture, planning of various buildings.

UNIT-I

Influences on architecture - nature-climate and topography-man-personality and interests.

UNIT-II

Represented plan-growth of mass from plan - organisation of space-Principles of composition-contrast proportion-scale balance-unity and character of composition.

UNIT-III

Review of history of architecture-Egyptian, classical and Indian architectural elements-walls, columns, roofs and openings.

UNIT-IV

Planning of buildings - simple structures - aspect, grouping, circulation, sanitation and orientation - planning and treatment of interiors - general principles of acoustics - design of auditoriums, lecture rooms-acoustic materials.

UNIT-V

Drawing-line sketches of planned buildings-residences, clinics, community hall-general idea of perspective drawing (course work only).

REFERENCE BOOKS:

1. Architecture: Form, Space and Order - Francis O.K. Ching, VNR, N.Y., 1999.
2. Man, Climate and Architecture - Givoni B., Applied Science, Barking ESSEX, 1982.
3. Planning the Architects Handbook - Edward D. Mills; Butterworth London, 1995.
4. The Urban Pattern City Planning and Design - Gallian B. Arthur and Simon Eisner, Affiliated Press Pvt. Ltd., New Delhi, 1995 .
5. An Introduction to Town Planning Techniques - Margaret Roberts, Hutchinson, London, 1990.

7. PREFABRICATED & INDUSTRIAL STRUCTURES

UNIT-I

Prefabricated structures: Advantages and disadvantages-general principles of prefabrication-suitable fields of application-economy of prefabrication-types of prefabrication.

UNIT-II

Designing of cross section for load carrying structures beams, slabs, columns and floor systems-structural behavior of precast units-handling and erection stresses-joints and connections-dimensions and detailing –production-transport and erection of precast units.

Construction techniques-modular construction-industrial building systems for housing.

UNIT-III

Industrial structures: General-specific requirements for industries like textiles, sugar, cement, chemical, etc,-site layout and external –facilities-standard.

Structural materials used-planning of multi storeyed buildings-shell and R.C frames-workshops and ware houses.

UNIT-IV

North lights and Monitors-chimneys, bunkers and silos.

UNIT-V

Functional requirements-layout planning for staircases-lifts-refuse disposals, utilization of waste materials-cranes and conveyor lifting-natural and artificial ventilation-fire protection.

REFERENCES :

- 1) Planning Industrial Structures - Dunham.
- 2) Industrial Buildings - Keteum.
- 3) Building for Industry - Water Henn.

8. SERVICES IN HIGHRISE BUILDINGS

Objective

High rise buildings are a pleasure to watch, but they are made a pleasure to live in only when the functional requirements are adequately provided through proper ventilation, sanitation and water supply in addition to safety measures during calamities like fire. This course covers the principles and practices to be followed in the provision of good service systems.

UNIT – I

Planning of building services – Important considerations – Floor loadings – Building cost – Material requirements.

UNIT – II

Water supply services – Collection and examination of water samples – Standards – Internal storage and distribution – Bulk water supply – Water treatment – Selection of pumps – Pump rooms and sump.

UNIT – III

Sanitation services – Sewerage collection and disposal – Storm water drains – Sewage disposal – Septic tanks – Solid waste disposal – Refuse disposal systems.

UNIT – IV

Lift and Escalators – Types – Selection – Codes and Rules – Structural provisions – Strength considerations – Pits and overheads – Safety precautions.

UNIT – V

Air-conditioning – Provisions in buildings – Systems.

Acoustics – Noise in buildings – Noise control – Materials – Methods.

Fire fighting services – Classification – Modes of fire – First-aid – Fighting installations – Fire extinguishers – Provisions in building from fire safety angle – Codes and rules.

TEXT BOOK:

1. Services in Building complexes and High Rise buildings – V.K.Jain

REFERENCE BOOK :

1. Handbook of Utilities and Services in Buildings – Harris.

9. WATERSHED CONSERVATION AND MANAGEMENT

Objective

1. To introduce the student to the concept of dynamic process of a watershed resulting in soil erosion.
2. At the completion of the course the students should be able to understand the appropriate Conservation measures to be adopted for remediation of watershed.

UNIT – I WATERSHED

Watershed - concept - classification - characteristics History of erosion - Erosion problems of India - Approaches to soil and water conservation.

UNIT – II SOIL CONSERVATION

Soil erosion - Types of soil erosion - Controlling soil erosion - Soil erosion by wind and water - soil conservation practices - vegetative practices - mechanical practices - erosion control in torrents and gullies - soil loss estimation models.

UNIT – III WATER CONSERVATION

Need for water conservation - water conservation measures - water harvesting - principle and techniques - flood water harvesting.

UNIT – IV WATERSHED MANAGEMENT

Watershed programmes - factors affecting watershed management - planning of watershed works - watershed water resources - watershed management practices.

UNIT – V MANAGEMENT PRACTICES

Joint forest management - Grass land farming and' management - Range and pastures - Grazing practices Wasteland development.

TEXT BOOKS:

1. Soil and Water Conservation Engineering - R. Suresh, Standard Publishers distributors, New Delhi, 2000.

2. Hydrology and Soil conservation Engineering - Ghanshyam Das, Prentice-Hall India, New Delhi, 2000.
3. Watershed Management - Guideline for Indian Conditions - E.M. Tideman, Omega Scientific Publishers, New Delhi, 1996.

10. WATER RESOURCES SYSTEMS MANAGEMENT

Objective

1. To introduce the student to the concept of Mathematical approaches for managing the water resources system.
2. At the completion of the course the students should be able to apply an appropriate system approach to optimally operate a water resource system.

UNIT – I SYSTEM APPROACH

Philosophy of modelling - Goals and Objectives - Basics of system analysis concept - scopes and steps in systems engineering.

UNIT – II PHYSICAL AND SOCIO-ECONOMIC DATA

Collection, evaluation and processing - project appraisal public involvement, master Comprehensive and integrated planning of water resources project.

UNIT – III LINEAR PROGRAMMING

Operations research - introduction - Problem Formulation graphical solution- Simplex method - Sensitivity analysis simple applications.

UNIT – IV DYNAMIC PROGRAMMING

Optimality criteria Stage coach problem - Bellman's optimality criteria - Problem formulation and Solution - simple applications

UNIT – V SIMULATION

Basic principles - Methodology and Philosophy - Model development - input and outputs - Deterministic simulation - simple applications

REFERENCE BOOKS

1. Water resource Systems Planning and Management - Chaturvedi M.C., Tata McGraw Hill inc., New Delhi, 1997 .
2. Principles of water resources Planning - Goodman Aluvin S., Prentice-Hall, India, 1984.
3. Operations Research - Taha, H.A., Macmillan Publication Co., New York, 1995.
4. Design of Water Resources System - Maass, A., Husfchimidt M.M., Dorfman R., Thomas H.A., Marglin S.A and Fair G.M., Harvard University Press, Cambridge, Mass., 1995.
5. Water Resources System Engineering - Hall Warren, A. and John A. Dracup., Tata McGraw-Hill Publishing Company Ltd., New Delhi, 1998.
6. Water Management and Planning - Pillai K.M., 1987.

11. SOLID WASTE AND HAZARDOUS WASTE MANAGEMENT

Objective

The management of solid waste is one of the recent developments in Environmental Engineering. Now a days many hazardous wastes are also emerging and comes as domestic and industrial wastes. This course throws light on the details of solid waste as well as hazardous waste which will be helpful to Civil Engineers in their profession.

UNIT - I

Introduction -goals and objectives of solid waste management - social aspects - health factors - generation of solid wastes - method of disposal as a factor dependent upon the quality of refuse.

UNIT – II

Storage system - dust bins at the streets - collection facility - frequency of collection - method of transport.

Volume reduction - methods - compaction and boiling - grinding of garbage -disposal methods.

Incinerators - design and operation - dust and air pollution problems – use disposal methods cost considerations.

UNIT – III

Sanitary land fill method - site selection machineries involved - cost consideration - environmental factors such as odours, flies and vectors and leachate and groundwater pollution - supervision - of the process operation.

UNIT – IV

Recovery and Reuse - Ocean disposal - impact assessment - precautions required for the operation of the project - cost considerations.

UNIT – V

Composting methods - recommended procedures impact assessment - cost consideration - disposal of industrial solid waste and hazardous refuse - precautions needs.

REFERENCE BOOKS:

1. Solid Waste Management - Haggerty, D.J., Von Nostrand Renihold company, New York, 1973.
2. Municipal Refuse Disposal - NY American Public Works Association, 1966.
3. Refuse Collection Practice - by American Public Works Association, 1967.
4. Management of Solid Wastes in Developing Countries - Flintoff, F., WHO Publication, 1972.

12. EARTHQUAKE ENGINEERING

Objective

Earthquake Engineering has evinced a great deal of curiosity and interest in the wake of the recent Bhuj earthquake and more regions have been added to the list of seismic prone zones. This course deals with the Elements of Engineering Seismology and seismic design philosophy of structures.

UNIT -I

Elements of Engineering Seismology: Earthquake occurrence in the world, causes of earthquake, plate tectonics, earthquake mechanism, seismic zoning map of India & its use. Earthquake Effects:- On, ground and soil liquefaction, buildings, structures, power plants, switch, yards, equipments & other lifeline structures. Secondary Effects- Land and rock slides, liquefaction, fires, tsunami, floods, release of poisonous gases and radiation.

UNIT-II

Earthquake Phenomenon:- focus, epicenter, seismic waves, magnitude, intensity, intensity scale and its correlation with ground acceleration, characteristics of strong ground motions and attenuation, earthquake recording instruments. Do's and Don'ts for protection of life and property

UNIT-III

Introduction to theory of vibrations: Single degree un-damped and damped systems, elastic response to simple load functions & earthquake response spectra.

UNIT-IV

Introduction to seismic Design of Structures: Philosophy and principles of earthquake resistance design- Strength and stiffness, ductility design and detailing (IS: 13920), design of energy absorbing devices, concepts of seismic base isolation and seismic active control. Building forms and architectural design concepts- Horizontal and vertical eccentricities due to mass and stiffness distribution, structural redundancy and setbacks.

UNIT- V

Equivalent static lateral earthquake force on buildings (IS: 1893): Equivalent static method _ Seismic coefficients-evaluation, estimation of fundamental time period, base shear and its distribution, Vulnerability Atlas.

Performance of building and Structures: Main causes of damage-Intensity of earthquake forces, lack of strength and integrity in buildings, quasi resonance, lack of ductility, lack of detailing. Lessons learnt from the past earthquakes:- case studies of important Indian earthquakes, major world earthquakes, earthquake catalogue, assessment of damage. Use of relevant codes.

TEXT BOOKS:

1. Dynamics of Structures - Anil K Chopra, McGraw-Hill International edition, 1998.
2. Elements of Earthquake Engineering - Jaikrishna and Chandrasekaran, A.R, Sarita Prakashan, Meerut, 1986.

REFERENCE BOOKS:

1. Dynamics of Structures - Clough, R.W. and Penzien, J., Second edition, McGraw-Hill International edition, 1993.
2. Building Configuration and Seismic Design - Arnold, C. and Reitherman, R., John Wiley & Sons, Inc., New York, 1982.
3. Earthquake Resistant Design - Dowrick, D.J., John Wiley & Sons, Chichester, U.K., 1977.
4. Seismic Design of Reinforced and Masonry Buildings - Paulay, T. and Priestley, M.J.N., John Wiley & Sons, Inc., New York, 1992.

5. Guidelines for seismic design of Buildings - National Earthquake Hazard Reduction Programme (NEHRP), Federal Emergency Management Agency - 312, Washington. DC, 2000.

LIST OF IS CODES:

1. IS 1893: 2002 - Criteria for Earthquake Design of Structures, Bureau of Indian Standards, New Delhi.
2. IS 4236: 1976 -- Code of Practice for Earthquake Resistant Design and Construction of Buildings, Bureau of Indian Standards, New Delhi.
3. IS 13920: 1992 - Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces - Code of Practice, Bureau of Indian Standards, New Delhi.
4. Explanatory Handbook or Codes for Earthquake Engineering, Special Publication SP 22, Bureau of Indian Standards, New Delhi.
5. Explanatory Handbook on Indian Standard Code of Practice for Plain and Reinforced Concrete (IS 456:2000), Special Publication SP:24, Bureau of Indian Standards, New Delhi.

13.HYDRO POWER ENGINEERING

Objective

This course aims at equipping the students with a basic understanding of the principles of Hydro Power plants and their safety requirements.

UNIT- I

Pipe flow: Pump - pipeline system, appurtenances, minor losses, water distribution network analysis and design. Transients in pipelines - causes, simple analysis, transient control using surge tanks, air chambers and control valves.

UNIT- II

Hydraulic Jump, Surge analysis, design of spillways, energy dissipaters, channel transitions. Dam break analysis.

UNIT- III

Planning, Analysis and design of different types of power plants - Chimneys, Induced draught and Natural draught cooling towers.

UNIT- IV

Turbo generator Foundation, Material handling structures, Intake towers, storage structures and other supporting structures for equipments.

UNIT- V

Introduction, Power plant structure, Layout of hydro power plants, Types of power houses, Underground power houses, Types of underground power plants, alignment and layout of cavities, Investigations and studies, Safety requirements, Sizing of a power house, Joints in hydropower plants.

TEXT BOOKS:

1. A Text Book of Water Power Engineering - R.K Sharma and T.K.Sharma, S.Chand Publishers, 2003.

REFERENCE BOOKS:

1. Hydraulic Engineering - Roberson, J. A. Cassidy and Chaudhry, M. H., Houghton Mifflin, Boston, 1988.
2. Pipeline design for Water Engineers - Stephenson, D., Elsevier Scientific Publishers, 1981.

14.ENVIRONMENTAL IMPACT ASSESSMENT

Objective

Students should be conversant with assessment of environmental impacts due to major infrastructure projects and their management

UNIT-I INTRODUCTION

Impact of Development on Environment and Environmental Impact Assessment (EIA) and Environmental Impact Statement (EIS) - Objectives - Historical development - EIA Types - EIA in project cycle - capability and limitations Legal provisions on EIA.

UNIT-II METHODOLOGIES

Elements of EIA - Process screening, Methods of EIA Strengths, weaknesses and applicability - appropriate methodology.

UNIT-III PREDICTION AND ASSESSMENT

Socio Economic Impact - Prediction and Assessment of Impact on land, water, air and noise energy impact; Impact on flora and fauna; Mathematical models for prediction; Public participation - Reports - Exchange of Information - Post Audit - rapid EIA.

UNIT-IV ENVIRONMENTAL MANAGEMENT PLAN

Plan for mitigation of adverse impact on environment options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People - Environment management Plan.

UNIT-V CASE STUDIES

EIA case studies on Roads, bridges, ports, Harbour, Airport, Dams, Irrigation projects, Power plants, Railways.

TEXT BOOKS:

1. Environmental Impact Assessment Methodologies - Anjaneyulu, Y. B.S. Publications, Hyderabad, 2002.
2. Environmental Impact Assessment - Canter, R.L. McGraw Hill Inc., New Delhi, 1996.
3. Concepts in Environmental Impact Analysis - S.K. Shukla and P.R. Srivastava, Common Wealth Publishers, New Delhi, 1992.

REFERENCE BOOKS:

1. Environmental Impact Analysis Handbook - John G. Rau and David C Hooten (Ed)., McGraw Hill Book Company, 1990.
2. Environmental Assessment Source book, Vol. II and III. The World Bank, Washington, D.C., 1991.
3. Handbook of Environmental Impact Assessment Vol. I and II. Blackwell Science, Judith Pelts, New York, 1999.

15 - MANAGEMENT SCIENCE

Objective

To introduce the basic concepts of Management needed for Civil Engineers.

UNIT – I BASIC CONCEPTS IN MANAGEMENT

Types of business operations - Sole proprietorship Partnership - Company - Public and- private sector enterprises / Joint ventures, collaborations.

Functions of Management - Principles of management - Functions of management - Functions of a manager.

Production Management - Planning - Scheduling - Procurement - Inventory control - management tools - L.P. - PERT, CPM, etc.

UNIT – II INTRODUCTION TO MARKETING AND FINANCIAL MANAGEMENT

Market - Marketing, Segmentation, Positioning, Marketing Research, Market Planning, Scope of financial management - Cost accounting Vs Financial accounting, Appraisal of projects, Investment decisions - concept of payback.

UNIT – III MATERIALS AND EQUIPMENT MANAGEMENT

Planning - Identification, Procurement, Schedule and Cost control - systems approach in resource management - ABC analysis, VED analysis, FSN analysis, vendor rating evaluation, buying versus leasing of equipment.

UNIT – IV HUMAN RESOURCE MANAGEMENT

Scope and objectives of HRM - Man power policy and planning - Recruitment and selection - Training performance appraisal - Wage policy and compensation systems - Company union relationship and collective bargaining Accidents - Absenteeism and turn over - Grievances / conflicts - Identification and resolution.

UNIT – V INTRODUCTION TO COMPUTER APPLICATION IN CONSTRUCTION MANAGEMENT

Planning - Scheduling and Resource-analysis - Recording and operations- Project accounting, costing and finance usage of project management software.

TEXTBOOKS:

1. Management, Eighth edition - Konni, Donnel C.O. and Weighnrich. H., McGraw Hill International Book Company, 1997.
2. Marketing Management - Philip Kotler, Prentice-Hall of India, Edition, 1998.

REFERENCE BOOKS:

1. Personal Management - Momoria, Himalaya Publishing Co., 1992.
2. Construction Management and Accounts - Sharma, J.L., Sathya Prakashan, New Delhi, 1994.
3. An Introduction to Project Management - Srinath, L.S. Tata McGraw Hill Publications, 1995.
4. Marketing Management - Rajan Saxena., Tata McGraw Hill publishing Company Limited, 2005.

16 - ECONOMICS AND FINANCE FOR CIVIL ENGINEERS

Objective

Business acumen and a deep insight in economics is imminent to be successful in civil engineering practice. This course teaches the basics of economics, finance and accounting necessary for a Civil Engineering enterprise to be successful and profitable.

UNIT-I

Economics – Role of Civil Engineering in Industrial development - Support matters of economy as related to engineering - Market demand & supply - Choice of technology Quality control and production - Audit in economic law of returns governing production.

UNIT-II

Land and construction economics - Urban land use and values - Construction development in housing, transport and other infrastructures - Economics of ecology, environment, energy resources, local material selection, form and functional designs - Construction workers - Urban problems - Poverty - Migration - Unemployment- Pollution.

UNIT -III

Financing - Need for financial management - Types of financing - Short-term and Long term borrowing - Leasing - Equity financing - Internal generation of funds - External commercial borrowings - Assistance from government - International financial corporations - Analysis of financial statements - Balance sheet - Profit and loss account - Funds flow statement - Ratio analysis - Investment and Financing decision - Financial control - Job control - Centralized management.

UNIT-IV

Accounting method - General - Cash basis of accounting - Accrual basis of accounting - Percentage completion method - Completed contract method - Accounting for tax reporting purposes and financial reporting purposes.

UNIT-V

Cost estimating of Civil Engineering equipment – Depreciation and Interest – Maintenance and Repair costs – Degree of utilization – equivalent annual cost – operating cost standards – exercises. Project Benefit Cost analysis – least cost – Net Present Value (NPV) – equivalent annual cost method – Internal Rate of Return method (IRR) – Benefit – Cost Ratio – exercises.

TEXT BOOKS:

1. Total Project Management-the Indian context - P. K. Joy
2. Fundamentals of Construction Management and Organisation - K. A. Tenah & J., M.Guevara

REFERENCE BOOKS:

1. Urban Economics - Warner Z.Hirsch
2. Engineering Economics - Mitchel, Robert L., John Wiley & Sons, UK, 1980.
3. Cost – Benefit Analysis for Engineers and Planners - Snell, Michael, Thomas Telford Publishers, London, UK, 1997.
4. Civil Engineering Systems Analysis and Design - Alan A.Smith, Ernest Hinton and Roland W. Lewis, John Wiley and Sons, UK, 1983.
5. Civil and Environmental Systems Engineering - Charles S.Revelle, E.Earl Whitlatch and Jeff.R.Wright, Pearson Prentice Hall Inc., New Jersey, USA, 2004.

17. ENTREPRENEURSHIP

Objective

- ❖ Develop an entrepreneurship spirit
- ❖ Help the participants to identify business opportunities within an organization or independently
- ❖ Initiate action on the business plan from the prospective business through EDC

UNIT – I INTRODUCTION

Introduction to the course entrepreneurship definition, nature and importance. Theories of entrepreneurship. Types and barriers to entrepreneurship. Corporate entrepreneurship. Entrepreneurship versus managers. Motivation converting dream to reality. Role of networks. Entrepreneurship – emerging scenario.

UNIT – II IDEA GENERATION

Entrepreneurship and Innovation. Innovation and imaging innovation. The role of incubation in innovation. Innovation diffusion. Idea to an entity – business ideas and opportunity. Idea generation workshop.

UNIT – III FUNCTIONAL AREAS

Communication for business. Products and markets negotiation skills. IT for entrepreneurs. people issues in entrepreneurship. Ethics for entrepreneurs. Financing the new business - venture capitalists, financial institutions. and banks.

UNIT - IV DEVELOPMENT ORGANIZATIONS

World Trade Organization (WTO), World Intellectual Property' Organization (WIPO), Trade Related Aspects of Intellectual Property Rights (TRIPS). Technology acquisition and Intellectual property rights. Role of agencies involved in 'promoting and assisting SSI units and facilities offered.

UNIT - V BUSINESS PLAN

Objectives of business plan, contents - Executive summary, product / service and competition, major sections - measurement of objectives, market analysis, micro environmental influences, financial analysis, management analysis, human resource analysis. Critical risk and contingencies. Summary and conclusions.
Business plan preparation - Mini project work .

TEXT BOOK :

1. Entrepreneurship by Hisrich (5th Edition) - Tata McGraw Hill, New Delhi.

REFERENCE BOOKS:

1. Entrepreneurship by Madhurina Lall & Shikha Salmi - Excel Books New Delhi.
2. Handbook of Entrepreneurship - Sexton and Landstrom.
3. Innovation and entrepreneurship - Peter Drucker – HRB Publication.
4. Small Business Management by William L.Megginson – McGraw Hill (International).
5. Entrepreneurship in the new millennium by Kondaiah – Tata McGraw Hill.
6. New Venture Creation by Jeffry A Timmons - McGraw Hill (International).