



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH. (INFRASTRUCTURE ENGINEERING)
COURSE STRUCTURE AND SYLLABUS

I Year – I Semester

Category	Course Title	Int. marks	Ext. marks	L	P	C
Core Course I	Water Resources Systems Planning and Management	25	75	4	--	4
Core Course II	Construction Management I	25	75	4	--	4
Core Course III	Geotechnics for Infrastructure	25	75	4	--	4
Core Elective I	1. Building Planning and Construction. 2. Integrated Water Resources Management 3. Computer Oriented Numerical Methods	25	75	4	--	4
Core Elective II	1. New Construction Materials 2. Construction Techniques 3. Advanced Reinforced Concrete Design	25	75	4	--	4
Open Elective I	1. Ports & Harbour Engineering 2. Airport Engineering 3. Geo Environmental Engineering	25	75	4	--	4
Laboratory I	Concrete & Geotechnic Lab	25	75	--	4	2
Seminar I	Seminar	50	--	--	4	2
Total Credits				24	8	28

I Year – II Semester

Category	Course Title	Int. marks	Ext. marks	L	P	C
Core Course IV	Finite Element Method	25	75	4	--	4
Core Course V	Urban/Regional Transportation Analysis and Planning Methods	25	75	4	--	4
Core Course VI	Waste Management Systems	25	75	4	--	4
Core Elective III	1. Advanced Surveying 2. Project Planning & Financial Management 3. Retaining Structures	25	75	4	--	4
Core Elective IV	1. Rehabilitation and Retrofitting of Structures 2. Offshore Geotechnics 3. Advanced Steel Design	25	75	4	--	4
Open Elective II	1. Disaster Management 2. Legal Issues in Infrastructure Management 3. Environmental Impact Assessment	25	75	4	--	4
Laboratory II	Software Lab	25	75	--	4	2
Seminar II	Seminar	50	--	--	4	2
Total Credits				24	8	28

II Year - I Semester

Course Title	Int. marks	Ext. marks	L	P	C
Comprehensive Viva-Voce	--	100	--	--	4
Project work Review I	50	--	--	24	12
Total Credits			--	24	16

II Year - II Semester

Course Title	Int. marks	Ext. marks	L	P	C
Project work Review II	50	--	--	8	4
Project Evaluation (Viva-Voce)	--	150	--	16	12
Total Credits			--	24	16



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

WATER RESOURCES SYSTEM PLANNING AND MANAGEMENT

Objective: To impart knowledge water resources planning , management, linear and dynamic programming

UNIT – I

Introduction: Concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.

UNIT – II

Linear programming: Formulation linear programming models, graphical method, simplex method, application of Linear programming in water resources. Revised simplex method, duality in linear programming.

UNIT – III

Dynamic programming: Belman's of principles of optimality forward and backward recursive dynamic programming, case of dimensionality, application of dynamic programming for resource allocation.

UNIT – IV

Non-linear optimization techniques: Classical method of optimization, Kuch-Tucker, gradient based research techniques for simple unconstrained optimization.

UNIT – V

Water –resources economics: Principles of Economics analysis, benefit cost analysis, socio economic intuitional and pricing of water resources.

REFERENCES:

1. "Operations Research" S. D. Sharma Kedar Nath Ram Nath & Co.
2. "Engineering Optimization – Theory and Practice" S. S. Rao New Age International (p) limited, Publishers.
3. Water Resources System Analysis – Vedula & Mujumdar – Tata Mc.Graw Hill Company Ltd. 2005.
4. Water Resources Economics - James & Lee. Oxford Publishers 2005.

Outcomes: The learner will be able to programming to water resource planning.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

CONSTRUCTION MANAGEMENT – I

Objectives : To impart knowledge on various aspects related to the construction, New Equipment in construction, tender procedures and management aspects in construction industry.

Unit – I

Introduction, Construction Sector in Indian and National Development, Role of Government and Construction Agencies, Planning for Construction projects, Project Feasibility Reports.

Unit – II

Project Scheduling, Project management through networks (CPM & PERT), Resource allocation and project updating

Unit - III

Construction Equipment, Time and motion studies

Unit – IV

Management Information Systems in Construction Industry Human Factors in Construction, Environmental Issues in Construction, Material Management, Construction Safety Management.

Unit – V

Tenders, contracts and specifications: Methods of tendering for projects. Different types of contracts. Importance of specifications. Design and construct Tenders, Build operate and transfer contracts – Turn key contracts. Legal problems. Arbitration. Payment schedule. Quality Control in Construction, Construction Disputes and there settlement

REFERENCE :

1. Construction Engineering and Management – S. Seetharaman
2. Construction Engineering and Management – V.K. Shrivastava
3. Construction Engineering and Management – K.L. Purifoy
4. Construction Equipment - Maheshvarma

Outcomes : The learner will able to prepare the tender for various works, plan for the projects and will be able to manage the resources more appropriative.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

GEOTECHNICS FOR INFRASTRUCTURE

Objectives : To impart knowledge on site investigation and soil testing methods and design of different types of foundation appropriate to the type of soil for different structures.

UNIT – I

Site Investigation for Infrastructure Projects: methods of site investigation, types of soil samples and samplers- Geotechnical field testing – SPT, CPT, Plate Load Test, Pile Load Test.

UNIT – II

Shallow Foundations for Railway & Highway Bridges and Port & Harbour Structures: types of foundations, design forces, safe and allowable bearing capacity of shallow foundations, settlement computation;

UNIT – III

Pile Foundations for Railway & Highway Bridges and Port & Harbour Structures: Pile foundations – types, axial and lateral capacity of pile, pile group analysis and pile cap; Introduction to drilled piers, caissons, well foundations.

UNIT – IV

Foundations for Transmission Line, Radar Antenna, Microwave and TV Tower and Chimneys:

Introduction, foundations for towers and chimneys, design forces, behaviour of pad and chimney foundations, design of chimney and pad foundations, anchor foundations (rock anchors), design of foundations for towers and chimneys, analysis of raft on pile foundations; design and construction of shallow foundations on rocks.

UNIT – V

Sheet Piles - introduction, types of sheet pile walls, cantilever sheet pile wall, anchored sheet pile wall, stability analysis of anchored bulkhead by free earth support and fixed earth support method, position of anchorage.

Expansive and Collapsible Soil: Difficult soils- loose granular soils, soft clays and shrinkable soils- identification, swell and swell pressure.

REFERENCES:

1. Soil Mechanics and foundation engineering – P. Purushottama Raj, Pearson Education.
2. Construction of marine and offshore structures – Ben C Gerwick, jr., CRC Press, Taylor and Francis Group.
3. Dynamic soil tests and applications – N S V Kameswara Rao, Wheeler Publishing.
4. Pile design and construction practice – M J Tomlinson, View point Publications, Palladian Publications Limited.
5. IS: 4091 (1979) - Design and construction of foundations for transmission line towers
6. IS: 11233 (1985) - Design and construction of foundations for Radar Antenna, Microwave and TV Tower.
7. Principle of foundation engineering – B.M.Das, CENGAGE Learning, Thomson, Brooks/Cole.
8. Foundation Engineering -Varghese, Prentice Hall of India.
9. Foundation analysis and design – J.E.Bowles, McGraw Hill Books Company

Outcomes : the learner will be able to design shallow and deep foundations like piles for railway and highway bridges, harbor structures and also sheet piles.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

Building Planning and Construction (Core Elective -I)

Objectives : To impart knowledge on Planning different types of buildings for various functionalities and to understand different aspects of construction.

Unit-I:

Planning of Building Principle of planning of Buildings, Principles of Architectural design –form, function, utility, esthetics. Integrated approach in Built Environment, Building Rules and Byelaws Necessity of laws, plot sizes, road width, open spaces, floor area ratio (F.A.R.), marginal distances, building line control line, height regulation, room sizes, types of area calculations – builtup area, floor area, carpet area, Rules for ventilation, lighting, drainage, sanitation and parking of vehicles ; Landscape elements and elements of interior decoration.

Unit-II

Planning of residential buildings – Load bearing / Framed Structure – (a) Bungalows (b) Row houses, (c) Ownership flats, (d) Apartments. Planning of public buildings Functional requirements of public buildings. Following types of public buildings may be considered for planning. Educational Buildings, Hostel building with Rector's and servants' quarters, Lodge/Hotel building, Primary Health center with Hospital staff quarters, factory building-Administrative block and factory, Bus Stand, Library building, Shopping complex, Health club, Marriage hall, auditorium, multiplex, sports complex, restaurant, vegetable market, post office, bank and any other.

Unit-III

(A) Stones and stone masonry: Stones – Requirements of good building stones IS specification and tests on stones, Stone masonry – principal terms, Detailing of constructions – procedure for UCR and CR masonry, mortar preparation, types of mortar, Pointing – Purpose and types.⁸

(B) Brick and block masonry: Characteristics of good building bricks, IS specifications and test; Classification of bricks silica, refractory, fire etc; Brick work – terms, types of bonds – English, Flemish, Stretcher, Header; Construction procedure, supervision, Openings in walls, mortar preparation; Block masonry – Hollow, solid, cavity wall construction; Scaffolding – types.

Unit-IV

(A) Doors and windows: Functional requirements, materials of doors and windows, types, glazing, method of fixing doors and windows, fixtures and fastenings.

(B) Arches and lintels: Principle of arch action, Types of arches, method of arch construction, centrifugal and renewal. Lintels – necessity and types, chajja / weather shade – necessity and types

(C) Protective coatings: Plastering types and application, mortar; Painting and varnishing, types and application ; White washing, distempering, oil paints ; Wall cladding – materials, methods of fixing, wall papering and glazing work.

UnitV:

(A) Fire protection: Fire safety – fire load, Grading of occupancies by fire load, considerations in fire, protection, properties of fire resistant construction, wall and columns, roofs and floors, wall openings, fire escape elements.

(B) Building Services : Importance of building services, Constructional requirements for different building services electrical, telecommunication and entertainment services, plumbing services layout of water supply and drainage system, storage and disposal arrangements, septic tanks, garbage disposal arrangement.

(C) Vertical circulation: Considerations in planning, design and construction ; Stairtypes, materials, fire resisting materials, design of stair, details of ramps, ladders, lifts and escalators.



(D) Steel construction: Steel construction – General purpose of steel work, sections for structural; steelwork, method connecting steel sections – bolting, riveting, welding; structural steel member and their connections – tubular structures.

Text Books:

1. Barrid, "Building Construction" Tata McGraw Hill, New Delhi
2. Ghosh, "Materials of Construction" Tata McGraw Hill
3. Menttt, "Building Design and Constructions", Tata McGraw Hill (Second edition)
4. Shah M.G., Kale C.M. and Patki S.Y., "Building drawing an Integrated approach to Built environment", Tata McGraw Hill (Fifth edition).
5. Menttt, "Building Design and Constructions", Tata McGraw Hill (Second edition)

Outcomes : Upon completion of the course the learner will be able to plan a building for different requirements and will be able to use different materials appropriately.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

Integrated Water Resources and Management (Core Elective -I)

Objectives : To impart knowledge on runoff, discharge measurement, estimation of flood, and flood disaster mitigation measures.

UNIT – I

Introduction : Definition, concepts of IWRM, approaches to iwr, components, importance. **Surface water:** Evapotranspiration – Runoff – Hydrographs – Methods of discharge measurement – Estimation of flood – Flood disaster mitigation measures and damage estimation, rainfall-runoff models.

UNIT – II

Surface water: River engineering and river training works – Hydrologic routing – Hydraulic routing – Hydrology of basin management.

UNIT – III

Ground water: Steady groundwater flow towards a well in confined and unconfined aquifers – Dupit's and Theism's equations, Assumptions, Formation constants, yield of an open well interface and well tests.

UNIT – IV

Groundwater: Unsteady flow towards a well – Non equilibrium equations – Thesis solution – Jacob and Chow's simplifications, Leak aquifers, Groundwater basin management.

UNIT – V

Conjunctive use: Concepts of conjunctive use Models, Case studies for IWRM.

REFERENCES :

1. Groundwater by Bawvwr, John Wiley & sons.
2. Groundwater Syatem Planning & Managemnet – R.Willes & W.W.G.Yeh, Printice Hall.
3. Applied Hydrogeology by C.W.Fetta, CBS Publishers & Distributers.
4. Hydrology by Madan mohan das & Mimi Das Saikia PHI Learning Private Limited
5. Ground water Hydrology by David Keith Todd, John Wiley & Son, New York.
6. Groundwater by H.M.Raghunath, Wiley Eastern Ltd.
7. Engineering Hydrology by K. Subramanya, TMH Publishing Company limited,

Outcomes : The learner will be able to estimate the quantum of water resources from different sources and able to implement and manage water resources effectively.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

COMPUTER ORIENTED NUMERICAL METHODS

(Core Elective -I)

Objectives : To impart knowledge about various methods of analysing linear equations and understand the different mathematical techniques.

UNIT I:

Solutions of linear equations: Direct method – Cramer's rule, Gauss – Elimination method- Gauss – Jordan elimination – Triangulation (LU Decomposition) method – Iterative methods Jacobi – Iteration method – Gauss – Siedel iteration, Successive over –relaxation method. Eigen values and eigen vectors; Jacobi method for symmetric matrices- Given's method for symmetric matrices- Householder's method for symmetric matrices-Rutishauser method of arbitrary matrices – Power method.

UNIT II:

Interpolation: Linear Interpolation_ - Higher order Interpolation_ - Lagrange Interpolation_– Interpolating polynomials using finites differences- Hermite Interpolation_ -piece-wise and spline Interpolation_

UNIT III

Finite Difference and their Applications: Introduction- Differentiation formulas by Interpolating parabolas – Backward and forward and central differences- Derivation of Differentiation formulas using Taylor series- Boundary conditions- Beam deflection – Solution of characteristic value problems- Richardson's extrapolation- Use of unevenly spaced pivotal points- Integration formulae by interpolating parabolas- Numerical solution to spatial differential equations – Application to Simply Supported Beams, Columns & rectangular Plates.

UNIT IV.

Numerical Differentiation: Difference methods based on undetermined coefficients- optimum choice of step length– Partial differentiation.

Numerical Integration: Method based on interpolation-method based on undetermined coefficient – Gauss – Lagrange interpolation method- Radaua integration method- composite integration method – Double integration using Trapezoidal and Simpson's method – New Marks Method and Application to Beams – Calculations of Slopes & Deflections.

UNIT V

Ordinary Differential Equation: Euler's method – Backward Euler method – Mid point method – single step method, Taylor's series method- Boundary value problems.

REFERENCES:

1. Numerical Methods For Scientific and Engineering Computations. M.K.Jain- S.R.K.Iyengar – R.K.Jain Willey Eastern Limited. New Age International (p) Ltd., Publishers, Reprint 2004, ISBN:81-224-1461-3 56789101112.
2. Numerical Methods for Engineering Problems by N. Krishna Raju and K.U. Muthu, M.C. Millan Publishers, New Delhi
3. Numerical Methods for Engineers Stevan C.Chopra, Raymond P.Canal Mc. Graw Hill Book Company. April 2009 ISBN: 0073401064 and ISBN-13:9780073401065
4. C Language and Numerical methods by C.Xavier – New Age International Publisher. Reprint March 2012 ISBN:978-81-224-1174-4.
5. Computer based numerical analysis by Dr. M.Shanta Kumar, Khanna Book publishers New Delhi.
6. Applied Numerical Analysis – Curtis I.Gerala- Addison Wasley.

Outcomes : The learner will be able to apply various mathematical techniques to civil engineering problems.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

NEW CONSTRUCTION MATERIALS

(Core Elective -II)

- Objectives :**
1. Understand the structural, physical and long-term performance of building materials used in construction.
 2. Understand mechanical and non-mechanical behaviour of neo- materials.

Unit I :

Aggregates: Introduction, Historical back ground of Light weight aggregate concrete, Artificial aggregates, Physical properties of aggregates, Light weight aggregate concrete, Applications of light weight aggregate concrete, Properties of green light weight aggregate concrete, Effect of size aggregate on the strength properties of LWAC made with palm oil shells, Recycled aggregate, Pre placed aggregate concrete.

Unit II:

Fibers in Concrete: Fiber reinforced concrete, Behavior of steel fibers in concrete, Glass fiber reinforced concrete, GFRC in construction, Natural fiber reinforced concrete, Polymer Fiber Reinforced Concrete.

Unit III:

Special Concretes: High strength concrete, Effect of RHA on the properties of HSC, High performance concrete –applications, Self-Compacting Concrete, Concrete made with waste rubber, Special Concretes, Sulfur Concrete, Ferro cement, Geo synthetics, Nano Concrete, Changes in concrete with respect to time.

Unit IV:

Corrosion In Concrete: Corrosion in concrete and its protection, Corrosion of rebars in concrete, Influence of fly ash on the corrosion steel bar in concrete.

Unit V:

Advanced Materials: Adhesives in construction industry-Acrylics, Bridge bearings, Industrial waste materials in concrete Rapid wall panels, Moisture Barriers.

REFERENCES:

1. Adam M Neville, Properties of Concrete, 5th Edition, Longman Sc and Tech Publishers, 2011.
2. Kumar Mehta. P and Paulo J M Monteiro, Concrete Microstructure, Properties and Materials, McGraw Hill, 2006.

Outcomes: The learner will be able to understand the use of advanced materials in construction projects and identify crucial problem areas in manufacture and applications of building materials.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

CONSTRUCTION TECHNIQUES

(Core Elective -II)

Objectives : 1. Understand the limitations of construction techniques.
2. Analyse productivity and economics in construction techniques.

Unit I:

Introduction: Introduction to Construction Techniques Reinforced and Prestressed Concrete construction, Mechanized methods of earthwork: Tractors and attachments, Dozers, Tippers, Scrapers, Shovels and Trenching machines, Dumpers, Rollers and Compactors, Estimation of quantities of earthwork in grading, Grading of sites with bulldozers and scrapers, Drilling, Blasting methods, Labor protection in drilling and blasting, Fabrication of reinforcement and transportation of erected reinforcement, Concreting, Special methods for concreting construction.

Unit II:

Introduction to Prestressed concrete, Advantages and Disadvantages of Prestressed concrete, Types of Pre-stressing, Methods of pre-stressing, Equipment for pre-stressing operation. Construction techniques- cantilever construction, staging method, push out technique, progressive placement construction method.

Unit III:

Prefabricated structures: Introduction to Prefabricated structures, Planning for pre-casting, Selection of equipment for fabrication, Transport and erection of prefabricated components, Quality measures, Design considerations of precast elements, Safety measure during erection

Unit IV:

Ready mixed Concrete: Production of Ready Mixed Concrete, Site mixed vs. Ready Mixed Concrete, Equipment for RMC plant, IS code provision for RMC, Quality measures of Ready Mixed Concrete, RMC Productivity analysis, Productivity analysis-Case study

Unit V:

Modular Construction Practices: Introduction to Modular Construction, Modular coordination, Modular Standardization, Modular System Building, Limitation and Advantages of Modular Construction Formwork: Requirements of Formwork, Loads carried by Formwork, Types of Formwork: Timber, Steel, Modular shuttering, Slip forms, Scaffolding.

READING:

1. Allen E, Iano, J, Fundamentals of Building Construction subscription E Book, Material and Method, John Wiley and Sons, 2011.
2. Cameron K. Andres, Ronald C. Smith, Principles and Practices of Commercial Construction, 8 th Ed., Prentice Hall, 2009.

Outcomes : The learner will be able to implement modular construction practices. Understand reliable proportioning concepts in construction techniques.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

ADVANCED REINFORCED CONCRETE DESIGN

(Core Elective -II)

Objectives : To impart knowledge on the behavior and design on various reinforced concrete structural elements.

UNIT I

Basic Design Concepts: Behaviour in flexure, Design of singly reinforced rectangular sections, Design of doubly reinforced rectangular sections, Design of flanged beams, Design of shear, Design for Torsion, Limit state of Serviceability: Deflections of Reinforced concrete beams and slabs, short term deflection and long term deflection, estimation of crack width in RCC members, calculation of crack widths.

UNIT II

Limit Analysis of R.C.Structures: Rotation of a plastic hinge, Redistribution of moments, moment rotation characteristics of RC member, I.S. code provisions, applications for fixed and continuous beam. Yield line analysis for slabs: Upper bound and lower bound theorems – yield line criterion – Virtual work and equilibrium methods of analysis for square and circular slabs with simple and continuous end conditions.

UNIT III

Design of Ribbed slabs, Flat slabs: Analysis of the Slabs for Moment and Shears, Ultimate Moment of Resistance, Design for shear, Deflection, Arrangement of Reinforcements.

Flat slabs: Direct design method – Distribution of moments in column strips and middle strip-moment and shear transfer from slabs to columns – Shear in Flat slabs-Check for one way and two way shears - Introduction to Equivalent frame method. Limitations of Direct design method, Distribution of moments in column strips and middle strip.

UNIT IV

Design of Reinforced Concrete Deep Beams & Corbels: Steps of Designing Deep Beams, Design by IS 456, Checking for Local Failures, Detailing of Deep Beams, Analysis of Forces in a Corbels , Design of Procedure of Corbels, Design of Nibs.

UNIT V

Design of Compression members: Estimation of effective length of a column-Code requirements on Slenderness Limits, Design of Short Columns under Axial Compression, Design of Short Columns with Uniaxial Bending, Design of Short Columns under Biaxial Bending, Design of Slender Columns. Design of Combined Footings- Distribution of soil Pressure – Geometry of Two Column Combined Footing – Design Considerations in Combined Footing for Two – Columns.

TEXT BOOKS:

1. Reinforced concrete design by S. Unnikrishna Pillai & Menon, Tata Mc. Graw Hill, 2nd Edition, 2004
2. Advanced Reinforced Concrete Design – P.C. Varghese, Practice Hall, 2008
3. Limit state theory and design of reinforced concrete by Dr. S.R. Karve and Dr. V.L. Shah, Standard publishers, Pune, 3rd Edition, 1994.
4. Principles of Reinforced Concrete Design by Mete A. Sozen, Toshikatsu Ichinose, Santiago Pujol July 14, 2014 CRC Press

REFERENCE BOOKS:

1. Reinforced concrete design by Kenneth Leet, Tata Mc. Graw-Hill International, editions, 2nd edition, 1991.
2. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
3. Design of concrete structures – Arthus H. Nilson, David Darwin, and Chores W. Dolar, Tata Mc. Graw-Hill, 3rd Edition, 2005.



4. Reinforced concrete structures, Vol.1, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, 2004.
5. Reinforced concrete structures – I.C. Syal & A.K. Goel, S. Chand, 2004.

Outcomes : The learner will be able to design the reinforced concrete elements like beams, slabs and compression members.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech – I year I Sem. (Infrastructure Engineering)

PORTS & HARBOUR ENGINEERING
(Open Electives- I)

Objective : To impart knowledge on port infrastructure

UNIT-I

Introduction and Fundamentals: Introduction: Ports and harbours – an infrastructure layer between two transport media, planning of ports and harbours. The fundamentals: Tide and current conditions inside harbour, water circulation; breakwaters, jetties and quay walls; mooring, berthing and ship motion inside the port; model studies, physical and mathematical studies.

UNIT-II

Design Issues and Design Of Port: Infrastructures: Design issues: Sea port layout with regards to (1) wave action (2) siltation (3) navigability, berthing facilities. Design of Port Infrastructures: Design of port infrastructures with regards to (1) cargo handling (2) cargo storage (3) integrated transport of goods, planning multipurpose port terminals.

UNIT-III

Port Operations: Allowable wave conditions for cargo handling, wave conditions for human safety on quays and breakwaters, forecasting / nowcasting of wave and current conditions for port operations, dredging and navigability, hazard scenarios; VTMS and management of computerized container terminal, safety & environment (handling of fire, oil spill, rescue, etc).

UNIT-IV

Inland Waterways And Ports : Maintenance of waterways, construction of environmentally engineered banks, dredging and disposal processing and storing of polluted dredged materials, development of river info

UNIT-V

Construction Aspects and Sustainability : Planning and construction expansion and renovation of port and Inland Port Infrastructure. Global trade and port restructuring/reforms, impact of possible climate change scenarios, sustainable development strategies for cities and ports.

TEXT BOOKS

1. Muir Wood, A.M., and Fleming.C.A., "Coastal Hydraulics Sea and Inland Port Structures", 1 st Edition, Hallstead Press, 2002.
2. Ozha&Ozha, "Dock and Harbour Engineering", 1 st Edition, Charotar Books, Anand., 1990

REFERENCES

1. S.Seetharaman, "Construction Engineering and Management", 4 thEdition ,Umesh publications, New Delhi, 1999.
2. Richard L. Silister, "Coastal Engineering Volume I & II, Elsevier Publishers, 2000.
3. PeraBrunn, "Port Engineering", 1 st Edition, Gulf Publishing Company, 200

Course Outcomes:

At the end of the course the student will be able to:

CO1 : Explain the significance of ports and harbours as a mode of transport.

CO2 : Demonstrate the fundamental principles of wave hydrodynamics and port cargo handling.

CO3 : Demonstrate the basic design of port layout

CO4 : Design, plan and integrate port and harbour infrastructure.

CO5 : Explain the construction, maintenance and renovation aspects of ports and inland waterways



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

AIRPORT ENGINEERING

(Open Electives- I)

Objectives

The module introduce the Airport planning issues along with the designing of Runway. The visual aids required from Airport Traffic operating is dealt with. The necessary inputs required for efficiency drainage system has a significance in maintenance the airport.

UNIT-I:

Airport Planning: General- Regional Planning- Development of New Airport- Data Required Before Site Selection- Airport Site Selection- Surveys for Site Selection- Drawings to be prepared- Estimation of Future Air Traffic Needs.

UNIT-II:

Runway Design: Runway Orientation- Basic Runway Length- Corrections for Elevation, Temperature and Gradient- Airport Classification- Runway Geometric Design- Airport Capacity- Runway Configurations- Runway Intersection Design.

UNIT-III:

Structural Design Of Airport Pavements: Introduction- Various Design Factors- Design Methods for Flexible Pavement- Design Methods for Rigid Pavement- LCN System of Pavement Design- Joints in Cement Concrete Pavement- Airport Pavement Overlays- Design of an Overlay.

UNIT-IV:

Visual Aids: General- Airport Marking- Airport Lighting.

UNIT-V:

Airport Grading And Drainage: General- Computation of Earthwork- Airport Drainage- Special Characteristics and Requirements of Airport Drainage- Design Data- Surface Drainage Design- Subsurface Drainage Design.

Outcomes:

Course Outcomes: At the end of the course, the student will be able to:

CO1 Introduced the region planning for an airport.

CO2 Design the runway length after considering the correction required for basis runway length.

CO3 Understand the visual aids required for safe landing and takeoff operating of airport.

CO4 Analysis and Design the drainage.

REFERENCES:

1. Airport Planning And Designing by S.K. Khanna, M.G. Arora.
2. Highway Engineering including Expressways and Airport Engineering by Dr.L.R. Kadyali, Dr.N.B. Lal.
3. Highway Engineering including Airport Pavements by Dr.S.K. Sharma.
4. Transportation Engineering by S.P.Chandola.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

GEO ENVIRONMENTAL ENGINEERING

(Open Electives- I)

Objectives : To impart knowledge on site characterization and different types of waste management.

Unit -I

Sources and Site Characterization: Scope of Geoenvironmental Engineering, Various Sources of Contaminations, Need for contaminated site characterization; and Characterisation methods.

Unit -II

Solid and Hazardous Waste Management: Classification of waste, Characterisation solid wastes, Environmental Concerns with waste, waste management strategies.

Unit -III

Contaminant Transport: Transport process, Mass-transfer process, Modeling, NAPL

Unit -IV

Remediation Techniques: Objectives of site remediation, various active and passive methods, Bioremediation, Phytoremediation, Remediation of NAPL sites.

Unit -V

Landfills: Types of landfills, Site Selection, Waste Containment Liners, Leachate collection system, Cover system, Gas collection system.

Text Books:

1. Phillip B. Bedient, Refai, H. S. & Newell C. J. - Ground Water Contamination - Prentice Hall Publications, 4th Edition, 2008
2. Sharma, H. D. and Reddy, K. R. - Geoenvironmental Engineering, John Wiley & Sons (2004)

References:

1. Rowe, R. K. - Geotechnical & Geoenvironmental Engineering Handbook, Kluwer Academic, 2001
2. Reddi, L. N. and Inyang, H. I. - Geoenvironmental Engineering Principles and Applications, Marcel. Dekker, Inc., New York (2000).
3. LaGrega, M. D., Buckingham, P. L. and Evans, J. C. - Hazardous Waste Management, New York: McGraw-Hill, 2001

Outcomes : The learner will be able to give different remedial techniques for the various waste and rehabilitate the soil.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M. Tech – I year I Sem. (Infrastructure Engineering)

CONCRETE & GEOTECHNIC LAB

Objectives : To impart knowledge about the different civil engineering materials and understand their behavior.

1. Compressive Strength of Concrete with Rebound Hammer Test.
2. Compressive Strength of Concrete using Ultra Sonic Pulse Velocity Test.
3. Evaluation of Reinforcement using Rebar Locator.
4. Compressive Strength of rock hardness using Rebound Hammer.
5. To find the Bitumen contents and gradation of the mix.
6. Collection and preservation of disturbed and undisturbed soil samples including advanced bore and identification of relevant tests.
7. Estimation of pollutants using spectrophotometer.
8. Quality control tests at site for construction materials.
Soil, bricks, concrete, water, steel Bitumen, Sand & aggregates.
9. **Any two of the following:**
 - a. DPR preparation for soil investigation for bridge foundation designing.
 - b. DPR preparation for construction of typical highway.
 - c. DPR preparation for canal construction.
 - d. DPR preparation for water supply and sewerage system.

Outcomes : The learner will be able to test and interpret the results of various tests on civil engineering material.