

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M. Tech in INFRASTRUCTURE ENGINEERING
Effective from Academic Year 2017- 18 admitted batch
COURSE STRUCTURE AND SYLLABUS
I Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-1	Water Resources Systems Planning and Management	25	75	4	0	0	4
PC-2	Construction Management	25	75	4	0	0	4
PC-3	Geotechnics for Infrastructure	25	75	4	0	0	4
PE-1	Building Planning and Construction. Integrated Water Resources Management Ground Improvement Techniques	25	75	3	0	0	3
PE-2	Ports & Harbours Construction Techniques Advanced Reinforced Concrete Design	25	75	3	0	0	3
OE-1	*Open Elective - I	25	75	3	0	0	3
Laboratory I	Concrete & Geotechnic Lab	25	75	0	0	3	2
Seminar I	Seminar-I	100	0	0	0	3	2
Total		275	525	21	0	6	25

II Semester

Category	Course Title	Int. marks	Ext. marks	L	T	P	C
PC-4	Retaining Structures	25	75	4	0	0	4
PC-5	Urban/Regional Transportation Analysis and Planning Methods	25	75	4	0	0	4
PC-6	Project Planning & Financial Management	25	75	4	0	0	4
PE-3	Advanced Surveying Waste Management Systems Airport Engineering	25	75	3	0	0	3
PE4	Repair & Rehabilitation of Buildings Offshore Geotechnics Advanced Steel Design	25	75	3	0	0	3
OE-2	*Open Elective - II	25	75	3	0	0	3
Laboratory II	Software Lab	25	75	0	0	3	2
Seminar II	Seminar-II	100	0	0	0	3	2
Total		275	525	21	0	6	25

III Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Technical Paper Writing	100	0	0	3	0	2
Comprehensive Viva-Voce	0	100	0	0	0	4
Project work Review II	100	0	0	0	22	8
Total	200	100	0	3	22	14

IV Semester

Course Title	Int. marks	Ext. marks	L	T	P	C
Project work Review III	100	0	0	0	24	8
Project Evaluation (Viva-Voce)	0	100	0	0	0	16
Total	100	100	0	0	24	24

*Open Elective subjects must be chosen from the list of open electives offered by **OTHER** departments.

For Project review I, please refer 7.10 in R17 Academic Regulations.

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

RETAINING STRUCTURES (PC - IV)

Course Objective: To design the earth retaining structures used in construction of road/railways/pipe lines/open excavations.

Course Outcome: Able to design conventional/Reinforced earth retaining walls, sheet pile walls, bracing system for open excavations

UNIT - I

Earth Pressure Theories: Rankine's and Coulomb's Earth pressure theories for cohesive and cohesion less soils, stresses due to compaction and surcharge loads.

UNIT - II

Conventional Retaining Wall: Types of retaining walls, Stability (sliding, overturning, bearing capacity & overall) of gravity and cantilever walls, Proportioning of retaining walls, Effect of backfill material and drainage, Static and pseudo-static analyses.

UNIT - III

Flexible Walls: Sheet pile walls, Construction methods- Cantilever and Anchored sheet pile wall.

UNIT - IV

Reinforced Soil Walls/Mechanically Stabilized Earth: - Failure mechanisms- Pullout and rupture failures, Analysis methods, Limit equilibrium method- Internal and external stability, Static and seismic analyses.

UNIT - V

Braced Cuts: Lateral earth pressure in braced cuts, Design of various components, Stability of braced cuts, base heave and stability, yielding and settlement of ground surrounding excavation.

TEXT BOOKS:

1. Clayton, C.R.I., Woods, R.I., Bond, A.J., Milititsky, J. - Earth Pressure and Earth-retaining structures, CRC Press, Taylor and Francis group, 2013.
2. Budhu, M. – Foundations and Earth retaining structures, John Wiley & Sons, Inc., 2008.

REFERENCES:

1. Bowles, J.E. – Foundation Analysis and Design, 5th Edition, BBS Publisher, 2009.
2. Donald P Coduto – Foundation Design Principles and Practices, 2nd edition, Pearson, Indian edition, 2012.

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

URBAN/REGIONAL TRANSPORTATION ANALYSIS AND PLANNING METHODS (PC - V)

UNIT– I

Traffic studies: Background of traffic studies and surveys; Basic principles of - Speed and density, volume, headways and accidents; Road Safety auditing, Measures to increase Road safety.

UNIT– II

Statistics and Probability Concepts in Transportations Systems: Statistical Distributions – Binomial, Poisson, exponential and normal distribution, fitness tests, their application to transportation system; probability concepts in transportation studies.

UNIT – III

Transportation Demand Forecasting: Travel Demand Scenario; Demand Forecasting Approaches; Time Services Analysis as approach in demand assessment, Factor Analysis apparatus, Behavior modeling forms in travel demand estimation.

UNIT – IV

Pedestrian Delays And Gaps: Pedestrian Gap acceptance and delays; Concept of Blocks, Anti-blocks, Gaps and Non-Gaps; Underwood's analysis for Pedestrian Delays; Warrants for Pedestrian Crossing Facilities – Minimum Vehicular Volume Warrant, Minimum Pedestrian Volume Warrant, Maximum Pedestrian Volume Warrant;

UNIT – V

Intelligent Transport Systems: ITS Definition, Benefits of ITS, user services, Detectors, Automatic Vehicle Location (AVL), Automatic Vehicle Identification (AVI), Introduction to ITS applications; Advanced Traffic Management systems (ATMS), Advanced Traveler Information systems (ATIS), Commercial Vehicle Operations (CVO), Advanced Vehicle Control systems (AVCS), Advanced Public Transportation systems (APTS), Electronic Road Pricing (ERP).

REFERENCES:

1. Probability Concepts in Engineering Planning and Design, Vol. II, Decision, Risk, and Reliability, New York. John Wiley & Sons. Hines, W. W. and Montgomery, D. C. (1990):
2. Probability and Statistics in Engineering and Management Science, 3rd Edition, New York: John Wiley & Sons. Mannering, F. L. and Kilareski, W. P. (1990):
3. Principles of Highway Engineering & Traffic Analysis, New York: F. L. Mannering & W. P. Kilareski, John Wiley & Sons publications
4. Sensor technologies and Data requirements of ITS, Lawrence A. Klein.

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

PROJECT PLANNING AND FINANCIAL MANAGEMENT (PC - VI)

Course Objectives: To impart knowledge on project assessment and management of various aspects related to finance.

Course Outcomes: The learner will be able to prepare a bid and understand the effect of various financial aspects and on the projects.

UNIT –I

Project feasibility assessment

UNIT –II

Effects of depreciation, taxation, inflation on project feasibility.

UNIT –III

Design cost estimating. Construction cost estimates. Risk and contingency in estimates. Cost control.

UNIT –IV

Financial management for projects.

UNIT –V

Bidding and pricing. Budgeting and budgetary control.

REFERENCES:

1. Blank, L. and Tarquin, A. (2000): **Engineering Economy**, 5th Edition. New York: McGraw Hill.
2. Peurifoy, R. L., and Oberlender, G. D. (2002): **Estimating Construction Costs**, 5th Edition. New York: McGraw Hill.
3. Damordaran, A. (1996): **Investment Valuation: Tools and Techniques for Determining the Value of Any Assets** : University Edition, John Wiley and Sons, Inc. Harris, F. and McCaffer, R. (2001):
4. **Modern Construction Management**, 5th Edition. London: Blackwell. Thuessen, J. G. and Fabrycky, W. J. (2001):
5. **Engineering Economy** , Prentice Hall Halpin, D. W. (1985):
6. **Financial and Cost Concepts for Construction** , John Wiley & Sons

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

ADVANCED SURVEYING (PE - III)

Course Objectives: To impart knowledge about all the measurement techniques, to know the ground topography, modern survey equipments and be able to use different software applications in surveying.

Course Outcomes: The learner will be able to Conduct tacheometry and geodetic survey, apply knowledge of astronomy for solving civil engineering problems, explain use of aerial camera, aerial photographs and procedure of aerial survey and apply GIS in solving engineering problems

UNIT - I:

Tacheometric Surveying: Introduction, purpose, principle, instruments, stadia constants, methods of tacheometry, anallatic lens, subtense bar, field work in tacheometry, reduction of readings, errors and precisions. Geodetic Surveying Principle and Classification of triangulation system Selection of base line and stations- Orders of triangulation- Triangulation figures- Station marks and signals- marking signals- Extension of base, Reduction of Centre, Selection and marking of stations

UNIT - II:

Theory of Errors : Introduction, types of errors, definitions, laws of accidental errors, laws of weights, theory of least squares, rules for giving weights and distribution of errors to the field observations, determination of the most probable values of quantities.

UNIT - III:

Field Astronomy: Introduction, purposes, astronomical terms, determination of azimuth, latitude , longitude and time corrections to the observations.

UNIT - IV:

Aerial photogrammetry : Introduction, Principle, Uses, Aerial camera, Aerial 6 10 photographs, Definitions, Scale of vertical and tilted photograph,, Ground Co-ordinates, Displacements and errors, Ground control, Procedure of aerial survey, Photomaps and mosaics, Stereoscopes, Parallax bar.

UNIT - V:

Modern Surveying Instruments: Introduction, Electromagnetic spectrum, Electromagnetic distance measurement, Total station, Digital self-leveling levels , scanners for topographical survey. Remote Sensing Introduction, Principles of energy interaction in atmosphere and earth surface features, Image interpretation techniques, visual interpretation, Digital image processing, Global Positioning system. Geographical Information System Definition of GIS, Key Components of GIS, Functions of GIS, Spatial data, spatial information system Geospatial analysis, Integration of Remote sensing and GIS, and Applications in Civil Engineering

REFERENCE BOOKS:

1. Advanced Surveying by R. Agor, Khanna Publishers, New Delhi
2. Fundamentals of Surveying by Roy, S.K., Prentice Hall India, New Delhi
3. Surveying and Leveling by Subramanian, R., Oxford University Press, New Delhi
4. Remote Sensing and GIS by B Bhatia, Oxford University Press, New Delhi.
5. Remote sensing and Image interpretation by T. M Lillesand, R.W Kiefer, and J. W Chipman, 5th edition, John Wiley and Sons India
6. Surveying theory and practice 7th Edition by James M Anderson and Adward M Mikhail Tata McGraw Hill Publication.

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WASTE MANAGEMENT SYSTEMS (PE - III)

Course Objectives: To impart knowledge on different types of waste and recycling procedures.

Course Outcomes: The learner will be able to give appropriate solution to recycle the different types of waste

UNIT – I

Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems.

UNIT – II

Solid Wastes, Collection and Transportation, Waste Disposal Systems, Land Treatment, Wastewater Management Methods, Landfilling, Incineration, Energy from Wastes, Recycling, Composting, Reuse and Recovery.

UNIT – III

Industrial waste water discharges into streams. Lakes and oceans and problems. Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries. Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods. Combined treatment Industrial and Domestic Wastes – Advantages.

UNIT – IV

Hazardous Waste Management – types of wastes – Health effects – treatment methods – Disposal.

UNIT – V

Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries Tanneries, and steel plants Characteristics, Effects and treatment methods.

REFERENCES:

1. Liquid waste of Industry by Newmerow.
2. Waste Water Treatment by Rao and Dutta.
3. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr)

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AIRPORT ENGINEERING (PE - III)

Course Objectives:

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

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

- Introduced the region planning for an airport.
- Design the runway length after considering the correction required for basis runway length.
- Understand the visual aids required for safe landing and takeoff operating of airport.
- Analysis and Design the drainage.

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.

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 II Sem. (Infrastructure Engineering)

REPAIR & REHABILITATION OF BUILDINGS (PE - IV)

Course Objectives: To impart knowledge on the distress in structures.

Course Outcomes: The learner will be able to understand the reasons for distress in structures and will be able to suggest suitable solutions.

UNIT – I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage.

UNIT – II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT – III

Inspection and Testing – Symptoms and Diagnosis of Distress - Damage assessment – NDT.

UNIT – IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shotcreting – Underpinning -Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT – V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation

REFERENCES

1. Concrete Technology by A. R. Santhakumar, Oxford University press
2. Defects and Deterioration in Buildings, E F & N Spon, London
3. Non-Destructive Evaluation of Concrete Structures by Bungey - Surrey University Press
4. Maintenance, Repair & Rehabilitation and Minor Works of Buildings by P. C. Varghese, PHI.
5. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.
6. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W. H. Ranso, (1981)
7. Building Failures: Diagnosis and Avoidance, EF & N Spon, London, B. A. Richardson, (1991).

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OFFSHORE GEOTECHNICS (PE - IV)

Course Objectives: To impart knowledge on different types of sub marine soils and design aspects related to foundations for offshore structures.

Course Outcomes: The learner will be able to design the foundation for various offshore structures.

UNIT - I

The nature of Submarine Soils: origin, classification and distribution of marine sediments; insitu stress state in submarine deposits; inorganic clay deposits; calcareous sediments; siliceous sediments. Offshore Geotechnical Investigations: phases of the investigation, geophysical survey, drilling and sampling procedures, in-situ testing techniques, laboratory testing.

UNIT - II

Foundations for Offshore Gravity Structures: construction, installation, instrumentation of gravity platforms, stability analysis, deformation analysis based on elastic theory, piping and erosion.

UNIT - III

Foundations for Jack-up Rigs: foundations types and design loads, Prediction of individual footing performance, prediction of mat footing performance, seabed anchors, load capacity of anchors, breakout forces, anchor systems for floating structures.

UNIT - IV

Offshore Pile Foundations: types of offshore piles, temporary support of piled structures, dynamic analysis of pile driving, axial load capacity, axial deformation analysis, Lateral loading, and dynamic response.

UNIT - V

Seafloor Stability: causes of seafloor instability, geological features of submarine slides, mechanisms of instability, slope stability under gravity forces and wave forces, Effects of soil instability on piles, installation, and stability of submarine pipelines.

TEXT BOOKS:

1. Marine Geotechnics – H. G. Poulos (1988), Prentice Hall Inc.
2. Construction of marine and offshore structures – Ben C Gerwick, jr., CRC Press, Taylor and Francis Group.(2012)

REFERENCES:

1. Seabed Reconnaissance and Offshore Soil Mechanics (for the installation of petroleum structures) – Pierre LE Tirant (1979), Gulf Publishing Company, Houston, Texas.
2. API (2000) – Recommended Practice for Planning, Designing and Constructing Fixed Offshore Platforms – API, RP2A.
3. Pile design and construction practice – M J Tomlinson, View point Publications, Palladian Publications Limited.(1987)
4. Port Engineering planning, construction, maintenance and security – George P Tsinker, John Wiley & Sons, Inc. (2004)

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

ADVANCED STEEL DESIGN (PE - IV)

Course Objectives: To impart knowledge on design of various connections, industrial and steel girders.

Course Outcomes: The learner will be able to design different industrial buildings.

UNIT- I:

Simple Connections –Riveted, Bolted Pinned and Welded Connections: Riveted connections- Bolted Connections- Load Transfer Mechanism – Failure of Bolted Joints – Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate – Strength and Efficiency of the Joint – Combined Shear and Tension – Slip – Critical Connections – Praying Action – Combined Shear and Tension for Slip- Critical Connections. Design of Groove welds- Design of Fillet Welds- Design of Intermittent fillet welds- Failure of Welds.

UNIT – II

Eccentric and Moment Connections: Introduction – Beams – Column Connections- Connections Subjected to Eccentric Shear – Bolted Framed Connections- Bolted Seat Connections – Bolted Brackete Connections. Bolted Moment Connections – Welded Framed Connections – Welded Brackete Connections - Moment Resistant Connections.

UNIT - III

Analysis and Design of Industrial Buildings: Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, design of knee braced trusses and stanchions. Design of bracings.

UNIT - IV:

Design of Steel Truss Girder Bridges: Types of truss bridges, component parts of a truss bridge, economic proportions of trusses, self weight of truss girders, design of bridge compression members, tension members; wind load on truss girder bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing.

UNIT - V:

Design of Steel Bunkers and Soils: Introduction – Janseen's Theory – Airy's Theory – Design of Parameters – Design Criteria – Analysis of Bins – Hopper Bottom –Design of Bins.

REFERENCES:

1. Design of Steel Structures. P. Dayaratnam, Publisher: S. Chand, Edition 2011 – 12.
2. Design Steel Structures Volume – II, Dr. Ramachandra & Vivendra Gehlot Scientitic Publishes Journals Department.
3. Limit State Design of Steel Structures S. K. Duggal, McGraw Hill Education Private Ltd. New Delhi.
4. Design of Steel Structures Galyord & Gaylord, Publisher; Tata McGraw Hill, Education. Edition 2012.
5. Indian Standard Code – IS – 800-2007.

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

Course Objectives: To impart knowledge about the use of various softwares.

Course Outcomes: The learner will be able to use different software available to solve civil engineering problems.

SOFTWARES:

Relevant Commercial Software Package

EXERCISES:

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Study of features estimation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering. .
6. 2-D Frame Analysis and Design
7. Steel Tabular Truss Analysis and Design
8. 3-D Frame Analysis and Design
9. Retaining Wall Analysis and Design
10. Simple tower Analysis and Design
11. Project Management

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