### IV YEAR I SEMESTER

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>L</th>
<th>T/P/D</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Remote Sensing &amp; GIS</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Transportation Engineering -II</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Estimating &amp; Costing</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Water Resources Engineering-II</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Elective-II</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Finite Element Methods</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advanced Foundation Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Watershed Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air Pollution and Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Elective-III</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Advanced Structural Design</td>
<td>4</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Earth and Rock fill Dams and Slope Stability</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water Resources Systems Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Industrial Waste Water Treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concrete &amp; Highway Materials Lab</td>
<td>-</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Environmental Engineering Lab</td>
<td>-</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>24</td>
<td>6</td>
<td>28</td>
</tr>
</tbody>
</table>

**Note:** All End Examinations (Theory and Practical) are of three hours duration.
TEXT BOOKS:

REFERENCES:
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
IV Year B.Tech. CE-I Sem
4
L T/P/D C
(A70143) TRANSPORTATION ENGINEERING - II

UNIT - I
Introduction to Railway: Permanent way components - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast, Gauge - Creep of Rails - Theories related to Creep - Sleeper density.

UNIT - II
Geometric Design of Railway Track: Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency - Degree of Curve, Points and Crossing, Rail Joints & Welding of Joints, Railway station & Yards, Signalizing & interlocking.

UNIT - III

UNIT - IV
Port and Harbour Engineering: Requirements of Port and Harbour, Classification of Port & Harbour, Features of a Harbour, Planning of Harbour, Breakwaters, Dry docks, Jetties, Aprons, Transit shed and Warehouses, Navigational aids, Maintenance of Port and Harbours, Inland Water Transport

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 Public Transportation systems (APTS), ITS architecture components and standards, Overview of ITS implementations in developed countries.

TEXT BOOKS:

REFERENCES:
UNIT – I

UNIT – II
Earthwork for roads and canals.

UNIT – III
Rate Analysis – Working out data for various items of work over head and contingent charges.

UNIT – IV

UNIT – V
Valuation of buildings. Standard specifications for different items of building construction.

TEXT BOOKS

REFERENCES:
3. Estimation, Costing and Specifications by M. Chakraborti; Laxmi publications.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. CE-I Sem

(L70330) FINITE ELEMENT METHODS
(Elective-II)

UNIT – I
Introduction to Finite Element Method – Basic Equations in Elasticity – stress strain equations – concept of plane stress – plane strain – advantages and disadvantages of FEM.
Element shapes – nodes – nodal degree of freedom – strain displacement relations.

UNIT – II
Finite Element Analysis (FEA) of one dimensional problems – Bar element – Shape functions stiffness matrix

UNIT – III
Lagrangian – Serendipity elements – Hermite polynomials – regular, irregular
2D & 3D – Element – shape functions.

UNIT – IV
Isoparametric formulation – Concepts of isoparametric elements for 2D analysis – formulation of CST element, 4 – noded and 8-noded iso-parametric quadrilateral elements.

UNIT-V
Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOKS:
1. Introduction to Finite elements in engineering by Chandrupatla, Belegundu, Prentice Hall.
2. Finite element method by Daryl L. Logan, CENGAGE Learning.

REFERENCES:
2. Finite element analysis by P. Seshu, PHI.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
IV Year B.Tech. CE-I Sem

(A70134) ADVANCED FOUNDATION ENGINEERING
(Elective-II)

UNIT – I
Introduction-Bearing capacity of Footings subjected to Eccentric and inclined loading – Meyerhoff’s, Hansen’s, Vesic theories – Foundations on layered soils - Elastic settlement of Footings embedded in sands and clays of Infinite thickness – Footings on soils of Finite thickness Schmertmann’s method, Janbu method.

UNIT – II
Pile Foundations – pile groups- settlement of pile groups resting in sands and clays - negative skin friction-under reamed piles-laterally loaded piles - ultimate lateral capacity - Broms Method - Reese and Matlock Approach.

UNIT – III
Lateral earth pressures theories – Rankine’s and Coulomb’s theories Graphical Methods, Culmann’s, Trial Wedge methods - Stability checks of cantilever and gravity retaining walls.

UNIT - IV
Cantilever and anchored sheet piles - earth pressure diagram - determination of depth of embedment in sands and clays – braced cuts - earth pressure diagrams - forces in struts.

UNIT – V

REFERENCE BOOKS:

TEXT BOOKS:
UNIT-I
Introduction: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

Characteristics of Watershed: size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

UNIT-II

Planning of watershed management activities, peoples participation, preparation of action plan, administrative requirements

UNIT-III

Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rockfill dams, brushwood dam, Gabion.

UNIT-IV
Water Harvesting: Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

UNIT-V
Forest and Grass Land Management: Interpretation of Satellite Imageries-Land use and Land Cover. Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

Ecosystem Management: Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.

TEXT BOOKS:

REFERENCE:
1. Land and Water Management by VVN Murthy, - Kalyani Publications.
2. Irrigation and Water Management by D.K.Majumdar, Prinice Hall of India.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. CE-I Sem

(A70136) AIR POLLUTION AND CONTROL
(Elective -II)

UNIT - I
Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary air pollutants, Point, Line and Areal Sources of air pollution- Stationary and mobile sources. Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.

UNIT - II
Meteorology and Plume Dispersion; Properties of atmosphere; Heat, Pressure, Wind forces, Moisture and Relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rose diagrams. Lapse Rates, Pressure Systems, Winds and moisture, plume behavior and plume Rise Models; Gaussian Model for Plume Dispersion.

UNIT-III
Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control.
Equipment’s – Settling Chambers, Cyclone separators, filters, Dry and Wet scrubbers, Electrostatic precipitators.

UNIT – IV
Control of gaseous emissions - General Methods of Control of NOx and SOx emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling – Adsorption – Absorption – Combustion.

UNIT – V

TEXT BOOKS:
1. Advanced Reinforced Concrete Structures by Varghese, Prantes Hall of India Pvt. Ltd.
4. Advanced Reinforced Concrete Structures by Krishna Raju.

REFERENCES:
(A70137) EARTH AND ROCKFILL DAMS AND SLOPE STABILITY  
(Elective-III)

UNIT-I
Earth and Rockfill Dams: General features, Selection of site; Merits and demerits of the earth and rock fill dams, Classification of earth dams, Causes of failure, Safe design criteria. Instrumentation in earth dams: Pore pressure measurements, Settlement gauges, Inclinometers, Stress measurements, Seismic measurements.

UNIT-II
Failures, Damages and Protection of Earth Dams: Nature and importance of failure, Piping through embankment and foundations, Methods of seepage control through embankments and foundations, Design Criteria for filters, Treatment of upstream and downstream of slopes, Drainage control, Filter design.

UNIT-III

UNIT-IV

UNIT-V
Rockfill Dams: Requirements of compacted rockfill, Shear strength of rockfill, Rockfill mixtures, Rockfill embankments, Earth-core Rockfill dams, Stability, Upstream & Downstream slopes.

Text Books:

References:
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. CE-I Sem

(A70144) WATER RESOURCES SYSTEMS ANALYSIS
(Elective-III)

UNIT - I
Introduction: Definition of system, Types of systems, System approach, System analysis and types of systems, Techniques of water resources system analysis.


UNIT - II
Linear programming: Formulation of linear programming models, graphical method, simplex method, application of Linear programming in water resources.

UNIT - III
Linear programming: Revised simplex method, duality in linear programming, sensitivity and post optimality analysis.

UNIT - IV
Dynamics programming: Bellman's principle of optimality, forward and backward recursive dynamic programming, curse of dimensionality, application of dynamic programming for resource allocation.

UNIT - V
Water Resources Economics: Basics of Engineering economics, Discount factors, Uniform annual series, Amortization, Comparison of alternate plans. Principles of Economics analysis, Conditions of project optimality, benefit cost analysis socio economic intuitional and pricing of water resources.

TEXT BOOKS:

REFERENCES:
2. Water Resources project Economic by Kuiper.E.
JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. CE-I Sem

(A70195) CONCRETE AND HIGHWAY MATERIALS LAB

I. ROAD AGGREGATES:
1. Aggregate Crushing value
2. Aggregate Impact Test.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

II. BITUMINOUS MATERIALS:
1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.

III. CEMENT AND CONCRETES:
TESTS ON CEMENTS:
1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity and soundness of cement.
5. Workability test on concrete by compaction factor, slump and Veebee.
7. Bulking of sand.
8. Non-Destructive testing on concrete (for demonstration).

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

IV Year B.Tech. CE-I Sem

(A70192) ENVIRONMENTAL ENGINEERING LAB

LIST OF EXPERIMENTS
1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids (Organic and Inorganic)
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination of iron.
7. Determination of Nitrates.
8. Determination of Optimum dose of coagulant
9. Determination of Chlorine demand
10. Determination of total Phosphorous.
11. Determination of B.O.D
12. Determination of C.O.D
15. Presumptive coliform test.

NOTE: At least 8 of the above experiments are to be conducted.