JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B.Tech (CE)– III-II

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(19A01603a) MAINTENANCE AND REPAIR OF CONCRETE STRUCTURES

PROFESSIONAL ELECTIVE-II

Course objectives

- To learn various distress and damages to concrete and masonry structures
- To understand the importance of maintenance of structures
- To study the various types and properties of repair materials
- To asses the damage to structures using various tests
- To learn the importance and methods of substrate preparation
- To learn various repair techniques of damaged structures, corroded structures

Unit – I

Introduction, significance of corrosion, and corrosion mechanisms - Embedded metal corrosion

Unit – II

Deterioration of cementitious systems – Sulphate and Acid attack - Alkali Silica Reaction (ASR), Shrinkage, and others

Unit – III

Concrete assessment using non-destructive tests (NDT) - : Concrete assessment and load effects

Unit – IV

Surface repair – Condition assessment – Analysis, strategy, and design – Material requirement, surface preparation, placement of repair material

Unit – V

Strengthening and stabilization – Introduction and beam shear capacity strengthening - Column strengthening - Flexural strengthening

Course outcomes

By the end of this course students will have the capability/knowledge of

- Various distress and damages to concrete and masonry structures
- The importance of maintenance of structures, types and properties of repair materials etc
- Assessing damage to structures and various repair techniques

Text Books and references

1. Concrete Repair and Maintenance" by Peter H. Emmons, R.S. Means Company, Kingston, MA, USA.
2. "Maintenance Repair & Rehabilitation & Minor Works of Buildings" P.C. Varghese, PHI Learning Pvt. Ltd., New Delhi.
3. "Concrete Repair to EN1504 – Diagnosis, Design, Principles and Practice" Michael Raupach and Till Buttner, CRC Press., Taylor and Francis Group, Boca Raton, FL, USA
4. "Concrete Structures – Protection, Repair and Rehabilitation" R. Dodge Woodson, Butterworth-Heinemann – Elsevier, UK

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B.Tech (CE) – III-II **L T P C**

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(19A01603b) GROUND IMPROVEMENT

PROFESSINAL ELECTIVE-II

Course Objectives:

- To introduce engineering properties of soft, weak and compressible deposits, principles of treatment for granular and cohesive soils and various stabilization techniques.
- To bring out concepts of reinforced earth.
- Applications of geotextiles in various civil engineering projects

Unit-I:

Introduction - Shallow Densification - Deep Dynamic Compaction - Rapid Impact Compaction

Unit – II

Vibrocompaction - Drainage And Dewatering - Excavation And Replacement

Unit – III

Preloading And Vertical Drain For Densification

Unit – IV

Grouting Methods - Chemical Stabilisation

Unit – V

Soil Nailing And Ground Anchors - Use Of Geosynthetics In Various Ground Improvement Problems

Course Outcomes

- Will gain competence in properly devising alternative solutions to difficult and earth construction problems and in evaluating their effectiveness before, during and after construction.
- A study of the many different approaches to the ground modification broadens the mind of any engineer and inspires creativity and innovation in Geotechnical construction and related fields.

Books and references

1. Engineering Principles of Ground Modifications by Manfred R. Hausmann
2. Ground Improvement Techniques by P Purushothama Raj
3. Principle and Practice of Ground Improvement by Jie Han

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(19A01603c) ENVIRONMENTAL AIR POLLUTION
PROFESSINAL ELECTIVE-II

Course Objective:

- To take up the basic concepts of air pollution.
- To introduce students to basic concepts of pollution.
- The contents involved the knowledge of causes of air pollution.
- The contents involved the knowledge of health related to air pollution.
- To develop skills relevant to control of air pollution.

Unit – I

Introduction and Scope - Environmental Systems: Source, Pollutant Transport and Impact on Receptor

Environmental Quality and Pollution: Air-Water quality parameters, units for expression; beneficial uses of water; water quality criteria and standards, air quality criteria, health effects and Indian national air quality standards (including methods for standard setting)

Unit – II

Air Pollution Sources and Assessment of Air Pollution Load– preparation of emission inventory, its presentation (data base) and interpretation Disposal, Fate and Transport of Waste: (i) pollutant dispersion in lakes, reservoirs, rivers, ground water, disposal and stream quality standards, (ii) air pollution dispersion, transportation and chemical transformation, meteorological parameters, simple box and gaussian type model for point, area and line (vehicular sources) (iii) Tutorials and simulated examples

Unit – III

Solid and Hazardous Waste Management: generation, collection, classification, processing and disposal, composting, land filling, incineration, hazardous waste definition and disposal

Unit – IV

Air Pollution Control Particulate removal mechanism and processes; reduction of gaseous pollution dry and wet scrubbing - Noise Pollution: causes, measurements, prevention and control

Unit – V

Environmental policies and regulations; water act, water cess act air act, environmental protection act, hazardous and biomedical waste rules, public liability insurance act, EIA notification, and regulatory mechanism -Environmental Impact Assessment (EIA): Assessment Procedure – Identification, prediction and evaluation; EIA methodologies; EIA statement and report preparation; examples and simulated case studies.

Course Outcomes

On the completion of the course one should be able to understand:

- Concepts of air pollution.

- How to estimate the quantity of air pollutant.
- Be able to develop control technologies.

Text books

1. John H. Seinfeld and Spyros N. Pandis, Atmospheric Chemistry and Physics: From Air Pollution to Climate Change, 2nd Edition, 2006, Wiley.
2. Barbara J. Finlayson-Pitts and James N. Pitts, Jr., Chemistry of the Upper and Lower Atmosphere, 1999, Academic Press.
3. Mark Z. Jacobson, Atmospheric Pollution: History, Science, and Regulation, 2002, Cambridge Univ. Press
4. Mark Z. Jacobson, Fundamentals of Atmospheric Modeling, 2nd Edition, 2005, Cambridge Univ. Press.

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(19A01603d) URBAN TRANSPORTATION PLANNING
PROFESSIONAL ELECTIVE-II

Course objective:

- To cover concepts of Transportation planning, various modes, transit systems and their suitability
- To give idea of modeling in planning, to develop the methodology of travel demand modeling for Urban Transportation Systems
- To provide knowledge of Land use planning and transportation interaction.

Unit – I

Introduction: Transport and Socioeconomic Activities- Historical Development of Transport, Transportation in the Cities, Freight Transportation, Future Developments. - Transportation Surveys: Definition of Study Area, Zoning, Types of Movements, Types of Surveys, HomeInterview Survey, Commercial Vehicle Survey, Intermediate Public Transport Survey,Public Transport Survey, Roadside-Interview Survey, Cordon-Line Survey,Post-Card Questionnaire Survey, Registration-Number Survey, Tag-onVehicle Survey

Unit – II

Urban Transportation System Planning - Conceptual Aspects: Transport Planning Process,Problem Definition,Solution Generation,Solution Analysis,Evaluation and Choice, Implementation,Sequence ofActivities Involved in Transport analysis.- Trip Generation Analysis: Trip Production Analysis, Category Analysis, Trip Attraction Modelling - Urban Structure: Urban Activity Systems, Urban Movement Hierarchies, Types of Urban Structure, Centripetal-Type Urban Structure, GridType Urban Structure, Linear-Type Urban Structure, Directional Grid Urban Structure.

Unit – III

Mode Choice Modelling: Influencing Factors,Earlier Modal Split Models, Trip-End Type Modal Split Model, Trip-Interchange Modal Split Model, Disaggregate Mode-Choice Model, Logit Model of Mode Choice,Binary Choice Situations, Multinomial Logit Model, Model calibration, Case studies - Urban Goods Movement: Classification of Urban Goods Movements, Methodology ofApproach to Analysis of Goods Movement, Modelling Demand for Urban Goods Transport.

Unit – IV

Trip Distribution Analysis: Presentation of Trip-Distribution Data,PA Matrix to OD Matrix,Basis of Trip Distribution, Gravity Model of Trip Distribution, Calibration of Gravity Model, Singly and Doubly Constrained Gravity Models,A case Studies, Growth Factor

Methods of Trip Distribution, Uniform Factor Method,Average Factor Method, Fratar Growth-Factor Method, Disadvantage of Growth Factor Method

Unit – V

Route Assignment: Description of transport network, Route Choice Behaviour, The Minimum Path, Minimum Path Algorithm, Route Assignment Techniques,All-or-Nothing Assignment, Multipath Traffic Assignment, Capacity-Restrained Traffic Assignment - Transport Related Land-Use Models: Development of Land - Use models, The Lowry Model,Application of Lowry Model

Course Outcomes:

- Justify the need for urban transportation system planning.
- Undertake transport surveys followed by a report.
- Plan the process of trip generation and distribution.
- Justify the need of a modal split.
- Prepare the transportation plans for urban mass rapid transit systems.

Text books /References:

1. Adib Kanafani.(1983). Transportation Demand Analysis. Mc Graw Hill Series in Transportation,Berkeley.
2. Hutchinson,B.G.(1974).Principles of Urban Transport Systems Planning. Mc Graw Hill Book Company, New York.
3. John W.Dickey.(1975). Metropolitan Transportation Planning. Mc Graw Hill Book Company, New York.
4. Papacostas, C.S., and Prevedouros,P.D.(2002). Transportation Engineering and Planning. 3rd Edition, Prentice - Hall of India Pvt Ltd., 318-436.

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(19A01603e) WATER RESOURCES SYSTEMS: MODELING TECHNIQUES AND ANALYSIS

PROFESSIONAL ELECTIVE-II

Course Objective:

- To introduce the student to the concept of Mathematical approaches for managing the water resources system.
- To make the students apply an appropriate system approach to optimally operate a water resource system.

Unit – I

Introduction – Concepts of Systems and Systems Analysis; Systems Techniques in Water Resources : Optimization with methods using calculus;

Unit – II

Linear Programming - Graphical method - Simplex method - Multiple solutions - Unbounded and infeasible problems - Dual problem - Dynamic Programming - Introduction to Dynamic Programming - Water allocation problem - Reservoir operation problem - Capacity expansion and shortest route problems

Unit - III

Simulation: Introduction to Multi-objective planning - Reservoir sizing - Reservoir capacity using Linear Programming - Reservoir operation - Multi-reservoir systems - Stationary policy using Dynamic Programming - Hydropower generation

Unit – IV

Reservoir Systems – Random inflows - Basic probability theory - Chance constrained Linear Programming for reservoir operation and design - Stochastic Dynamic Programming for reservoir operation –

Unit – V

Fuzzy Optimization - Fuzzy optimization for water quality control and reservoir operation – Conjunctive use of ground and surface water - Hydropower optimization - Crop yield optimization - Multi-basin and multi-reservoir systems

Course Outcome:

The students will be

- Eexposed to the economic aspects and analysis of water resources systems by which they will get an idea of comprehensive and integrated planning of a water resources project.
- Understanding the concept of linear programming and apply in water resource system.
- Understanding the concept of dynamic programming and apply in water resource system.
- Develops simulation models.
- Ddeveloping skills in solving problems in operations research through LP, DP and Simulation techniques.

Text Books/References:

1. Loucks, D.P. and Ellco Van Beek (2005) Water Resources Systems Planning and Management :An Introduction to Methods, Models and Applications., UNESCO, Netherlands.
2. Vedula,S. and Mujumdar,P.P.(2005) Water Resources Systems : Modelling Techniques and Analysis, Tata McGraw Hill, New Delhi.
3. Mays L.W and Tung Y-K,(1992) Hydrosystems Engineering and Management, McGraw Hill, USA.
4. Simonovic,S.P.(2009) Managing Water Resources : Methods and Tools for a Systems Approach, UNESCO Publishing, France