Paper 2: Advances in Civil Engineering				
Teaching Scheme				
Lectures	Seminar	Library Work	Total	
40	10	10	60	
Examination Scheme				
Credits	Theory	Internal	Minimum for Passing	Total Marks
04	80	20	40	100

Assessments: As per SUK Guidelines

- **Theory Examination: is to be conducted by the university with duration of 3 hours per paper.**
- **Internal Examination is to be conducted by the concerned departments or research centers in the following form:**
  1. **For paper 1 and 2 the internal evaluation will include 2 Seminars of 10 Marks each**
  2. **For paper – 3 the internal evaluation will be as follows:**

  a) **Seminars** (Submission and Presentation)- 10 marks

  b) **Review s Literature :** Submission and Presentation- 10 marks

(Papers will have separate passing head for theory examination and internal evaluation 32+8=40)

Course Contents

Advances in Construction Management — **10 Hrs.**

Introduction to construction operations, erection work, automation processes and special Equipments for Infrastructure Projects- Dams, bridges, ports, harbors, flyovers, recent trends in construction techniques. Material planning, accounting and material reconciliation, Systems of material classification. Deterministic and probabilistic models and applications, ABC analysis, replenishment and replacement policies, VED analysis, lead time demand, purchase planning, EOQ model. Wastage audit at site, Site waste material management plan. Computer applications based upon available softwares

New trends and construction equipment of future. Planning and selection of equipments, for earthmoving, hauling, hoisting, conveying, pneumatic, pumping, aggregate production, concrete production, pile driving, tunneling and road construction applications. Equipment procurement, purchase, import of equipment, procedural formalities for Import Operations Research in Construction- Decision Theory, Game Theory, Linear Programming, Non linear programming

Textbooks and References:

1. Construction Engineering and Management by. S. Seetharaman, Umesh Publications, New Delhi
2. Materials Management – Gopalkrishnan and Sunderasan, Prentice Hall Publications
3. Construction Planning, Methods & Equipment: Puerifoy – Tata McGraw Hill

Advances in Geotechnical Engineering Types of earth retaining structures, design of gravity and cantilever retaining walls, bracing system and apparent earth pressure diagram for open cuts. Reinforced earth retaining wall: general principle, concepts and mechanism of earth retaining wall, design considerations of reinforced earth: geotextiles, geogrid, metal strips and facing elements, construction selection of earth retaining structures, construction practice, field observations. Soil stabilization: introduction, objectives, factors affecting stabilization of soils, methods of stabilization: mechanical, cement, lime, bituminous; classification of stabilizing agents and stabilization processes. Lime stabilization: base exchange mechanism, pozzolanic reaction, lime-soil interaction, cement stabilization: mechanism, amount, fly ash: lime stabilization and soil bitumen stabilization. In- situ ground improvement by compaction piles, dynamic loads, explosion, sand drains, grouting, deep mixing, inserting reinforcement elements, freezing soil and vibroflotation. **Textbooks and References:** **1.** Gopal Ranjan and Rao A.S.R. (2000), Basic and Applied Soil Mechanics- New Age International (P) Ltd., Newe Delhi. 2. P. Purushottam Raj. (2015) 'Geotechnical Engineering' Tata Mcgraw Hill Company Ltd. New Delhi. 3. K. Terzaghi, R. B. Peck, G. Mesri 'Soil mechanics' 3rd edition, John Willey and Sons publication, New- York.	**10 Hrs**
Advances in Transportation Engineering Urban Transportation Problems & Policy: Urban transportation Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach Travel Demand Modelling: Trends, Overall Planning process, Long term - Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques, Tour based models, and Activity based models. Trip Distribution Models: Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models. Mode Split Analysis: Mode Choice Behavior, Competing Modes, Mode Split Curves, Models and Probabilistic Approaches–Logit Model Traffic Assignment Techniques: Diversion Curves, Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All- or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment, Multipath Assignment Technique. Corridor Identification-Plan preparation and evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; TOD; Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities; Pivot Point Analysis, Environmental and Energy Analysis. **Textbooks and References:** 1 Principles of Urban Transport Systems Planning Hutchinson, B.G. McGraw Hill 2 Modelling Transport Juan de Dios Ortuzar and Luis G. Willumsen 4th Edition, JohnWiley and Sons 3 Transportation Planning Handbook Michael D. Meyer Fourth Edition, Institute of Transportation Engineers, John Wiley & Sons Inc.	**10 Hrs.**

Advances in Water Resource Engineering Hydrologic Cycle and its individual component processes. River Basin as a Linear Hydrologic System. Linear Theory of Hydrologic Systems. Lumped Integral and Distributed Differential modelling approaches. Transform methods of Linear Systems Analysis. Morphological attributes of watersheds and its role in runoff dynamics. Flood Routing by Lumped Hydrologic and Distributed Hydraulic approaches. Unsaturated zone Hydrology and physics of the Soil- Plant-Atmosphere Continuum. Calibration and Validation of Rainfall-Runoff models. **Textbooks and References:** 1. H.M. Raghunath, Hydrology, Principles, Analysis and Design, Wiley Eastern Ltd., 1986.	**5 Hrs,**
Advances in Structural Engineering Advanced Reinforced Concrete Design Strut and tie method; Design of slender columns; Design of two way flat slabs; Design for torsion; Design of shear walls; Serviceability, crack width and deflection calculations. Composite Construction General concepts; Composite beams; Composite slabs; Composite columns. Structural use of composite and other emerging materials Structural Dynamics Earthquake response of linear MDOF systems, Modal analysis, Participation factors, Modal contributions, Dynamic analysis of Multi-storeyed buildings. Corrosion Estimation and Vulnerability Assessment Determine the mass loss of steel reinforcement embedded in concrete due to corrosion by Impressed Current Technique (ICD) through accelerated corrosion process. Seismic vulnerability assessment, HAZUS, Different types of MBT, Fragility curve, DPM, Simplified Vulnerability assessment as per ASCE 41.Assesment procedures of NDT results **Textbooks and References:** 1. Lynn S. Beedle, "Plastic Design of Steel Frames", John Wiley and Sons, 1990. 2. Narayanan.R.et.al., "Teaching Resource on Structural steel Design", INSDAG, Ministry of 3. Steel Publishing, 2000. 4. Subramanian.N, "Design of Steel Structures", Oxford University Press, 2008. **5.** Wie Wen Yu, "Design of Cold Formed Steel Structures", Mc Graw Hill Book Company, 1996	**15 Hrs**
Advances in Environmental Engineering Membrane separation processes, Design and operation of Reverse osmosis, Ultrafiltration, and Electrodialysis. Membrane fouling: Causes, and Control disposal. Kinetics of disinfection, Ozone disinfection: Chemistry, System components, Modeling. UV disinfection: Source, System components, Estimation of UV dose. Principles and theories of Chemical oxidation. Design and operation of decentralized wastewater treatment systems Moving Bed Bio-reactor,Anaerobic filter, Modified septic tank,Constructed Wetland (CW): Classification and application, Design and operation of horizontal flow subsurface, Vertical flow systems Emerging concepts in CW, Sludge treatment constructed wetland, Design and operation of Water hyacinth system. Air quality models : Gaussian dispersion model, Regional air quality models Indoor air quality Modelling approaches to water quality - classification and considerations in selecting models, Model requirements and limitations. D.O. Models for Streams: DO model for streams, Streeter - Phelps model - oxygen 'sag' curve, Benthal oxygen demand, Study of Mathematical Models, Models for Estuary and Lakes Transfer Recycling and Disposal Techniques of Municipal Solid Waste (MSW), Economic Evaluation of the Systems, Plastic waste management **Textbooks and References:** 1. Peavy H, S, Rowe D, R, and Tchobanoglous G, “Environmental Engineering”, McGraw-Hill Book Company, Indian edition 2017. 2. Metcalf and Eddy “Wastewater Engineering Treatment and Reuse”, Tata McGraw Hill Publication, Indian Edition 2017.	**10 Hrs.**