I SEMESTER

15CN01 APPLIED STATISTICS AND RELIABILITY
Vide Structural Engineering 15CS01

15CN02 REVIEW OF CONCEPTS OF STRUCTURAL and GEOTECHNICAL ENGINEERING
Vide Structural Engineering 15CS02

15CN03 PAVEMENT ANALYSIS, DESIGN & EVALUATION 3 0 0 3

PRINCIPLES OF PAVEMENT DESIGN: Components of road – IRC guidelines for each component - Factors influencing pavement stability - vehicle and traffic factors - ESWL and Wheel Load factor – Moisture and climate, Soil – CBR, Hveem stabilometer method, Plate bearing method for modulus of subgrade reaction and North Dakota Cone method – Stress Distribution factor – Boussinesq and Burmister theories. (10)


STRESSES IN RIGID PAVEMENT: Stresses in concrete pavements - stresses due to wheel loads (Westergaard theory and its modifications) - stresses due to changes in temperature, stresses due to subgrade restraint – Critical combinations of stresses. (5)

DESIGN OF RIGID PAVEMENT: Modulus of Rupture of concrete Design for airport pavements - Portland Cement Association (PCA) method - Corps of Engineers (CE) method, Design based on recommendations of ICAO - Design for highway pavements – IRC 58 method and PCA method, – Types of joints, Types of rigid pavement based on reinforcement in longitudinal and transverse direction, Design of tie bars and dowel bars. (8)

PAVEMENT DISTRESS, EVALUATION AND REHABILITATION: Flexible pavement distress - rigid pavement distress - condition surveys - Types of roughness - present serviceability index - skid resistance - structural evaluation - Bituminous and flexible overlays on rigid pavements - Rigid overlays on rigid pavements - Rigid overlays over existing flexible pavements. (6)

STABILISATION OF PAVEMENTS: Stabilisation with special reference to highway pavements, Choice of stabilisers, Testing and field control, Use of Geosynthetics (Geotextiles and geogrids) in roads . (5)

Total L: 45

REFERENCES:

15CN04 REINFORCED CONCRETE DESIGN
Vide Structural Engineering 15CS04

15CN05 COMPUTER ANALYSIS OF STRUCTURES
Vide Structural Engineering 15CS05

15CN51 CONCRETE TECHNOLOGY AND STRUCTURAL ENGINEERING LABORATORY
Vide Structural Engineering 15CS51

15CN61 INDUSTRIAL VISIT AND TECHNICAL SEMINAR
Vide Structural Engineering 15CS61

II SEMESTER

15CN06 STRUCTURAL STEEL DESIGN
Vide Structural Engineering 15CS06
15CN07 CONSTRUCTION PROJECT MANAGEMENT

INTRODUCTION: Management objectives and concepts as a blend of art and science – Functions of management – Opportunities and threats to project managers – Application of management principles and tools to construction projects – Importance of applying management concepts in construction industry. (3)

PLANNING: Importance of planning in the overall project management – Periods of planning – Pretender, Pre contract and contract period planning – Data collection, analysis, design, Activity – time scheduling, charts for labour, material, staff and plant requirements – BOQ and cost estimates – Master Programme Chart. (6)

PROJECT SCHEDULING: Activity break down – Bar chart scheduling – its merits and shortcomings; Inter dependencies of activities – CPM/PERT network diagram – Forward and Backward pass – Critical period and critical path analysis – Float – Three time aspects for PERT activities and their identification based on statistical data – Probability of achieving desired time targets for construction projects. (9)

RESOURCE AGGREGATION AND LEVELING: Optimal use of resources – Aggregation as per early start time of activities and initial histogram – Leveling of resources by manipulating activity start time with respect to float availability and late finish time of activities and final histogram. (5)

TIME COST OPTIMIZATION: Direct cost and Indirect cost, and their influence on project duration – Normal and Crash duration of activities and their corresponding costs – Crashing of network to optimize cost and duration of projects – Simple Operation Research techniques to optimize assignment of tasks to groups of workmen, and transport of materials from quarries to sites. (8)

TECHNICAL PROCEDURES: Tenders – aim, importance and tender documents; tender process – Invitation, submission, opening, scrutiny, negotiation, acceptance and award, Contract – definition, types of contracts, their merit and suitability – contract agreement – Principal clauses and conditions; Payment for works – Measurements, Running Bills, deductions. (7)

COST CONTROL: Aims and scope of cost control – use of estimates, data, unit rate and standard rate as tools for cost monitoring – systems of cost control based on accounting details of spends and periodicity of cost comparison. (4)

EARTHWORK CALCULATION: Mass Haul Diagram – features and characteristics – balancing cut and fill and optimizing haul distances and quantities. (3)

SOFTWARE: Applicable software packages for construction management.

Total L: 45

TEXT BOOKS:

REFERENCES:

15CN08 TRAFFIC ENGINEERING AND TRANSPORT PLANNING

INTRODUCTION: Importance of transportation - Employment in transportation - Transportation systems and organization. Characteristics of Driver, the pedestrian, the vehicle and road. (Problems). Traffic and Environment. (5)

TRAFFIC ENGINEERING STUDIES: Statistical studies for traffic engineering, speed studies - volume studies - travel time and delay studies - parking studies - traffic forecasting. Accident studies. (Concepts and problems). (6)

TRAFFIC FLOW: Introduction to traffic flow theory - Macroscopic and microscopic traffic model, shock waves, traffic flow at signal and unsignal intersection. Simulation of traffic. (Concept and problems). (7)

DESIGN FOR TRAFFIC FACILITIES: Intersection design, Design of traffic signal and signal coordination. Intersection design, signalized design - Interchanges - warrant for interchanges, design of interchange - round about, design for parking facilities, capacity analysis and level of service. (Concepts and problems). (8)

TRANSPORT ECONOMICS: Economic evaluation of transport plans - accident cost - traffic congestion, restrain and road pricing, EIA.  

COMPUTER APPLICATION: Computer application in signal design, GIS in urban planning and traffic engineering, SPSS and others.  

REFERENCES:  

15CN09 GEOGRAPHIC INFORMATION SYSTEMS  

GIS TECHNIQUES AND DATA INPUT: Map – Types of map - Map analysis, Digital Cartography and Evolution of GIS, Components of GIS- Software, Hardware and organization- Types of Map Projections and Coordinate concepts - Datums,ellipsoids, geoids,Type of data - spatial and non spatial data,Various Sources of data-Conceptualization of real world in GIS , georeferencing.  

DATABASE, DATA STRUCTURES, ERROR ANALYSIS AND OUTPUT: vector and raster data structure, database concepts,E-R Model, Geodatabase, Object Oriented Database-digitizer, scanner, files and data formats. Collection of Data using GPS - Data transfer from other spatial data sources, data compression, GIS flow chart for projects, Edge matching, rubber sheeting.  


GIS APPLICATION: GIS for water distribution network, sewer network, transportation network, telecom network, power network and other utilities, Site selection for larger projects based on GIS analysis, Remote Sensing data integration, Navigation and tracking using GPS and GIS, GIS database for buildings, Emergency planning, Internet GIS.  

REFERENCES:  

15CN10 ADVANCED ENVIRONMENTAL ENGINEERING SYSTEMS  

WATER SUPPLY ENGINEERING: Quantity of water -population forecasting- per capita consumption - fluctuation in consumption rate - design period.  


DISTRIBUTION SYSTEMS: Classification - Storage reservoir design- layout of distribution system - residual pressure - analysis of distribution system- leakage / waste prevention - appurtenances in distribution system.  


AIR POLLUTION CONTROL: Effect of air pollution on human health, plants, animals, properties - air quality and emission standards - particulate removal - removal of gaseous pollutants - stack design - sampling techniques.

REFERENCES:

15CN52 COMPUTER AIDED INFRASTRUCTURE PLANNING AND ANALYSIS LABORATORY

1. Scaling Techniques
2. Frequency distributions
3. T-test and chi-square list
4. ANOVA
5. Correlation
6. Regression analysis
7. Cluster analysis
8. Conjoint analysis
9. Factor analysis
10. Multi dimensional scaling
11. Non-parametric list
12. Project planning
13. Scheduling a project
14. Resource and cost analysis
15. Round about planning and analysis
16. Fixed time signal designing
17. Signal Co-ordination

Problems solved using commercially available software.
1. Project planning and scheduling
2. Statistical requirements
3. Signal design
4. Round about

Total L: 45

III SEMESTER

15CN53 GIS LABORATORY

EXERCISES:
1. Classifications of spatial data, layer and symbol concept using a GIS software.
2. Onscreen digitisation for points, lines and polygons for a map. Integration of data from various sources.
3. GPS data collection for utilities.
4. Digitisation using digitiser. Cleaning up the data, error removal and topology building.
5. Satellite image processing to produce landuse / landcover maps.
6. Attribute data query on maps, simple analysis
7. Simple overlay and weighted overlay
8. Network analysis in GIS.
9. DEM, TIN creation and Cost path analysis
10. Site selection of projects using GIS.
11. Output generation and cartographic design of maps.

Total P: 60

15CN71 PROJECT WORK – PHASE I
Vide Structural Engineering 15CS71

EIA METHODOLOGIES: Methods of EIA – Checklists – Matrices – Networks – Cost-benefit analysis – environmental pricing – Analysis of alternatives - case studies.

PREDICTION AND ASSESSMENT: Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA.

ENVIRONMENTAL MANAGEMENT PLAN: Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected people- ISO 14000.


REFERENCES:
PRIVATISATION OF INFRASTRUCTURE: Infrastructure Laws. (4)

COST ESTIMATION FOR DESIGNING AND MAINTAINING INFRASTRUCTURE: Financing of Infrastructure projects. (4)

RURAL INFRASTRUCTURE: Alternate construction materials, village ponds, village transportation, Sanitation (5)

REFERENCES:

 total L: 45

WEBSITES:
- http://infrastructure.gov.in/
- http://www.indiacore.com/
- http://www.indianinfrastructureobserver.com/
- http://www.mapsofindia.com/infrastructure/

15CN27 OPTIMISATION TECHNIQUES
Vide Structural Engineering 15CS26

15CN28 MAINTENANCE AND REHABILITATION OF STRUCTURES
Vide Structural Engineering 15CS27

15CN29 MODERN MATERIALS FOR CONSTRUCTION

INTRODUCTION: Introduction to the physics and chemistry of materials, focusing on chemical bonding, crystal structure, mechanical properties, phase transformation, Energy in building materials and building. (5)


CERAMICS AND GLASS: Physical and chemical properties – Mechanical behavior – requirements and applications. (4)

FIRE PROOFING MATERIALS: Physical and chemical properties – Mechanical behaviour – requirements and applications - Fire damage assessment of materials. (3)

HIGHWAY MATERIALS & PAINTS: Requirements – special paints for Road marking. (5)

BUILDING MATERIALS FROM AGRO AND INDUSTRIAL WASTE: Typical agro waste and other biomasses resources. (5)

MISCELLANEOUS MATERIALS: PVC, EPOXY, Thermocole, Geotextile, Acoustics, Thermal and sound insulation materials, Green building material. (5)

SMART AND INTELLIGENT MATERIALS: Brief outline and uses. (4)

REFERENCES:

Total L: 45
15CN30 EXPERIMENTAL TECHNIQUES AND INSTRUMENTATION
Vide Structural Engineering 15CS29

15CN31 FINANCIAL MANAGEMENT AND ACCOUNTING


INTRODUCTION TO BALANCE SHEET: The Corporate Balance Sheet – Format of Balance sheet – Balance Sheet as per company law and annexure to it – Generally Accepted Accounting Principles. (3)


FINANCIAL STATEMENTS ANALYSIS: Characteristics – limitations - Ratio Analysis (Including Dupont Model): Interpretation. (3)


COST ACCOUNTING: Meaning and objectives – classification -Direct Cost - Overheads – Cost Sheet. (3)

MARGINAL COSTING: Cost- volume profit analysis – Break Even Point - Application of marginal costing techniques to Managerial Decision making. (3)

FINANCIAL MANAGEMENT: An overview – Nature & scope - Finance functions - goals of financial management - Financial manager’s role -agency problems ,agency cost. (3)

SOURCES OF FINANCE: Long term finance -ordinary shares, right issue of equity shares, preference shares, debentures, term loan, asset based financing-hire purchase, leasing, venture capital financing. Short term finance - trade credit, bank credit, bill discounting, commercial paper. (3)

TIME VALUE OF MONEY: Concept - future value- present value – single cash flows, annuity, uneven cash flows, multi period and continuous - yield calculation, applications : bonds valuation and yield - valuation of preference shares -valuation of ordinary shares. (3)

COST OF CAPITAL: Concept -determining component cost of capital -weighted average cost of capital - weighted marginal cost of capital. (3)

INVESTMENT DECISION: Capital budgeting decisions - Evaluation of capital budgeting -discounted & non discounted cash flows methods – simple problems. (4)

WORKING CAPITAL MANAGEMENT: Principles and concepts of working capital – operating cycle -determinants of working capital -policies for financing current assets. (4)

RECEIVABLES MANAGEMENT: Inventory management and cash management – basic concepts only. (4)

Total L: 45

REFERENCES:

15CN32 PREFABRICATED STRUCTURES


ROOF AND FLOOR UNITS: Roofing slabs – large slab type roof components – floor units – structural design of roof and floor units – manufacture of roof and floor units – dimensional variations – structural design problems. (9)


REFERENCES:

15CN33 CITY PLANNING AND URBAN DESIGN

CITY PLANNING: Evolution of cities; principle of city planning; type of cities & new towns; Indian cities and metropolitanises constraints and prospects; Polarization of economic socio cultural and administrative activities; Distribution of urbanization process; National settlement polices; eco city concept; sustainable development.

METROPOLITAN PLANNING: Metropolitan plan making processes, metropolitan plans in India, Metropolitan planning strategies.

TECHNIQUES OF PLANNING: Planning survey techniques; Conducting survey; statistical methods of data analysis; report presentation; application of GIS and remote sensing techniques in urban and regional planning; decision making models.

DEVELOPMENT ADMINISTRATION AND MANAGEMENT: Scope and content of master plan and structure plan, integrated urban development plans and IDSMT and urban development projects; Planning laws; development control and zoning regulations; law relating to land acquisition; development enforcements, urban land ceiling, scope and content of zonal development plans, detailed town planning schemes, area development plans, action plans and subject plans, Land management techniques; planning and municipal administration; disaster mitigation management; 73rd and 74th constitutional amendments; public participation and role of NGO & CBO.

URBAN DESIGN: Definition of urban design, scope of urban design under Indian context and its integration with urban planning; Historical development and approach to urban design; urban form; Urban structure and design rational inter-relationship between economic activities, public organization, communication system, urban conservation and land-use structure. Organization of space. Review and designing of urban renewal and redevelopment projects for old and new towns.

REFERENCES:

15CN34 ORGANISATION BEHAVIOUR

INTRODUCTION TO OB: Definition, Meaning and Importance of OB, Historic developments of OB, Hawthorne experiment, Basic OB Model, Different approaches to OB, Contributing disciplines to OB, Scope of OB, Significance of OB.

PERSONALITY: Definition, Origin of the word Personality, Determinants of Personality, Theories of Personality (Psychoanalytic theory, Self theory, Holland’s personality theory, Myers Briggs Type Indicators and Big 5 personality theory), Attributes of personality.
EMOTIONAL INTELLIGENCE: Definition and Meaning, Categories of intelligence, EI Dimensions, Physiology of EI, OB applications of emotions.

MOTIVATION: Definition, Meaning, Characteristics of Motivation, Process of Motivation, Theories of Motivation (Maslow’s need theory, ERG theory, Hertzberg theory, Expectancy theory, Theory X & Y, McClelland’s theory of needs, Goal setting theory, Equity theory), Incentives for Motivation.

LEADERSHIP: Definition and Meaning, Styles of leadership, Theories of leadership (Trait theory, Ohio state theory, Managerial grid, Contingency theory, Path goal theory, Leader Member Exchange (LMX), Transactional & transformational leadership theory, Charismatic and Visionary leadership theory).

GROUP DYNAMICS: Definition and Meaning, Difference between Group and Team, Groups in Organisation, Team Effectiveness model, Troubles with team, Social loafing.

ORGANISATIONAL CULTURE: Meaning and Definition, Characteristics of Organisational culture, Elements of Organisational culture, Organisational sub culture, Artifacts for Organisational culture, Bicultural audit, Strategies to merger different organisational culture.

ORGANISATIONAL CHANGE: Meaning, Why to change, Factors of Organisational change, Lewin’s forced field model, Human reactions to change, Resistance to change, Strategies for reducing change, Ethical issues in Organisational change.

REFERENCES:

15CN35 MODERN SURVEYING

ASTRONOMY: Spherical Trigonometry - Astronomical Terms - Coordinate Systems – astronomical triangle – determination of azimuth of a line, latitude of the place of observation and error in the chronometer by taking extrameridian observations of the sun.

TYPES OF SURVEYING AND CONTOURING
Geodetic surveying-triangulation and its classification-reconnaissance-station marks-intervisibility and heights of stations-signals-sounding party-methods and reduction of soundings-plotting-use of sextant-three point problem and use station pointer, CONTOURING: Definition-Contour interval and horizontal equivalent-characteristics-interpolation-contouring by grid and radial methods-drawing contour lines-use of contour maps-drawing of contours through computers.

ADVANCED TOTAL STATION AND GPS: EDM measurements, Electronic theodolite - Principles of working of Advanced Total Station, linear measurements and angular measurements, co-ordinate measurement programme, vertical plane method - data transfer to computer- Introduction to GPS-functions and applications

SETTING OUT WORKS: Procedures for setting out a building-pipelines-sewers-setting out curves-simple curve-compound curve-transition curves-vertical summit curves

PHOTOGRAphIC SURVEYING: Photo theodolite - principles of terrestrial photogrammetry - stereo photogrammetry - examples - aerial surveying - terminology - scale - simple problems on vertical photographs, soft copy photogrammetry.

REFERENCES:

15CN36 GEOSYNTHETICS

OVERVIEW OF GEOSYNTHETICS AND DESIGN PRINCIPLES: Introduction, basic descriptions of geosynthetics, types, their current applications for various functions, materials, manufacturing processes, properties and testing, Mechanism of reinforced soil, Factors influencing behaviour and performance.

IMPROVEMENT OF BEARING CAPACITY: Modes of failure in reinforced earth, Determination of force induced in reinforcement, Guidelines on the use of geogrids, bearing capacity improvement in soft soils.

DESIGN OF REINFORCED SOIL RETAINING WALLS: Components of reinforced soil walls, Principles of design – Internal and
EXTERNAL STABILITY: Design.

EMBANKMENTS IN SOFT SOILS: Analysis, Influence of reinforcement extensibility, deformation in foundation, Overall stability with respect to bearing.

USE OF GEOSYNTHETICS FOR FILTRATION AND DRAINAGE: Applications, Geotextile filter requirements, boundary conditions, drain and filter properties, design criteria.

USE OF GEOSYNTHETICS IN ROADS: Applications, Role of subgrade conditions, Design – The Giroud and Noiray approach, Geotextile serviceability, Application in pavement overlays.

GEOSYNTHETICS IN ENVIRONMENTAL CONTROL: Liners for ponds and canals, covers and liners for landfills, material aspects and stability considerations.

REFERENCES:

Total L: 45

15CN37 CORROSION ENGINEERING


REFERENCES:

Total L: 45

15CN38 REMOTE SENSING


SATELLITE DATA PRODUCT AND INTERPRETATION OF SATELLITE IMAGERIES: Types of data product- software and hardware requirement for data processing- Elements of visual image interpretation- Digital Image processing techniques, Landuse/landcover classification.

CHARACTERISTICS OF SATELLITES AND THEIR APPLICATIONS: GOES, NOAA, METEOSAT, INSAT - Land observation satellites: LANDSAT, SPOT, IRS, IKONOS, GEOEYE, QUICKBIRD, WORLDVIEW – SEASAT, SIRA, SIRB, ERS, JERS, RADARSAT and other currently available satellites.

REMOTE SENSING APPLICATIONS: Urban land use planning - site selection for various infrastructure projects- resource management- mapping of infrastructure facilities and planning - integration of satellite imageries in GIS

REFERENCES:

ONE CREDIT COURSES

For the detailed syllabi of the electives and one credit courses offered by other departments refer to the syllabi of M.E- Automotive Engineering offered by Automobile Engineering Department.