

**MAHATMA GANDHI
UNIVERSITY**

B.TECH. DEGREE COURSE

7TH SEMESTER

**SCHEME
&
SYLLABUS**

2002

**CIVIL ENGINEERING
BRANCH**

CIVIL ENGINEERING

SCHEME

7TH SEMESTER

Course Code	Subject Code	Subject	Duration of Uty. Exam (hrs.)	No. of periods per week (hrs)			Marks			
				Lect.	Tut.	Prac.	Sessional	Theory	Practical	Total
A	C701	Design of Concrete Structures – II	4	3	1	-	50	100	-	150
B	C702	Water Resources Engineering - II	3	3	1	-	50	100	-	150
C	C703	Transportation Engineering –II	3	3	1	-	50	100	-	150
D	C704	Architecture and town planning	3	3	1	-	50	100	-	150
E	C705	Environmental Engineering - I	3	3	1	-	50	100	-	150
F	C706	Elective –I	3	3	1	-	50	100	-	150
G	C707	Transportation Engineering Lab.	3	-	-	3	50	-	100	150
H	C708	Computer Aided Design -II	3	-	-	3	50	-	100	150
Total			25	18	6	6	400	600	200	1200

SYLLABUS

DESIGN OF CONCRETE STRUCTURES - II

C701

2+2+0

Module 1

Prestressed concrete: I. S. Specifications - general principles - methods and systems of prestressing - losses of prestress - design of simply supported rectangular beams.

Module 2

Retaining walls: Types-Earth pressure diagrams- modes of failure- design of cantilever and counter fort retaining walls ("L" not included)

Module 3

Design of continuous beam: using coefficients given in IS: 456 - design of circular beams -uniformly loaded and supported on symmetrically placed columns.

Module 4

Domes: membrane stresses in spherical and conical domes –design of domes with uniformly distributed and concentrated loads - openings - ring beams.

Module 5

Water tanks: Types - design of ground supported and overhead water tanks-rectangular and circular with flat bottom-flexible and rigid joints – design of staging- columns and bracings - IS code method.

References

1. Relevant IS codes.(I.S 456, I.S 875,SP 16)
2. Park R and Pauloy T, Reinforced concrete structures, John Wiely & sons Inc.
3. Purushothaman P, Reinforced concrete structural elements-Behaviour, Analysis and Design, Tata Mc Graw Hill Publishing company Ltd.
4. Unnikrishna Pillai .S & D.Menon, Reinforced concrete design, Tata Mc Graw Hill Publishing Company Ltd.
5. Mallick S.K, Reinforced concrete, Oxford & IBH Publishing Company.
6. Varghese P.C, Limit state design of Reinforced concrete, Printice Hall of India Pvt Ltd.
7. Ashok .K. Jain, Reinforced concrete- Limit state design, New Chand & Bose.
8. Krishna Raju, Prestressed Concrete, Oxford and I B H Publishing companyLtd.
9. Ramamruthum S., Design of Reinforced concrete structures, Dhanpat Rai Publishing co.
10. Punmia B.C, Reinforced concrete structures Vol II, Lakshmi Publications

WATER RESOURCES ENGINEERING - II

C702

3+1+0

Module 1

Dams: definitions - classifications - factors governing the selection of the type of dam and site of the dam- investigation for a dam site. Gravity dam: forces acting - combination of forces for design - modes of failure and stability requirements - elementary profile and practical profile - principal and shear stress - base width of elementary profile by stress and stability criteria-stresses developed in the elementary profile - low dam and high dam - methods-of design of gravity dam (introduction only) - joints - keys water stops – opening and galleries and shaft - foundation treatment - brief description on type of spill ways.

Module 2

Arch dams: types of arch dams - forces acting -design of arch dams on thin cylinder theory - introduction of other methods of design - thick cylinder theory - trial load analysis and elastic theory. Buttress dam - types - advantages and disadvantages. Earthen dam - types of earth dams - design criteria - selection of a dam - phreatic line - stability analysis - different dam sections to suit available materials and foundation - rock fill dams materials of construction - impervious membrane type and earth core type (brief description only)

Module 3

Diversion head works: function and component parts of diversion head works - effect of construction of weir on the regime of river- causes of failure of weirs on permeable foundation. Bligh's creep theory and its limitations - Lane's weighted creep theory - Khosla's theory and design of impermeable foundation - design of vertical drop weir - silt control devices - silt excluder, silt ejector.

Module 4

Design and drawings emphasizing the hydraulic aspects of the following structures: (1) Regulators-design of head regulator and cross regulator. (2) Canal falls- trapezoidal notch fall- vertical drop fall sarda type and glaxis fall. (3) Cross drainage works –aqueduct and syphon aqueduct.

Module 5

Water power engineering: Classification of hydel plants- runoff river plants, storage plants and pumped storage plants - low, medium and high head schemes - investigation and planning - fore bay – intakes - surge tanks - penstocks - powerhouse – selection of turbine-Scroll casing - draft tube - tailrace definition of gross head - operating head - effective head - firm power –secondary power- load factor, capacity factor and utilization factor.

References

1. P. M. Modi, Irrigation-water resources and water power, Standard book house.

2. S. K.Garg, Irrigation and hydraulic structures, S. K.Garg, Khanna publishers
3. R. K. Linsley, M. A. Kholer, L. H. Paulhur, Hydrology for Engineerers, Tata Mc Graw Hill
4. Bharat Singer, Fundamentals of Irrigation Engineering
5. V. B. Priyani, Irrigation and water power Engg. , Charotar Book stall.
6. B C Punmia, Pande B B Lal, Irrigation and water power engineering, Laxmi Publications.
7. R.S.Varshney, S.C.Guptha, R.L.Guptha, Theory and design of irrigation
8. Structures, Vol II, Nemchand &brothers, Roorkee.

TRANSPORTATION ENGINEERING - II

C703

2+1+0

Module 1

Classification, alignment and surveys -classification of highways - historical development of road construction, typical cross section of roads in urban and rural areas - definitions of various cross sectional elements - requirements and factors controlling alignment of roads, engineering surveys for highway location.

Geometric design of highways: pavement surface characteristics, camber and width requirements, sight distances - over taking zone requirements and related problems. Design of horizontal alignment - speed - radius – super elevation - extra widening - transition curves, methods of attainment of super elevation - related problems.Design of vertical alignment - gradient and grade compensation - sight distance requirements on summit and valley curves -simple problems on design of vertical alignment.

Module 2

Traffic Engineering: traffic characteristics-various traffic studies and their applications . Traffic control devices- Traffic signs, markings, traffic signals and traffic islands. Types of road intersection - kerb parking - principles of highway lighting - (Design of traffic signals not expected).

Module 3

Highway materials: Road aggregates - their desirable properties and tests.

Bituminous materials - properties and tests - sub grade soil - desirable properties.

Highway construction and maintenance: Bituminous surface dressing and pavement construction - cement concrete construction and joints in concrete pavements - types and causes of failures in flexible and rigid pavements, highway drainage.

Pavement design: Basic difference between flexible and rigid pavements -factors affecting their design - designof flexible pavements-CBR, GI & IRC methods.

Module 4

Aircraft characteristics- regional planning, selection of site for airport - factors to be considered. Imaginary surfaces - approach zone and turning zone, obstructions

and zoning laws. Runway orientation and layout of runways: use of wind rose diagrams, basic runway length and corrections required. Methods of classification of airports. Stopway, clearway and taxiway design requirements.

Module 5

Aprons: loading aprons - factors controlling size and number of gate positions - aircraft parking systems - holding apron. Facilities required in the terminal building - facilities for movement of baggage and passengers. Use of blast fences, typical airport layout - airport markings - marking of runways, taxiways etc. Airport lighting: lighting of runways approaches, taxiways and aprons. Air traffic control -airways, navigational aids and landing aids.

References

1. S. K.Khanna, C. E. G. Justo, Highway engineering, Nem Chand Publications.
2. L .R. Khadiyali, Traffic Engineering and Transport Planning, Khanna Publishers.
3. S.K. Khanna, M. G. Arora, S.S. Jain, Airport Planning & Design, Nem Chand Publishers
4. S. C. Rangwala, Airport Engg., Charotar Publishing Co.
5. Horenjeft, Robert & Francise Mc Keivy, Planning and design of airports, Mc Graw Hill
6. G V Rao, Principles of transportation and High way Engineering, Tata Mc Graw Hill, New Delhi.
7. Robert. G. Hennes, Martin Ekse, Fundamentals of Transportation engineering, Tata Mc Graw Hill.
8. Theodore M Matson, Wilbur.S.Smith, Frederick.W.Hurd, Traffic Engineering, Mc Graw Hill.

ARCHITECTURE AND TOWN PLANNING

C704

2+1+0

Module 1

Principles of architectural Design:

Definition of architecture: factors influencing architectural development-characteristic features of a style-historical examples. Creative principles: function/strength, aesthetics - deciding the space and form - detailed analysis of factors influencing the space - activity space, circulation space and tolerance space - Factors influencing form- form perception - form expressive of function-form related with material and Structural system. Design principles - elements of composition - point, line, plane, texture, colour etc. - mass and scale, proportion, rhythm, balance and unity - iconic, canonic and analogic design -consideration of comfort factors such as acoustics, lighting, ventilation and thermal aspects.

Module 2

Functional planning of buildings: Occupancy classification of buildings'-general requirements of site and building - building codes and rules - licencing of building works. Functional planning of building such as residential, institutional, public, commercial, industrial buildings - the process of identifying activity areas and linkages - drawing built diagrams - checking for circulation, ventilation, structural requirements and other constraints preparing sketch plan and working drawings - site plans.

Kerala Municipal acts – planning regulations of corporations and developmental authorities – Kerala building bye laws.

Module 3

Building services: Vertical Transportation: stairs - layout and details of different types of timber - masonry, steel and concrete stairs - pre-cast concrete stairs, elevators - types - traction, hydraulic operation - passenger, service goods elevators - design considerations of passenger elevators - handling capacity - arrangement of lifts - positioning, escalators, features- operation arrangement - ramps. Ventilation and air conditioning - ventilation requirements -natural and mechanical ventilation - air movement - cross ventilation - effect of orientation - radiation - evaporation, calculation of air conditioning load - summer and winter air conditioning. Plumbing services: typical details of water supply and sewage disposal arrangements for residence, hospitals and hostel buildings - standard requirements.

Module 4

Town planning theory: Evolution of towns: problems of urban growth - beginning of planning acts - ideal town - garden city movement - concept of new towns and conservative theory - comprehensive planning of towns- Survey and analysis of town: fare maps - land use classification - transportation network - housing demographic and social surveys - economic studies - environmental aspects. Theories of land use planning, transportation planning and housing development. Urban area lineation: urban influence zone - urban region concept of regional planning.

Module 5

Planning Process: Concept of master plan: structural plan, detailed town planning scheme and act.

Estimating future needs: planning standards for different land use allocation for commerce, industries, public amenities, open areas etc. planning standard for density distributions-density zone, planning standards for traffic networks - standards of roads and paths - provision for urban growth-growth models. Plan implementation: town planning legislation and municipal acts - planning control development schemes - urban financing - land acquisitions - slum clearance schemes - pollution control aspects.

References

1. Banister Fletcher, History of World Architecture, Taraporevalas.
2. Broadbent, Theory of Architecture Design, John Wiley Sons
3. Gallien, Urban Pattern, D.Van Nostrand CD. Inc.
4. Nelson P. Low's, Planning to Modern City
5. Rangwala, Town Planning, Charotar Publishing House.
6. S.C Agarwala, Architecture and Town Planning, Dhanpatrai &sons.

ENVIRONMENTAL ENGINEERING - I

C705

3+1+0

Module 1

Scope of Environmental Engg. population trends resource use - effect on the balance of ecosystem and natural resources. Water supply Engineering: Rural and Urban water supply systems - water requirements - consumption for various purposes, percapita demand, factors affecting percapita demand, variations in the rate of consumption, fire demand, design period, forecasting population. Quality of water: impurities in water and their importance - water borne diseases - sampling of water for tests - analysis of water - physical, chemical and bacteriological tests - MPN total coliforms, fecal coliforms by A-1 medium. WHO and Indian standards for drinking water.

Module 2

Collection of water: intakes - location, types, principles of design and construction. Transmission of water: free flow and pressure conduits - pipe materials - hydraulics-of flow - design of pipes - Indian standards for pipes. Pumps: Classification - rotary, reciprocating, centrifugal pumps, hand pumps submersible pumps - selection of pumps - location of pumping stations. Distribution of water: pumping system, gravity system, pumping and storage system distribution reservoirs -storage capacity of balancing reservoir, pipe grids, methods of analysis of network. Appurtenances in the distribution system - meters, valves, fire hydrants etc. pipe laying, testing & disinfections of mains. Detection and prevention of leaks in distribution system-cleaning and maintenance of distribution system, pipe corrosion and its control. Water supply of buildings: house connections - overhead tanks.

Module 3

Introduction: Sanitation, sewage, sewer, and sewerage systems, sewage treatment and disposal. Sanitary Plumbing - Sanitary Fixtures, traps, soil pipe, anti- siphonage pipes, systems of plumbing. House drainage: Principles- inspection chamber, ventilation, testing of drain, connection of house drain to street sewer. Sewerage systems – separate, combined and partially combined systems, situation for adoption, collection pattern.

Quantity of sewage: sanitary sewage - sources, factors affecting. Fluctuations in sewage flow, peak factor.

Characteristics of sewage: physical, chemical and biological characteristics and analysis, sampling, population equivalent relative stability-cycles of decay.

Storm sewage: Factors affecting, intensity of rainfall, rational and empirical formula, time of concentration, intensity - duration curve and formula.

Design of sewers: Flow formula, minimum and maximum velocity of flow, effect of variation of discharge on velocity, use of partial flow diagrams, design of circular sewers, longitudinal and cross section of sewer lines.

Module 4

Construction of sewers: Materials of sewers, crown corrosion, sewer joints, planning, preparation of layout and construction of sewers and testing of sewers, cleaning and maintenance, ventilation of sewers. Sewer appurtenances: inlets, catch basins, clean outs, manholes, drop manholes, lamp holes/flushing tanks, grease and oil traps, inverted siphons, storm regulators. Sewage pumping: pumping stations - types of pumps - capacity of pumps - design of pumps.

Natural methods of wastewater disposal: land disposal -. Sewage farming - disposal by dilution - self purification of streams - oxygen sag curve - dilution into sea, comparison of disposal methods.

Module 5

Air pollution: Types of pollutants, sources, health effects, Monitoring.

Noise pollution: Sources, effects. Solid waste management: Type and source of solid waste, characteristics, collection, transportation and processing- Disposal-composting, sanitary land fill, incineration

References

1. Peavy, Rowe, Tchobanoglous, Environmental Engineering, Mc Graw Hill International Editions.
2. M.N. Rao & H.V.N. Rao, Air Pollution, Tata Mc Graw Hill Pvt. Ltd., New Delhi.
3. S. K. Garg, Environmental Engineering Vol. 1 & II, Khanna Publishers, New Delhi.
4. B.C. Punmia, Water supply Engineering, Arihant Publications, Jodpur.
5. B.C. Punmia, Waste water Engineering, Arihant Publications, Jodpur.

OPTIMIZATION TECHNIQUES (ELECTIVE - I)

CMELRTA 706-1

3+1+0

Module1: Classical optimization techniques

Single variable optimization – Multivariable optimization with no constraints – Hessian matrix – Multivariable saddle point – Optimization with equality constraints – Lagrange multiplier method - Multivariable optimization with inequality constraints – Kuhn-Tucker conditions.

Module 2: One-dimensional unconstrained minimization

Elimination methods – unrestricted search method – Fibonacci method – Interpolation methods – Quadratic interpolation and cubic interpolation methods.

Module 3: Unconstrained minimization

Gradient of a function – Steepest descent method – Newton’s method – Powells method – Hooke and Jeeve’s method.

Module 4: Integer – Linear programming problem

Gomory’s cutting plane method – Gomory’s method for all integer programming problems, mixed integer programming problems.

Module 5: Network Techniques

Shortest path model – Dijkstra’s Algorithm – Floyd’s Algorithm – minimum spanning tree problem – PRIM algorithm – Maximal Flow Problem algorithm.

References

1. S.S. Rao, Optimization theory and application, New Age International P. Ltd.
2. A.D. Belegundu, T.R. Chandrupatla, Optimization Concepts and applications in Engineering, Pearson Education Asia.
3. F. S. Budnick, D. McLeavey, R. Mojena, Richard D, Principles of Operations Research for Management, Irwin, INC.
4. H. A. Taha, Operation Research an introduction, Eastern Economy Edition.
5. R. Panneerselvam, Operations Research, PHI.

THEORY OF PLATES (ELECTIVE - I)

C706-2

3+1+0

Module 1

Plates- Introduction- classification of plates- thin plates and thick plates – small deflection theory and large deflection theory – basic concepts of two imensional theory of elasticity – fourth order differential equation for generalized bending problems (derivation in next module)

Module 2

Pure bending of plates – slope and curvature of slightly bent plates – relation between bending moment and curvature in pure bending – stresses – variation– plates subjected to lateral loadings -small deflection theory of thin plates – Love- Kirchhoff’s theory – assumptions– derivation of fourth order differential equation

Module 3

Solution techniques for fourth order differential equation – boundary conditions – simply supported, built- in and free edge – Navier’s solution for simply supported rectangular plates – uniformly distributed and concentrated load.

Module 4

Strain energy – pure bending of plate – bending of plates by lateral loads – Mindlin’s theory – assumptions - equilibrium equations – stress variations – comparative study with Love- Kirchhoff’s equations.

Module 5

Circular plates – polar coordinates – differential equation of symmetrical bending of laterally loaded circular plates- uniformly loaded circular plates – circular plates loaded at the centre

References

1. Lloyd Hamilton Donnell, Beams, plates and shells, Mc Graw Hill, New York.
2. Timoshenko, W Krieger, Theory of plates and shells, Mc Graw Hill.
3. Owen F Hughes, Ship structural design, John Wiley & Sons, New York, 1983.
4. William Muckle, Strength of ship structures, Edqward Arnold Ltd, London, 1967.

PRESTRESSED CONCRETE (ELECTIVE - I)

C706-3

3+1

Module 1

Introduction: Basic concept of prestressing - Advantages of prestressed concrete over reinforced concrete - materials for prestressed concrete and their characteristics. Uniform prestress distribution in prestressed concrete - nonuniform prestress distribution - moments of resistance.

Module 2

Systems and methods of prestressing- pre-tensioning systems - post tensioning systems - Thermo elastic prestressing - chemical prestressing. Behavior of prestressed concrete beams in flexure : load - deflection curves for prestressed concrete beams - Interpreting bending tests - Microcracks and visible cracks - Failure.

Module 3

Losses in prestress: purpose of assessing losses - counteracting elastic loss-loss of prestress in case of nonuniform prestress - creep, shrinkage, relaxation and anchorage losses - friction loss in prestress -graphical solution of friction losses - overcoming friction losses.

Module 4

Elastic design of sections for flexure: design of a simply supported beam with symmetrical sections of post tensioned and pretensioned type- tension members.

Module 5

Bearing and anchorage zone- statically indeterminate structure-continuous beams- primary moment –secondary moment- resultant moment – Concordant cable profile-Gyons theorem.

References

1. N. Krishna Raju, Prestressed Concrete, Tata Mc Graw Hill Publishing Co. Ltd, New Dehi.
2. S K Mallick, A P Gupta, Prestressed concrete, Oxford and IBI Series.
3. R. H. Evans, Bennet E W, Prestressed concrete theory and design, Chapman and Hall, London.
4. T. Y. Lin, Design of Prestressed Concrete Structures, Asia Publishing House.

GROUND IMPROVEMENT TECHNIQUES (ELECTIVE - I)

C706-4

3+1+0

Module 1

Necessity of soil improvement-selection of improvement method- mechanical stabilization-effect on engineering properties-dewatering-well-point system-electro osmosis-pre-loading- sand drains- methods of installation-vibro-flotation-stone columns.

Module 2

Chemical stabilization- cement stabilization- factors affecting soil cement mixing-admixtures- lime stabilization-effect of lime on soil properties-construction of lime stabilized bases-bituminous stabilization- thermal stabilization- electrical stabilization.

Module 3

Introduction to grouts and grouting- basic functions – groutability ratio – classification of grouts-properties of grouts- fluidity, bleeding potential, rigidity and thixotropy, strength and permeance- grouting applications-seepage control in soil under dams and for cut off walls- seepage control in rock under dams-stabilization grouting for under pinning.

Module 4

Earth Reinforcement- mechanism and concept- stress strain relationship of reinforced soil-design theories and stability analysis of retaining wall-tie back analysis-coherent gravity analysis- application areas of earth reinforcement

Module 5

Geotextiles: Soil reinforcement with geotextiles- classification- concepts- geotextiles as separators, filters, and drainage media-damage and durability of geotextiles

References

1. M.J.Tholinson - Foundation design and construction Robert M.Koerner - Construction and Geotechnical methods in Foundation Engineering
2. C.J.F.P.Jones - Earth Reinforcement and Soil structures
3. R.A.Jewell - Soil Reinforcement with Geotextiles
4. Donald P.Coduto - Geotechnical Engineering, Principles and Practices Prentice Hall India

CONCRETE TECHNOLOGY (ELECTIVE - I)

C706-5

3+1+0

Module 1

Concrete materials: cement manufacture - chemical composition hydration - types of cement- tests for cement - setting and hardening - Aggregates - Classification - requirements - size - shape - texture - Tests for aggregates - Alkali aggregate reaction - grading of aggregate - sieve analysis - Flakiness index - Elongation Index Impact value-abrasion value -Water - general requirements - quality of water.

Module 2

Fresh Concrete: Workability - factors affecting - measurement of workability - different tests for workability - segregation - bleeding - process of manufacture of concrete - Batching - mixing - transportation - compaction - curing of concrete - curing methods - admixtures in concrete - air entraining agents - Accelerators - Retarders -workability agents - Damp proofing agents - Miscellaneous admixtures - quality control.

Module 3

Elastic properties of Concrete - factors affecting modulus of elasticity - Strength of concrete: w/c ratio - gel/space ratio - Gain of strength with age. - accelerated curing tests - maturity concept of concrete - effect of maximum size of aggregate on strength - relation between compressive and tensile strength - revibration - high speed slurry mixing - creep - shrinkage - factors affecting.

Module 4

Durability of concrete: - sulphate attack - methods of controlling sulphate attack. Durability of concrete in sea water - action of organic acids, mineral oils, sugar etc. on hard concrete - thermal properties of concrete - Fire resistance cracks in concrete - Remedies, Testing of Hardened concrete, flexural strength - comparison of cube test and cylinder test - Indirect tension test methods - concrete mix design - IS methods - ACI methods - mean strength - characteristic compressive strength - Non destructive testing of concrete.

Module 5

Special aggregates: light weight - artificial - natural - special concrete - no - fine concrete - high density concrete - Sulphur infiltrated concrete - fibre reinforced concrete - polymer concrete polymer impregnated concrete - polymer cement concrete - properties of polymer concrete - special concreting methods - cold Weather concreting, hot weather concreting - Ferrocement.

References

1. Krishna Raju N, Concrete Technology
2. A.M. Neville, Properties of concrete
3. M.S. Shetty, Concrete Technology

TRAFFIC ENGINEERING AND MANAGEMENT (ELECTIVE-I)

C706-6

3+1+0

Module 1

Traffic management - scope of traffic management measures - restrictions to turning movements - one way streets - tidal flow operation - regulation of traffic - Need and scope of traffic regulations- Motor Vehicle Act - Speed limit at different locations- regulation of the vehicle - regulations concerning the driver rules of the road enforcement.

Module 2

Highway capacity: Its importance in transportation studies - basic, possible and practical capacity - determination of theoretical maximum capacity - passenger car units - level of service - concept in HC manual - factors affecting level of service.

Module 3

Design of Intersection: Design of at grade & grade separated intersection - rotary intersection - capacity of rotary intersection - traffic signals - design of fixed timesignal - pretimed signalised intersection - performance - Webster's approach for the design.

Module 4

Traffic Safety: causes of road accidents - collection of accident data - influence of road, the vehicle, the driver, the weather and other factors on road accident - preventive measures.

Module 5

Traffic Flow: theory of traffic flow - scope - definition and basic diagrams of traffic flow- basic concepts of light hill - Whitham's theory - Car following theory and queuing

References

1. Khadiyali L.R. Traffic Engineering and Transport planning, Khanna Tech Publishers
2. Khanna O.P and Jestro C.G; Highway Engineering, Nem Chand Publishers
3. Martin, Whol, Traffic system Analysis for Engineers
4. Donald Drew, Traffic Flow Theory

OBJECT ORIENTED PROGRAMMING (ELECTIVE - I)

C706-7

3+1+0

Module 1

Introduction to OOP: Basic concepts objects-classes-data abstraction-inheritance-polymorphism-dynamic binding-virtual functions-advantages of OPP over procedure oriented programming-object oriented languages. Introduction to C++ - C++ character set - C++ tokens-data types constants and variables - declaration of variables - operators, expression, and statements-type compatibility - type casting- I/O operators (<<and >>) cascading of I/O operators.

Module 2

Control flow and iterative statements standard input-output streams arrays: one dimension array-multidimensional array- array Initialization. Structures: definition-referencing structure elements. Function prototypes-argument data types-returning values and their types – scope - rules of functions and variables – built - in functions.

Module 3

Classes and Objects: Class declaration - data member functions private and public members class function definition member function definition - private and public member functions methods - creating objects - accessing class data members-accessing member functions - constructors and destructors – declaration, definition and use.

Module 4

Advanced features: Dynamic memory allocation-pointers –new and delete operators-pointer variables- pointers to objects-accessing member functions-classes with pointers to objects- accessing member functions - classes with pointers-copy constructor-static members-friend classes-friend functions-operator overloading File handling in C++: File pointers F-stream classes open (), close () read (), write () functions-detecting end of file.

Module 5

Polymorphism and Inheritance: Function overloading-base class derived class-class conversion-visibility modes-private, public and protected members-single inheritance -privately derived and publicly derived - making protected member inheritable - access control-virtual functions-dynamic binding- abstract classes-concept of multiple inheritance.

References

1. Stanely, Lipman, C++ primer
2. Balaguruswamy, Object Oriented Programming with C++, Tata Mc Graw Hill
3. Robert Lafore, Turbo C++
4. Gordenkeith, Data Abstraction and OOP in C++
5. Strostraup, C++ Programming Language
6. David Parsons, Object Oriented Programming with C++, B P B Publications
7. Y.Kanetkar, Let Us C++, BPB Publications.

OPEN CHANNEL AND COASTAL HYDRAULICS (ELECTIVE - 1)

C706-8

3+1+0

Module 1

Parameters of open channel flow - uniform and non uniform flow normal depth - conveyance - friction formula - specific energy - specific force - diagram - critical depth - application to problems. Critical flow computation - section factor - hydraulic exponent for critical flow computation and its use for trapezoidal channel.

Module 2

Hydraulic jump - sequent depths - dimensionless equation of the jump - loss of head - the jump at the feet of a spillway - criteria for the formation of a jump - use of jump as an energy dissipator. Control of jump by sills - stilling basins.

Module 3

Non-uniform flow - friction slope - differential equation of non-uniform flow - the 12 type of surface profiles - the point of control - computation by Bresse's method and the simplified step method.

Module 4

Water waves - classification into periodic progressive, periodic oscillatory, oscillatory and stationary waves - ocean waves - wave period - wave length and celerity. General expression for the celerity of deep Water - gravity wave and shallow water gravity wave - determination of the wave length and celerity for any water depth given the deep water wave amount as wave energy (no proof). Wave deformation - transformation of waves on a slope (description only) reflection of waves at a vertical sea wall. Clapotis - wave refraction - breaking of waves (description only).

Module 5

Wind generated waves - wave forecasting - significant wave height - breakwaters - different types. Coastal erosion with special reference to the Kerala Coast - shore protection measures - sea walls - tetrapods. groynes and beach nourishment.

References

1. I.S.M.Woodward, C.J.Posey, Hydraulic of Steady Flow in Open Channels
2. F. N. Henderson, Open Channel Flow
3. A. I. Ippen, Estuary and Coast line Hydrodynamics
4. K. E. R. I. Peechi, Coastal Engineering Publications
5. V. T. Chow, Open Channel hydraulics, Mc Graw Hill
6. Robert .M. Sorensen, Basic coastal engineering, John Willy & Sons

AIR POLLUTION CONTROL (ELECTIVE - 1)

C 706-9

3+1+0

Module 1

Introduction - Significance of air pollution studies, factors that contribute to air pollution - possibilities to air pollution abatement - air pollution legislation - Techno - administrative aspects of air pollution - Emission and noise standards of Kerala State Pollution Control board.

Module 2

Gaseous pollutants-source, chemistry, adverse effects on plants, animals and human beings, properties - tolerance levels - carbon monoxide, carbon dioxide, aldehydes, hydrocarbons - compounds of sulphur, compounds of Nitrogen, Oxidants, Hydrogen fluoride - Control of gaseous pollutants - Automobile pollution control.

Module 3

Particulates in the air - source, nature and adverse effects - control of particulates - settling, filtration, collection in fluids, electrostatic precipitation, conversion to harmless and useful products. Meteorology related to atmosphere - pressure, temperature, lapse rates - humidity - condensation - wind direction and velocity.

Effects of meteorological parameters on transport and diffusion. Atmospheric Electricity.

Module 4

Optics of the atmosphere - Effects of air pollutants on atmospheric visibility - methods of measurement of visibility - Introduction to noise pollution. Photochemical reactions of the atmosphere.

Module 5

Purpose and principles of measurement of (1) High volume sampler (2) Exhaust gas analyser (petrol and diesel) (3) Stack sampler (4) Sound level meter - industrial hygiene and in plant safety to workers.

References

1. Henry C Perkins, Air pollution, Mc Graw Hill Pvt Ltd, NewDelhi.
2. Arthur C Stern, Air pollution, Vol I, II, III, IV, V, Academic Press, NewYork.
3. Noel De Nevers, Air pollution control Engineering, Mc Graw Hill International Edition, Mc Graw Hill Inc, New Delhi.
4. M. N. Rao, H V N Rao, Air pollution, Tata Mc Graw Hill Pvt Ltd, NewDelhi.

REMOTE SENSING AND ITS APPLICATIONS (ELECTIVE - I)

C706-10

3+1+0

Module 1

Principles and concepts: Introduction and definition of remote sensing terminology- principles and methods of remote sensing- electro-magnetic radiation and spectrum- radiation sources-interference- atmospheric effects on remote sensing- atmospheric window –energy interaction with surface features-different types of platforms- sensors and their characteristics-orbital parameters of a satellite- multi concepts in remote sensing.

Module 2

Aerial photogrammetry: Definition- types of photographs- geometry of photographs – parallax - pair of photographs- height determination- flight planning stereoscopy.

Module 3

Interpretation of images: Aerial photo interpretation – basic elements- techniques of photo interpretation- application of aerial photo interpretation- photographs versus maps- interpretation of satellite images- ground truth collection and interpretation and verification- advantages of multi date and multi band images.

Module 4

Imagery: Landsat imagery- thermal infrared imagery- Radar imagery- digital image processing- comparison with image types- applications of satellite imagery- merits- limitations-comparison with aerial photographs.

Module 5

Applications: Applications in water resources management- land use mapping and monitoring- soil sciences- geology- agriculture- forestry - oceanography.

References

1. Thomas M. Lillesand & Raiph W. Kiefer, “Remote sensing and image interpretation”, John Wiley Sons.
2. Floyd F. Sabins, “Remote sensing principles and interpretation”, Freeman and company.
3. Campbell J. B, “Introduction to remote sensing”, The Guilford press, London.
4. Curran P.J., “Principles of remote sensing”, Longman, London.
5. Engmen E.T and Gurnay R. J.,”Remote sensing in hydrology”, Chapman and Hall.
6. Wolf P.R., “Elements of photogrammetry”, McGraw Hills.

TRANSPORTATION ENGINEERING LAB

C707

0+0+3

TEST ON SOIL

1. California bearing ratio method.

TEST ON BITUMEN

2. Softening point of Bitumen
3. Ductility test on Bitumen
4. Specific gravity of Bitumen
5. Flash and fire point test
6. Stripping value test
7. Viscosity using Viscometer

TESTS ON ROAD AGGREGATES

8. Aggregate crushing value test
9. Impact value test
10. Specific gravity test
11. Shape tests - Flakiness index and elongation index
12. Los angles abrasion test
13. Bulk density, specific gravity, void ratio and porosity of coarse aggregate, water absorption.

TESTS ON MIXES

14. Marshall stability value
15. Determination of bitumen content by bitumen extractor.

COMPUTER AIDED DESIGN II

C708

0+0+3

Module I and II

- **INTRODUCTION**
Overview and the Environment of STAAD-III Package.
- **GENERAL DESCRIPTION**
Type of structure, Unit systems, structure geometry and Co-ordinate systems, global co-ordinate system, Local co-ordinate systems
- **STAAD III Commands- Using Edit Input-Command Formats-Text Input.**
- **STAAD PRE- Graphical Input Generation-“Concurrent” Verifications- Library- Geometry Generation – Dimensioning.**
- **STAAD POST – Graphical Post Processing – Animation – Icons – Isometric View – Zooming-Results of Analysis & Design – Query reports.**
- **LOAD – Member Load, Element Load, Joint Load, Floor Load, Self**

weight Command, Load case no, Load Combination .Load Generation for Wind Load, Seismic Load and Moving Load

- FINITE ELEMENT ANALYSIS & Dynamic Analysis.
- DESIGN for Concrete and Steel Structures using IS: 456 and IS 800 respectively.
- STAAD INTDES – Interactive Design Series for slabs, retaining walls and footings.

Note

The student has to practice the above topics by working out problems in

1. Analysis and design of steel trusses, Steel and RCC framed structures.
2. Analysis and design of multi-storied framed structures.
3. Analysis and design of RCC and steel water tanks.

Module III & IV

Project management using CPM/PERT Software
(Microsoft Project /PRIMAVERA software)

1. Practice on the GUI of the software and Input of Date
2. Practice on Creating Bar Charts/Ghant charts
3. Practice on creating CPM/PERT charts and finding out critical path.
4. Practice on resource allocation and leveling of resources.
5. Practice on Project Monitoring (Cost &Time)
6. Plotting and printing of various charts and project

Note

The student has to practice the above topics by doing Project Management for Turn key projects related to Civil Engineering applications.

References

1. STAAD III Reference Manual
2. MS Project/PRIMAVERA Reference Manual

