

Civil Engineering Department
Mid Semester Examination October 2014 Syllabus

Sr. No	Subject Name	Subject Code	Syllabus	Remarks
3RD SEMESTER				
1	Advanced Engineering Mathematics	2130002	(1) Introduction to Some Special Functions. (2) Ordinary Differential Equation and Application(First O.D.E,Higher O.D.E) (3) Fourier Series and Fourier Integral (4) Laplace Transforms and Application	
2	Mechanics of Solids	2130003	<p>MODULE.2 : Support Reaction: Types of support, types of beams, types of load, equilibrium condition, reaction for simply supported beam, cantilever beam, overhanging beam. Shear force and Bending Moment Diagrams: relation between shear force and bending moment, sagging moment and hogging moment, shear force and bending movement diagrams for simply supported beams, cantilever beams and overhanging beams .MODULE.1: Introduction: Definition of space ,time,particle, rigid body, deformable body, force types of force,characteristics of a force, system of forces, composition and resolution of forces, fundamental principles of mechanics, . Fundamentals of statics : Coplanar concurrent and non concurrent force system.Resultant, Equilibrant, Free body diagrams.</p> <p>Coplanar concurrent forces: Resultant of coplanar concurrent force system by analytical and graphical method, Law of triangle of forces, Law of polygon of forces, Equilibrium conditions for coplanar concurrent forces, Lami's theorem. Application of these principles. Coplanar non-concurrent forces: Moments & couples, Characteristics of moment and couple, Equivalent couples, Force couple system, Varignon's theorem, Resultant of non-concurrent forces by analytical method and graphical method, Equilibrium conditions of coplanar non-concurrent force system, Application of these principlesCentroid and moment of inertia</p> <p>MODULE.3 : Centroid: Centroid of lines, plane areas and volumes, Examples related to centroid of composite geometry, Pappus – Guldinus first and second theorems.</p> <p>Moment of inertia of planar cross-sections: Derivation of equation of moment of inertia of standard lamina using first principle, Parallel & perpendicular axes theorems, polar moment of inertia, radius of gyration of areas. Examples related to moment of inertia of composite geometry,</p> <p>Torsion: Derivation of equation of torsion, Assumptions, application of theory of torsion equation to solid & hollow circular shaft, torsional rigidity.</p> <p>MODULE.4 : Simple stresses & strains</p> <p>Basics of stress and strain: 3-D state of stress (Concept only)</p> <p>Normal/axial stresses: Tensile & compressive</p> <p>Stresses :Shear and complementary shear</p> <p>Strains: Linear, shear, lateral, thermal and volumetric.</p>	

			<p>Hooke's law, Elastic Constants: Modulus of elasticity, Poisson's ratio, Modulus of rigidity and bulk modulus and relations between them with derivation.</p> <p>Application of normal stress & strains: Homogeneous and composite bars having uniform & stepped sections subjected to axial loads and thermal loads, analysis of homogeneous prismatic bars under multidirectional stresses.</p>	
3	Surveying	2130601	<p>1. Plane Table Survey: Introduction, principle, instruments, setting up the plane table, methods of plane tabling, advantages, sources of Errors.</p> <p>2. Theodolite Traversing: Introduction, definitions, the vernier transit theodolite, temporary and permanent adjustment of theodolite, measuring horizontal and vertical angles, methods of traversing, closing error, computation of latitudes and departure, check in closed and open traverse, balancing of traverse, Gale's table, traverse area, omitted measurements.</p> <p>3. Trigonometric levelling: Indirect levelling, levelling on steep ground- methods.</p> <p>4. Curves: Introduction, theory and setting out methods of simple circular curve, elements of a compound and reverse curves</p> <p>5. Computation of Areas: Methods to compute area of traverse- Determining areas from Plans, Trapezoidal rule- Simpson's rule, Use of planimeter</p> <p>Computation of Volumes- Volume from cross sections, Trapezoidal and Prismoidal formulae, Prismoidal correction, Curvature correction, Determination of capacity of reservoir and volume from borrow pits.</p>	
4	Fluid Mechanics	2130602	<p>Module 1: Properties of Fluids Mass density, specific weight, specific gravity, specific volume, vapour pressure, compressibility, elasticity, surface tension, capillarity; Newton's law of viscosity, classification of fluids, dynamic viscosity, kinematic viscosity, variation of viscosity with temperature; Basic concept applicable to fluid mechanics.</p> <p>Module 2: Fluid Statics Measurement of Pressure: Pressure variation in static fluid, PASCAL's law, Units and scale of pressure measurement- Atmospheric pressure, Absolute pressure, Gauge pressure, and Vacuum pressure, Hydrostatic paradox, Piezometer, U-Tube manometer, Single column manometer, U-tube differential manometer, Inverted U-tube differential manometer, micromanometers, Mechanical pressure gauges. Hydrostatic force on plane and curved surface : Total pressure and center of pressure, pressure diagram, Total pressure on plane surfaces and curved surfaces depth of center of pressure, Practical applications of Total pressure and Center of pressure. Buoyancy and Flotation: Buoyant force, Buoyancy and Center of Buoyancy, Archimedes Principle, Metacentre and Metacentric height, Equilibrium of floating and submerged bodies, Metacentric height evaluation – theoretical and experimental method, Oscillation of floating body Fluids in Relative</p>	

			Equilibrium:Static fluid subjected to uniform linear acceleration, Liquid containers subjected to constant horizontal acceleration,Liquid containers subjected to constant vertical acceleration, Liquid containers subjected to constant rotation. Module 4: Fluid DynamicsEuler's equation, Bernoulli's equation, Energy correction factor Module 5: Flow Measuring DevicesMeasurement of discharge-Venturimeter, Orificemeter, Nozzlemeter, Rotometer. Measurement of velocity-Pitot tube. Orifice-classification. Flow through reservoir opening i.e. orifice, trajectory of free jet, hydraulic coefficients, Experimental determination of hydraulic coefficients, Small and large orifice, Time of emptying a tank with orifice. Mouthpiece-classification, External cylindrical mouthpiece, Convergent –divergent mouthpiece, Borda's mouthpiece.	
5	Geotechnics & Applied Geology	2130606	1) Introduction: Definition, brief history, scope, and limitations of Geotechnics. 2) Origin and Nature of Soil: Geological cycle, Physical and chemical agencies for soil, Formation - residual, transported, alluvial, marine and lacustrine, glacial drift, loess and colluvial soils. General characteristics of different types of soils. Overview of different types of soils in Gujarat / India.3) Index Properties, Relationships and Tests: Phase diagram, Basic terms and definitions, Functional relationships,Determination of index properties, Relative density for granular soil. 4) Particle Size Analysis: Size and nomenclature of soil particles as per IS, Sieve analysis, Sedimentation analysis, Particle size distribution curve and its uses. 5) Soil Structure: Shape of the particles, Texture and structure of the soil. Types of the structure, properties, conditions for the formation of different structures 6) Soil Consistency: Consistency limits and its determination, different indices, Field moisture equivalent, Activity, Sensitivity & Thixotropy of soil. 7) Soil Classification: Objectives, Basis, Textural, Unified soil classification, IS classification method, group index. Field identification and General characteristics of the soil. 8) Soil Water: Free water and held water, Structural water and absorbed water, Capillary 9) Permeability and Seepage: Darcy's law and its validity, Factors affecting permeability, Laplace equation (2-D), Seepage pressure, Quick condition, Flow net, its characteristics 10) Physical Geology: Branches and scope of Geology; Surface processes and landforms: Weathering and Erosion; Introduction to geological agents (river, wind, oceans, glaciers, groundwater) and their actions (erosion, transport and deposition). Interior of the Earth: internal structure of earth, study of core, mantle and crust of the Earth. Processes responsible for volcanism (Process of volcanic eruption, types of volcanoes and volcanic hazard) and earthquake (Causes of earthquake occurrence, Distribution (seismic zoning), Seismo-tectonic setup of India, seismic hazard: Tsunamis, Active fault rupture, liquefaction).	
6	Building Construction	2130607	Module 1: Introduction (Overview of construction practices, theory and methods),Subsurface Investigation: Objectives, methods of boring like wash boring, percussion etc.,Shallow Foundations:	

		<p>Necessity, types, setting out, excavation, construction, failures of foundation and remedial measures.</p> <p>Module:2 Masonary Construction :</p> <p>a) Stone masonry: Technical terms, lifting appliances, joints, types – random (un-coursed) rubble, coursed rubble, dry rubble masonry, Ashlar masonry- Ashlar fine, chamfered fine.</p> <p>b) Brick masonry: Technical terms, bonds in brick work- English bond, single & double Flemish bond, garden wall bond, raking bond, Dutch bond.</p> <p>c) Composite masonry: Stone facing with brick backing, brick facing with concrete backing.d) Hollow concrete blocks and construction</p> <p>e) Cavity walls: Brick cavity walls, position of cavity at foundation, roof and at opening levels.</p> <p>f) Lintels & arches: Lintels – types, construction. Arches – technical terms, types – brick arches, rough, axed, stone arches, flat – semi circular. Plain and Reinforced Concrete Construction: Pre-cast and cast-in-situ Construction</p> <p>Module 3: Doors and Window</p> <p>v s :</p> <p>a) Doors: Location, technical terms, size, types, construction, suitability.</p> <p>b) Windows: Factors affecting selection of size, shape, location and no. of windows, types, construction, suitability, fixtures and fastenings.</p> <p>c) Ventilators: Ventilators combined with window, fan light.</p> <p>Stairs and Staircases: Definition, technical terms, requirements of good stair, fixing of going and rise of a step, types of steps, classification, example – stair planning, elevators, escalators.</p> <p>Module 4 Floorings :</p> <p>Introduction, essential requirements of a floor, factors affecting selection of flooring material, types of ground floors, brick, flag stone, tiled cementconcrete, granolithic, terrazzo, marble, timber flooring, upper floor- timber, timber floor supported on RSJ flag stone floor resting on RSJ, jack arch floor, reinforced concrete floor, ribbed floor, pre cast concrete floor.</p> <p>Module 5 Roofs and Roof Covering :Introduction, requirements of good roof technical terms, classification, types of roof coverings for pitched roof. A.C. sheet roofs – fixing of A.C. sheets, laying of big six sheets, G.I. Sheets roofs, slates, flat roof – advantages, dis-advantages, types of flat terraced roofing.</p>	
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5TH SEMESTER

1	Highway Engineering	150601	<p>Module 1: High Planning and Development - Field Surveys</p> <p>Module 2: Highway Geometric Design up to horizontal Alignment</p> <p>Module 3: Road Sub-Grade - Road Materials - Low cost roads - Highway Pavements</p> <p>Module 4: Highway Drainage - Hill Roads - Roadside Developments - Road Administration & Finance</p>	
2	Hydrology & Water Resources Engineering	150602	<p>Module:1 Introduction, Hydrologic cycle, Climate and water availability, Water balances, Precipitation: Forms, Classification, Variability, Measurement, Data analysis, Evaporation and its measurement, Evapotranspiration and its measurement, Penman Monteith method. Infiltration: Factors affection infiltration, Horton's equation and Green Ampt method.</p> <p>Module:2 Hyetograph and Hydrograph Analysis: Hyetograph, Runoff: drainage basin characteristics, Hydrograph concepts, assumptions and limitations of unit hydrograph, Derivation of unit hydrograph, Shydrograph, Flow duration curve. Groundwater: Occurrence, Darcy's law, Well hydraulics, Well losses, Yield, Pumping and recuperation test. Module: 3 Hydroelectric Power: Low, Medium and High head plants, Power house components, Hydel schemes. Module: 4 Hydrologic Analysis and Design: Design flood, Flood estimation, Frequency analysis, Flood routing through reservoirs and open channels, Storm drainage design.</p>	
3	Environmental Engineering	150603	<p>Module 1: Introduction, Quality & Quantity of water</p> <p>Module 2: Characteristics of Wastewater</p> <p>Module 3: House Drainage</p> <p>Module 4: Solid waste Management</p>	
4	Geotechnical Engineering - I	150604	<p>MODULE - I</p> <p>1. Introduction: Definition, Brief history, Scope and limitations of Geotechnics.</p> <p>2. Origin and Nature of Soil: Geological cycle, Physical and chemical agencies for soil, Formation - residual, transported, cumulose, alluvial, marine and lacustrine, loess and colluvial soils. General characteristics of different types of soils. Overview of different types of soils in Gujarat / India.</p> <p>3. Index Properties, Relationships and Tests: Phase diagram, Basic terms and definitions, Functional relationships, Determination of index properties, Relative density for granular soil.</p> <p>4. Particle Size Analysis:</p>	

			<p>Size and nomenclature of soil particles as per BIS, Sieve analysis, Sedimentation analysis, Particle size distribution curve and its uses.</p> <p>MODULE - II</p> <p>1. Soil Structure: Shape of the particles, Texture and structure of the soil. Types of the structure, properties, Conditions for the formation of different structures.</p> <p>2. Soil Consistency: Consistency limits and its determination, Different indices, Field moisture equivalent, Activity, Sensitivity & Thixotropy of soil.</p> <p>3. Soil Classification: Objectives, Basis, Textural, Unified soil classification, IS classification method, group index. Field identification and General characteristics of the soil.</p> <p>4. Soil Water: Free water and held water, Structural water and absorbed water, Capillary water, Total stress, Neutral stress and Effective stress.</p> <p>MODULE – III</p> <p>1. Permeability and Seepage: Darcy's law and its validity, Factors affecting permeability, Laboratory permeability tests, Introduction to field permeability test, Permeability of stratified soil masses, Laplace equation (2-D), Seepage pressure, Quick condition, Flow net, its characteristics and application.</p> <p>2. Compaction: Definition, Theory of compaction, Factors affecting compaction, Laboratory compaction tests, Effect of compaction on soil properties, Placement water content, Placement layer thickness, Field control of compaction, Proctor's needle, Methods of compaction used in field.</p>	
5	Structural Analysis - III	150605	<p>MODULE - I 1. Matrix Methods: Types of skeletal structures, Internal forces and deformations. Introduction and applications of flexibility method and stiffness method to analyze beams, Trusses and plane frames.</p> <p>MODULE-II 1. Domes: Uses of domes, Types of domes, Nature of stresses in conical and spherical domes, Analysis of conical and spherical domes subjected to uniformly distributed load/ concentrated load at crown, Analysis of domes with opening.</p> <p>MODULE – III</p> <p>1. Beam Curved in Plan: Uses of curved beam, types of internal forces, Analysis of curved beam fixed at ends for point load, Uniformly distributed load, Analysis of circular beam supported symmetrically.</p>	
6	Conventional Power Engineering	151906	<p>1) Thermal Power Plant Simple Rankine cycle, General layout of modern thermal power plant, Site selection, Present status of power generation in India. 2) Steam Turbine Principle of operation, Classification, Compounding of steam turbines, Impulse turbine-</p>	

	(Institute Elective - II)		velocity diagram, Condition for maximum efficiency, Reaction turbine- velocity diagram, Degree of reaction, Parson turbine, Condition for maximum efficiency, Governing of steam turbines. 3) Gas turbine Classification, Open and closed cycle, Actual Brayton cycle, Methods of improving efficiency and specific output – open cycle with regeneration, Reheating and inter cooling, Combined steam and gas turbine plant. 4) Diesel Power plant Outline of diesel power plant, Systems of diesel power plant like air intake system, Fuel system, Cooling system. 5) Hydro-Electric Power plant Elements of hydro electric power plant, Classification of hydraulic turbines, Construction and working of Pelton wheel, Francis and Kaplan turbine, Draft tube, Cavitation, Governing of hydraulic turbines, Hydraulic electric power plants in India 6) Nuclear Power Plant Nuclear fusion and fission, Chain reaction, Nuclear fuels, Components of nuclear reactor, Classification of reactors, Pressurized water reactor, Boiling water reactor, Gas cooled reactor, CANDU reactor, Fast breeder reactor, Nuclear waste and its disposal, Nuclear power plants in India.	
7	DAUGT- Disaster Assessment Using Geospatial Techniques	150606	MODULE – I Basic concepts of remote sensing, Airborne and space borne sensors, Data acquisition, Indian Space Program. MODULE – II Digital Image Processing: Introduction, Image Processing Systems, Digital Image, Media for digital data recording, Storage, Data formats, Pre-processing, Image enhancement, Transformation and Classification. MODULE – III Global Positioning System. MODULE – IV Geographical Information System: Concept of GIS, Functions and advantages of GIS, Spatial data model, Attribute management and metadata concept, Data sources, Linking spatial and attribute data, Organizing data for analysis, Geospatial analysis. MODULE – V Integration of GIS and Remote Sensing, Analysis and Presentation. Disaster Assessment: Types of natural disasters- landslides, earthquakes-tsunami cyclones- floods-snow avalanche, Case studies for disaster assessment using Geospatial techniques, Use of Remote Sensing & GIS software for disaster assessment.	
7TH SEMESTER				
1	Construction management and Equipments	170601	1) Construction Management 2) Management Techniques • Conventional Methods • Network Analysis Ø Critical Path Method (CPM) Ø Cost Optimization Ø Programme Evaluation and Review Technique (PERT)	

			<p>3) Construction Equipment</p> <p>4) Equipments:</p> <ul style="list-style-type: none"> Ø Tractors and related equipment: Bulldozers, Rippers, Scrapers. Ø Excavating Equipment Ø Belt conveyor system 	
2	Irrigation Engineering	170602	<p>Module-1: Introduction and water requirement of crops (Full Chapter)</p> <p>Module-2: Methods of irrigation: Classification- choice of method of irrigation- surface and subsurface irrigation methods, Sprinkler and Drip Irrigation Water logging: Causes, Measures: surface and sub-surface drains, land reclamation</p> <p>Module-3: Diversion headworks: Types- selection of the suitable site for the diversion headworkcomponents of diversion headwork- Causes of failure of structure on pervious foundation</p> <p>Module-4: Cross Drainage work and canal regulation works ((Full Chapter)</p>	
3	Structural Design-I	170603	<p>RCC-Chp-1 Introduction Part-A & Part B, Chp-2 General IS Requirements for Design According to IS:2000 - 456, Chp-3 Singly R C Beam, Chp-4 Doubly R C Beam, Chp-5 Tee-Beam, Chp-6 Development and Shear Reinforcement, Chp-7 Axially Loaded Column, Chp-8 Isolated Column footing, Chp-9 One-way Slab, Chp-10 Two-way Slab, Chp-11 Combined Shear and Torsion. STEEL - Connection-Bolted, Welded, tension members, compression members, Plastic Design.</p>	
4	Urban Transportation System (Department Elective-I)	170604	<p>Module 1: Introduction - Urbanisation - Travel Demand</p> <p>Module 2: Transportation Surveys - Travel Forecasting</p> <p>Module 3: Trip generation - Zonal regression methods and category analysis - Trip distribution methods - Gravity Models and trip distribution models</p> <p>Module 4: Corridor Identification</p>	