Integral University, Lucknow

Department of Civil Engineering

Study and Evaluation Scheme

Program: Diploma in Engineering

Semester –III (New Students)

S. No.	Course code	Course Title	Type of Paper	Period Per hr./week/sem.			Evaluation Scheme				Sub. Total	Credit	Total Credits	Attributes						
				L	T	P	CT	TA	Total	ESE				Employability	Entrepreneurship	Skill Development	Gender Equality	Environment & Sustainability	Human Value	Professional Ethics
THEORIES																				
1	DCE -301	Elementary Electrical & Mechanical Engineering	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y		Y				
2	DCE - 302	Strength of Materials	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y				
3	DCE - 303	Hydraulics	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y				
4	DCE - 304	Public Health Engineering – I	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y		Y		
5	DCE - 305	Building Construction & Maintenance Engineering – I	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y				
6	DCE - 306	Concrete Technology – I	Core	03	01	00	40	20	60	40	100	3:1:0	4	Y	Y	Y				
1	DCE – 352	Strength of Material Lab.	Core	00	00	03	40	20	60	40	100	0:0:1.5	1.5	Y	Y	Y				
2	DCE - 353	Hydraulics Lab.	Core	00	00	03	40	20	60	40	100	0:0:1.5	1.5	Y	Y	Y				
3	DCE - 356	Concrete Technology & Building Construction and Maintenance Lab.	Core	00	00	03	40	20	60	40	100	0:0:1.5	1.5	Y	Y	Y				
4	GP - 351	General Proficiency		-	-	-	-	-	60	-	60								Y	Y
Total				18	06	09	360	180	600	360	960		28.5							

ELEMENTRY ELECTRICAL AND MECHANICAL ENGG.

(DCE-301)

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UNIT-I

Elements of Mechanical Engineering

1. Construction and working of I.C. Engines, their classifications (2 stroke and 4 stroke),details of 4 stroke I.C. Engines.

2. Types of compressors and their uses

3. Different type of gears and their applications. 8

4. Various types of bearings & their uses.

UNIT-II

1. Conveyers, hoists and other material handling equipments-their functioning and uses.

2. Different kinds of lathes, shaper machines , planer machines and drilling machines.

3. Different kinds of Jacks & Hammers and their uses. 8

UNIT-III

Elements of Electrical Engineering

1. A.C.Machines

(a) Transformers (b) Alternators (c) Induction Motor - their types,uses and Physical & Electrical specification.

2. General idea of electrical measuring instruments like Ammeter, Voltmeter, Wattmeter and Megger and their uses. 8

UNIT-IV

1. Different types of lamps like incandescent lamps, sodium vapour lamps, florescent tube. Halogen lamps - CFL, their merits, demerits and use.

2. Bye laws pertaining to electrical installations, Fans and AC's different types of artificial lighting systems, Lighting systems for residential buildings, public building, schools, colleges, hotels, hospital, exhibition hall, library etc.(IS)

8

UNIT-V

1. Simple electrical circuits used in house wiring

2. Earthing - need and procedure.

3. Safety against electrical shocks. 8

STRENGTH OF MATERIALS

(DCE-302)

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UNIT-I

Principal Stress and Principal Planes :

Principal stress and principal plane under direct and shear stress. Graphical determination by Mohr's circle

method.

Bending Moment and Shear Force:

Concept of a beam, and supports (Hinged, Roller and Fixed). Types of Beams:Simply supported, cantilever, fixed, overhang and continuous beams.Types of loads (distributed, point and varying). Concept of Bending Moment & Shear Force. Sign coventions. Bending moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to uniformly distributed, concentrated and uniformly varying

loads. Relationship between load, shear force and bending moment. Point of maximum B.M. and contraflexure, concept of fixed and continuous beams. 10

UNIT-II

Bending and Shear Stresses

Assumption of theory of simple bending. Derivation of the equation. M/I=F/Y=E/R. Concept of centroid and second moment of area, Radius of gyration, Theorems of parallel and perpendicular axes, Second Moment of area for sections:rectangle, triangle,circle,trapezium,angle,Tee,I,Channel and compound sections. Moment of resistance, section modulus and permissible bending stresses, Bending stresses in circular

rectangular, I,T and L section. Comparison of strength of the above sections. Concept of shear stresses in beams, Shear stress distribution in rectangular, I and T section .

Combined Direct & Bending Stresses:

Concentric and eccentric loads, eccentricity, effect of eccentric load on the section, middle thirdrule;

stresses due to eccentric loads. Examples in the case of short columns, chimneys and dams. 8

UNIT-III

Slopes and Deflections of Beams:

Definition of slope and deflection, sign convention.Circular bending. Calculation of maximum slope and deflection for the following standard cases by double integration or moment area method. Cantilever having point load at the free end. Cantelever having point load at any point of the span. Cantitilever with uniformly distributed load over the entire span Cantilever having U.D.L. over part of the span from free end

Cantelever having U.D.L. over a part of span from fixed end Simply supported beam with point load at centre of the span. Simply supported beam with U.D. load over entire span. NOTE: All examples will be for constant moment of inertia without derivation of formula. 8

UNIT-IV

Columns & Struts:

Definition of long column, short column and strut, slenderness ratio, equivalent length, critical load, collaps

Load, End conditions of column. Application of Eular's and Rankine's formula (no derivation), simple numerical problems based on Euler's and Rankine's formulae. 6

UNIT-V

Torsion

Definition of torque and angle of twist. Derivation of torsion equation. Polar moment of inertia.Strength of hollow and solid shaft, advantage of a hollow shaft over a solid shaft. Comparison of weights of solid and hollow shafts for same strength. Horse Power transmitted. Calculation of shaft diameter for a given Horse Power.

Fixed and Continuous Beam:

Effect of fixing and continuity, fixed beams with point loads and U.D. Load. Continuous beam of uniform section covering three spans with free ends (supports being at the same level) B.M. & S.F. Diagram. Points of Contraflexure of fixed and continuous beams. 8

Ref. Books :

1. "Strength of Materials – R.K. Rajput
2. "Strength of Materials – R.S. Khurmi

HYDRAULICS

(DCE-303)

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UNIT-I

Introduction:

Fluid : Real fluid, ideal fluid. Fluid Mechanics, Hydraulics, Hydrostatics, Hydrokinematics and Hydrodynamics.

Properties of Fluids

Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility. Hydrostatic Pressure: Pressure, intensity of pressure, pressure head,

Pascal's law and its applications. Total pressure, resultant pressure, and centre of pressure. Total pressure and centre of pressure on vertical and inclined plane surfaces:

Rectangular, Triangular, Trapezoidal, Circular 8

UNIT-II

Measurement of Pressure Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.

Piezometers, simple manometer, differential manometer and mechanical gauges. Measurement of pressure by manometers and pressure gauges.

Fundamental of Fluid Flow

Types of Flow: Steady and Unsteady flow Laminar and Turbulent flow Uniform and Non-uniform flow.

Discharge and continuity equation (flow equation) Types of hydraulic energy. Potential energy,Kinetic energy, Pressure energy Bernoulli's theorem; statement and description (without proof of theorems).

Venturimeter (horizontal and inclined) and Orifice Plate meter. 8

UNIT-III

Orifice:

Definition of Orifice, and types of Orifices, Hydraulic Coefficients. Large vertical orifices. Free, Drowned and Partially drowned orifice. Time of emptying a rectangular/circular tanks with flat bottom.

Flow through Pipes

Definition, laminar and turbulant flow explained through Reynold's Experiment. Reynolds Number, critical velocity and velocity distribution. Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, obstruction and change of direction (No derivation of formula) Hydraulic gradient line and total energy line. Flow from one reservoir to another through long pipe of uniform and composite section. Water Hammer Phenomenon and its effects.

(only elementary treatment) 6

UNIT-IV

Flow through open channels.

Definition of a channel, uniform flow and open channel flow .

Discharge through channels using

(i) Chezy's formula (no derivation)

(ii) Manning's formula

Most economical sections

(i) Rectangular

(ii) Trapezoidal 6

UNIT-V

Flow Measurements

Measurement of velocity by :- (i) Pitot tube (iii) Surface Float (ii) Current-meter (iv) Velocity rods.

Measurement of Discharge by a Notch Difference between notches and orifices. Discharge formulae for rectangular notch, triangular Notch, trapezoidal notch, and conditions for their use. (with derivation) Measurement of discharge by weirs. Difference between notch,weir and barrage. Discharge formula for free, drowned, and broad crested weir with and without end contractions ; velocity of approach and condition of their use. Venturi flumes to measure flow. Measurement of Discharge by velocity area-method.

HYDRAULIC MACHINE :

Reciprocating pumps, Centrifugal pumps, Impulse Turbine & Reaction Turbines Sketching and description of principles of working of above mentioned machines 10

Ref. Books :

1. Fluid Mechanics – D.S. Kumar
2. Hydraulics – R.K Bansal

PUBLIC HEALTH ENGG.-I

(DCE-304)

L T P

3 1 0

UNIT-I

Water Supply Engg

Introduction

Necessity and brief description of water supply system. Water requirement: Per capita consumption for

domestic, industrial, public and firefighting uses as per IS standards. Consumption, demand and its variation.

Sources of Water

a. Surface water sources : Rivers, canal, inponding reservoir and lakes, their quality of water and suitability. 6

UNIT-II

Water Treatment

Suspended, colloidal and dissolved impurities. Physical, chemical and bacteriological tests and their

significance. Minimum standards required for drinking water,Principles of Sedimentation, Coagulation,

Flocculation, Filteration, Disinfection (Chlorination) including Jar Test, Break point chlorination, Residual

chlorine. Flow diagram of different treatment units. Function, constructional details, working and operation of (i) Airation fountain (ii) Mixer (iii) Flocculator (iv) Clarifier (v) Slow and rapid sand filter (vii) Chlorination chamber (viii) Water softening (ix) Removal of Iron and Magnese. Chemicals required for water treatment,their uses,and feeding devices. Simple design of sedimentation tank, and filters. 8

UNIT-III

Water Distribution

Pipes:

Different types of Pipes:

Cast iron, steel,plastic, (PVC,LDPE,HDPE), asbestos cement, concrete, plastic, GI and lead pipes. Details of their sizes, joints and uses. Appurtenances: Sluice (Gate and spindle), air,reflux,scour and

safety valves, fire hydrants,their working and uses

Distribution system:

Requirements of distribution:Minimum head and rate. Types of lay out-dead end, grid, radial and

ring systems. System of water supply-intermittent and continuous. Service reservoirs-types,

necessity and accessories.

Storage:

Necessity, types of storing tanks: G.I. Sheet Tank, P.V.C. tank, over head tanks. 8

UNIT-IV

Laying of Pipes:

Setting out alignment of pipe line. Excavation in different types of soils and precautions taken.

Precautions taken for traffic control, bedding for pipe line. handling, lowering, laying and

jointing of pipes, testing of pipe lines and back filling. Use of boning rods. 8

UNIT-V

Building Water Supply

General layout of water supply arrangement for a building (single and multistoried)as per IS Code

of practice. Water supply fixtures and their installation. Tapping of water mains. Hot and Cold Water supply in buildings. Use of Solar water heaters. Rural water supply:Sources, treatment and distribution.

Maintenance

Leakage detection and prevention. Replacement ofdamaged pipe. Maintenance of domestic plumbing fixtures.

Ref. Books :

1. “Public Health Engg. - S.K. Garg

2. “Public Health Engg. - Rangwala

BUILDING CONSTRUCTION AND MAINTENANCE ENGG.-I

(DCE-305)

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UNIT-I

Introduction:

Definition of a building, classification of buildings based on occupancy. Different parts of a building. Orientation of buildings. Site selection. Exposure to building bylaws/master plan and building approval. 3

UNIT-II

Foundation

(i) Concept of foundation and its purpose.

(ii) Types of foundations-shallow and deep.

(a) Shallow foundation – Constructional details of: Spread foundations for walls, Thumb rules for depth and width of foundation and thickness of concrete block stepped foundation, masonary pillars and concrete columns, raft foundation, Grillage foundation and machine foundation.

(b) Deep foundations.Pile foundations, their suitability, classifcation of piles according to function, material and installation of concrete piles (underreamed, bored, compacted).

(c) Construction-preparing foundation plans, setting out, excavation, timbering and dewatering. Well point system. 10

UNIT-III

Walls

Purpose of walls;

Classifcation of walls-Load Bearing and Non Load Beariang. Dwarf wall. Classification of walls as per materials of construction, brick, stone, reinforced brick, reinforced concrete, precast hollow and

solid concrete block and composite masonry walls. Brick masonry-Definition of terms; mortar,

bond , facing, backing, hearting, column, pillar, jambs, reveals, soffit, plinth, plinth masonry, Brick: header, stretcher, bed of brick, bat,queen closer, king closer, frog and quoin. Bond-Meaning and necessity: Types of bond and thier suitability (English,Flamish,Header and Stretcher) 1, 1-1/2 and 2 Brick thick

walls in English Bond. T, X and right angled corner junctions. Sketches for 1, 1-1/2 and 2

brick square pillars in English Bond.

Construction of Brick walls-Method of laying bricks in walls, precautions observed in the construction of walls, method of bonding new brick work with old (Toothing,raking back and block bonding).

-Construction and Expansion Joints. -Stone Masonry

(a) Glossary of terms-Natural bed of a surface, beding planes, string course, corbel, cornice, block-incourse,grouting, mouldings, templates, throating, through stones,parapet,coping, spalls, pilaster and

buttress.

(b) Types of Stone Masonry:

Rubble Masonry; random and coarsed, Ashlar Masonry, Ashlar fine, Ashlar roughtooled Ashler facing, specifcations for coarsed rubble masonry, principles to be observed in construction of stone masonry

walls.

Partition walls:Constructional details, suitability and uses of brick and wooden partition walls.

Mortars-preparation, use and average strength of cement, lime, lime cement, lime surkhi and mud mortar.

Scaffolding:Constructional details and suitability of Mason's Brick Layers and Tubular scaffolding Centering & Shultering. Shoring & under pinning: Types and uses. Safety in construction of low rise and high rise buildings. 12

UNIT-IV

Arches and Lintels

(i) Meaning and use of Arches and Lintels.

(ii) Glossary of terms used in Arches and Lintels- Abutment, Peir, Arch ring, Intrados, Soffit Extrados, Voussoiers, Springer, Springing line, Crown, Key stone, Skew back, Span, Rise, Depth of an Arch, Haunch, Spandril, Jambs, Bearing,Thickness of lintel,Effective span.

(iii) Arches:

(a) types of Arches-Semi circular, segmental, elliptical and parabolic,flat, inverted and relieving.

(b) Stone arches and their construction.

(c) Brick arches and their construction. 10

UNIT-V

Doors and windows:

Glossary of terms, used in Doors and Windows.

Doors-Name;uses and sketches of Metal doors; Ledged and Battened Doors;Ledged, battened and braced door;Framed and Panelled doors;glazed and panelled doors;flush doors;collapsible doors; Rolling steel

shutters, side sliding doors;Door frames, PVC shutters & metal doors.

Windows-names,uses and sketches of metal windows,fully panelled windows, fully glazed

windows, casement windows, fanlight windows and ventillators, sky light window frames,

Louvered shutters (emphasis shall be given for using metals and plastics etc. in place of timber). 7

Ref. Books:

1. "Building Construction" – Jha J.& Sinha S.K. – Khanna Publications
2. "A Text Book of Building Construction" – Arora S.P. & sindra S.P. – Danpat Rai & Sons.
3. Building Material – Sushil Kumar
4. Building Construction – Sushil Kumar

CONCRETE TECHNOLOGY-I

(DCE-306)

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3 1 0

UNIT-I

Introduction

Definition of concrete. Brief introduction to properties of concrete. Advantages of concrete. Uses of concrete in comparison to other building materials. 4

UNIT-II

Ingredients of Concrete:

Cement

The chemical ingredients causing changes in properties, situations of use and special precautions in use of the following types of cement: Ordinary Portland cement, rapid hardening cement, low heat cement, high alumina cement, blast furnace slag cement, quick setting, white and coloured cements.

Aggregates:

Classification of aggregates according to source, size and shape. Characteristics of aggregates particle size

and shape, surface texture;specific gravity of aggregate;bulk density, water absorption surface moisture, bulking of sand and deleterious materials in the aggregate. Grading of Aggregate:-Coarse aggregate,

fine aggregate; All in-aggregate; fineness modulus; interpretation of grading charts and combination of two

aggregates.

Water:

Limits on the impurities as per ISI;affect of excessive impurities on concrete, Ascertaining the suitability of

water with the help of concrete cube test. 10

UNIT-III

Water Cement Ratio

Hydration of cement, Effect of various W/C ratios on the physical structure of hydrated cement, water cement ratio law and conditions under which the law is valid;internal moisture, temperature,age,and size of specimen. Definition of cube strength of concrete. Relations between water cement ratio and strength of concrete. Use of CBRI chart. 10

UNIT-IV

Workability:

Definition, of workability. Concept of:Internal friction,, Segregation, Harshness. Factors affecting workability; water conent,shape,size and percentage of fineness passing 300 mic. Measurement of workability slump test, compaction factor test.Recommended slumps for placement in various conditions. Vee-Bee Consistometer. 8

UNIT-V

Proportioning for Ordinary Concrete:

Object of mix design, Strength required for various grades as per IS 456, Preliminary test, Works cube test. Proportioning for ordinary mix as prescribed by IS and its interpretation. Adjustment on site for:Bulking, water content,Absorption, Workability Design data for moisture, bulkage, absorption and suitable fine aggregate and coarse aggregate ratio. Difference between ordinary and controlled concrete.8

Ref. Books :

1. "Advances in Building Materials and Const."- Rai Mohan and Jai Singh M.P., CBRI, roorkee.
2. "Concrete Technology Theory & Practices" – Shetty M.S. – S.Chand Company Ltd. New Delhi

STRENGTH OF MATERIALS LAB

(DCE-352)

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1. Determination of shear force at different sections on a simply supported beam under points loads.
2. Determination of bending moment at different sections on a simply supported beam under different types of loading.
3. Determination of yield stress, ultimate stress, percentage elongation, plot the stress strain diagram and compute the value of Young's Modulus of mild steel.
4. Determination of the maximum deflection and Young's Modulus of elasticity by deflection apparatus.
5. Determination of modulus of rigidity of material by Torsion apparatus.
6. Determination of stiffness/deflection of a helical spring.
7. Determination of hardness of a metal plate by Rock Well Brinell hardness testing machine.
8. To perform impact test on Izod Impact testing machine.

HYDRAULIC LAB:

(DCE-353)

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(i) To verify Bernoullis Theorem.

(ii) To find out venturimeter coefficient.

(iii) To determine coef. of velocity (Cv),Coef.of discharge(Cd) Coef. of contraction (Cc) and verify the relation between them.

(iv) To perform Reynold's Experiment.

(v) To determine Darcy's coefficient of friction for flow through pipes.

(vi) To verify loss of head due to:

(a) Sudden enlargement

(b) Sudden Contraction.

(viii) To determine velocity of flow of an open channel by using a current meter.

(ix) To determine coefficient of discharge of a rectangular notch/triangular notch.

(x) Study of the following

(i) Reciprocating Pumps or Centrifugal Pumps.

(ii) Impulse turbine or Reaction turbine

(iii)Pressure Gauge/water meter/mechanical flow meter/ pitot tube.

CONCRETE TECHNOLOGY & BLDG. CONSTN.& MAINTENANCE LAB

(DCE-356)

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1. Concrete Technology:

(i) To determine flakiness index and elongation index of coarse aggregate (ISI:2386-pt.1-1963)

(ii) Field method to determine fine silt in aggregate.

(iii)Determination of specific gravity and water absorption of aggregates (IS:2386 Part-III-1963) (for aggregates 40mm to 10mm)

(iv)Determination of bulk density and voids of aggregates (IS:2386-Part-III-1963)

(v)Determination of surface moisture in fine aggregate by displacement method (IS:2383-Part-III-1963)

(vi) To determine necessary adjustment for bulking of fine aggregate by field method (IS:2383-Part-III-1983).

(vii) Test for workability (slump test);

(a) To verify the effect of water, fine aggregate/coarse aggregate ratio and aggregate/cement ratio on slump.

(b) To test cube strength of concrete with varying water cement ratio.

(viii) Compacting factor test for workability (IS:1199-1959)

(ix) Workability of concrete by Vee-Bee consistometer.

(x) Fineness modulus of sand.

2. Building Construction & Maintenance:

(i) Layout of a building.

(ii) To construct brick bonds (English and Flemish bonds) in one, one and half and two brick thick.

(a) walls. L, T and cross junction. (b) Columns

(iii) Visit to construction site for showing the

following item of works and to write specific

report about the works seen.

(a) Timbering of excavated Trenching

(b) Construction of Masonry Walls

(c) Flooring: Laying of flooring on an already

prepared lime concrete base.

(d) Plastering and Pointing of wall

(e) Finishing of wall surface by Lime, Distemper,

Snowcem, etc. and calculation of material in

100 Sqm. wall area

(f) Use of Special type of shuttering/cranes/heavy

machines in construction work.