J. S. UNIVERSITY, SHIKOHABAD

DIPLOMA

3rd Semester
(Civil Engineering)

SCHEME
&
SYLLABUS

[Effective from the session 2015-16]

STUDY AND EVALUATION SCHEME FOR
THREE YEAR DIPLOMA COURSE IN

CIVIL ENGG.

SEMESTER - THIRD

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	DEM-31	Ele.Elect.& Mech. Engg.	4	1	-	-	20	50	70	2.5
2	DME-34	Strength of Material	4	1	-	-	20	50	70	2.5
3	DCE-31	Hydraulics	4	1	-	-	20	50	70	2.5
4	DCE-32	Public Health Engg.	4	1	-	-	20	50	70	2.5
5	DCE-33	Surveying-I	4	1	-	-	20	50	70	2.5
PRACTICA/DRAWING SUBJECTS										
6	DME-34P	Strength of Material Lab	-	-	4	-	20	40	80	3
7	DCE-31 P	Hydraulics Lab	-	-	4	-	15	30	45	3
8	DCE-32 P	Public Health Engg. Lab	-	-	4	-	30	60	90	3
9	DCE-33 P	Surveying-I Lab	-	-	4	-	40	80	120	3
10	DGD-30	Games//Social and Cultural Activities + Discipline (15 + 10)							25	
								Grand Total	690	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

[DEM-31] ELEMENTRY ELECTRIAL & MECHANICAL ENGG.

(A) 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.
4. Conveyers, hoists and other material handling equipments-their functioning and uses. 5. Different kinds of lathes, milling machines and drilling machines.
6. Different kinds of Jacks & Hammers and their uses.
(B) 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.
3. Different types of lamps like incandescent lamps, sodium vapour lamps, florescent tube. Halogen lamps - CFL, their merits, demerits and use.
4. 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)
5. Simple electrical circuits used in house wiring
6. Earthing - need and procedure.
7. Safety against electrical shocks.

[DME-34] STRENGTH OF MATERIALS

DETAILED CONTENTS
1. Principal Stress and Principal Planes : Principal stress and principal plane under direct and shear stress. Graphical determination by Mohr's circle method.
2. 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.
3. Bending and Shear Stresses
Assumption of theory of simple bending. Derivation of he 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 .
4. Combined Direct & Bending Stresses: Concentric and eccentric loads, eccentricity, effect of eccentric load on the section, middle third rule; stresses due to eccentric loads. Examples in the case of short columns, chimneys and dams.
5. 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.
(1) 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
(2) 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.
6. 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.
7. 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.

8. 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.

[DME-34P] STRENGTH OF MATERIALS LAB

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.

[DCE-31] HYDRAULICS

1. Introduction:
1.1 Fluid : Real fluid, ideal fluid.
1.2 Fluid Mechanics, Hydraulics, Hydrostatics, Hydrokinematics and Hydrodynamics. 2. Properties of Fluids
2.1 Mass density, specific weight, specific gravity, cohesion, adhesion, viscosity, surface tension, capillarity, vapour pressure and compressibility.
3. Hydrostatic Pressure:
3.1 Pressure, intensity of pressure, pressure head, Pascal's law and its applications.
3.2 Total pressure, resultant pressure, and centre of pressure.
3.3 Total pressure and centre of pressure on vertical and inclined plane surfaces: 3.3.1 Rectangular
3.3.2 Triangular
3.3.3 Trapezoidal
3.3.4 Circular
4. Measurement of Pressure
4.1 Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.
4.2 Piezometers, simple manometer, differential manometer and mechanical gauges. Measurement of pressure by manometers and pressure gauges.
5. Fundamental of Fluid Flow
5.1 Types of Flow:
5.1.1 Steady and unsteady flow 5.1.2
Laminar and turbulent flow 5.1.3
Uniform and non-uniform flow.
5.2 Discharge and continuity equation (flow equation)
5.3 Types of hydraulic energy. 5.3.1 Potential energy
5.3.2 Kinetic energy
5.3.3 Pressure energy
5.4 Bernoulli's theorem; statement and description (without proof of theorems).
5.5 Venturimeter (horizontal and inclined) and Orifice Plate meter. 6. Orifice:
6.1 Definition of Orifice, and types of Orifices,
6.2 Hydraulic Coefficients.
6.3 Large vertical orifices.
6.4 Free, drowned and partially drowned orifice.
6.5 Time of emptying a rectangular/circular tanks with flat bottom.
7. Flow through Pipes
7.1 Definition, laminar and turbulant flow explained through Reynold's Experiment.

7.2 Reynolds Number, critical velocity and velocity distribution.
7.3 Head Losses in pipe lines due to friction, sudden expansion and sudden contraction entrance, exit, obstruction and change of direction (No derivation of formula)
7.4 Hydraulic gradient line and total energy line.
7.5 Flow from one reservoir to another through long pipe of uniform and composite section.
7.6 Water Hammer Phenomenon and its effects. (only elementary treatment)
8. Flow through open channels.
8.1 Definition of a channel, uniform flow and open channel flow .
8.2 Discharge through channels using
(i) Chezy's formula (no derivation)
(ii) Manning's formula
8.3 Most economical sections
(i) Rectangular
(ii) Trapezoidal
9. Flow Measurements
9.1 Measurement of velocity by
(i) Pitot tube (iii) Surface Float
(ii) Current-meter (iv) Velocity rods.
9.2 Measurement of Discharge by a Notch 9.2.1
Difference between notches and orifices.
9.2.2 Discharge formulae for rectangular notch, triangular Notch, trapezoidal notch, and conditions for their use. (with derivation)
9.3 Measurement of discharge by weirs.
9.3.1 Difference between notch,weir and barrage.
9.3.2 Discharge formula for free, drowned, and broad crested weir with and without end contractions ; velocity of approach and condition of their use.
9.3.3 Venturi flumes to measure flow.
9.4 Measurement of Discharge by velocity area-method.
10. HYDRAULIC MACHINE :
10.1 Reciprocating pumps
10.2 Centrifugal pumps
10.3 Impulse Turbines
10.4 Reaction Turbines Sketching and description of principles of working of above mentioned machines

[DCE-31P] HYDRAULICS LAB

(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.

[DCE-32] PUBLIC HEALTH ENGG.

(A) Water Supply Engg.

1. 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.

2. Sources of Water

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

3. 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,theiruses,and feeding devices. Simple design of sedimentation tank, and filters.

4. Water Distribution

(i) 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.

(ii) Appurtenances: Sluice (Gate and spindle), air,reflux,scour and safety valves, fire hydrants,their working and uses.

(iii) 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.

(iv) Storage: Necessity, types of storing tanks: G.I. Sheet Tank, P.V.C. tank, over head tanks.

5. 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.

6. Building Water Supply

(i) 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.

(ii) Hot and Cold Water supply in buildings. Use of Solar water heaters.

(iii) Rural water supply:Sources, treatment and distribution.

7. Maintenance :-Leakage detection and prevention. Replacement

of damaged pipe. Maintenance of domestic plumbing fixtures.

(B) SANITARY ENGINEERING

8. Introdcution: Waste:Dry,semiliquid,liquid,Necessity of systematic collection and disposal of waste. Brief description of sewage disposal system.Conservancy and water carriage system, their advantages and disadvantages.

9. Quantity of Sewage:

(i) Sewage:Domestic, industrial and storm water.

(ii) Volume of domestic sewage (DWF), variability of flow, limiting velocities in sewers.

(iii) Use of table as per I:S 1742-1983 to determine relationship between gradient, diameter, discharge and velocity.

10. Sewerage Systems:

(i) Types of sewerage systems separate, combined and partialyseperate.

(ii) Sewers : Stone ware, cast iron, concrete and masonry seweres their sizes and joints.

(iii) Appurtenances: (Location,function and construction) manholes, drop manhole, lamp hole catch basin, inverted syphon, flushing tanks, ventilating shafts and storm water flows.

(iv) Laying of sewers: Setting out alignment of sewer.

Excavation, checking the gradient with the help of boning rods, preparation of bedding, handling, lowering, laying and jointing, testing and backfilling.

(v) Construction of surface drains and different sections

required. 11. Building Drainage

(i) Aims of building drainage and its requirements. General layout of sanitary fittings and house drainage arrangement for a building (single and multistoryed)as per IS 1742-1983.

(ii) Different sanitary fittings and their installation.

(iii) Traps, seal in traps, causes of breaking of seal, precuations taken, Gulley, Intercepting and Grease traps.

(iv) Testing of house drainage.
12. Rural Sanitation:
(a) Drainage: Topography, alignment of lanes and byelanes, storm water, natural passage, development of drains, alignment, size and gradient. Phase Programme.
(b) Disposal of night soil and village latrines :
(i) Collection and disposal of garbage and refuse.
(ii) Septic tanks, cess pools/soak pit (design of septic tank, soak pit/cess pools), privy pit and bore hole latrines.
(iii) Biogas plant, constructional details,uses and maintenance.
(c) Guide lines for future development of village.
13. Maintenance: Inspection of mains, cleaning and flushing of sewers.
Precautions during cleaning, maintenance of traps, cleaning of house drainage line. Tools and equipment needed for maintenance.
14. Sewage Disposal
(i) General compostion of sewage, importance & method of determination of O.D., B.O.D. and C.O.D.
(ii) Disposal methods. Land disposal, disposal by dilution and disposal in sea.Merits and demerits. (iii)
Nuisance due to disposal, self purifcation of streams, condtions of disposal.
15. Sewage Treatment:
(i) Meaning and principle of primary and secondary treatment, constructional details of screening chamber, grit chamber, clarifier, trikling filters, secondary clarifiers/airation tank.
(ii) Sludge treatment, sludge digestion,sludge drying; sludge disposal.
(iii) Oxidation ponds. Practicals

[DCE-32P] PUBLIC HEALTH ENGG. LAB

1. To determine dissolved and suspended solids in water.
2. To determine pH value of water sample.
3. To determine turbidity of water.
4. To calculate :
i. Oxygen Demand (OD)
ii. Biological Oxygen Demand (BOD)
iii. Chemical Oxygen Demand (COD)
5. To determine residual chlorine in water sample.
6. To perform Jar Test for Coagulants.
7. To collect samples of water from shallow & deep wells.
8. To perform chlorine demand test.
9. To determine hrdness of water.
10. To determine available chlorine in bleaching powder.
11. To perform field test for the detection of intermeidate pollution in drinking water by OT test.
12. To visit and write specific report for the following.: (Any three) a. Water treatment plant for moderate town (say Polulation 1lacs) b. Sewage treatment plant for 5 lac to 10 lac polulation
c. Sewage disposal work
d. Construction site for layout of water supply & sewerage system.
e. Industrial effluent treatment plant

[DCE-33] SURVEYING-I

1. Introduction
Concept of surveying, purpose of surveying, Measurements linear and angular, units of measurement, instruments used for taking these measurements. Classifcation of survey based on insturments. Basic principles of surveying.
2. Chain Surveying :-Purpose of chain surveying, Principles of chain surveying. Equipment used in chain surveying Viz. chains,tapes,ranging rods, arrows, pegs, cross staffs, Indian optical square
their construction and uses. Different operations in chain surveying:Ranging (direct/indirect), offset (perpendicular/oblique), chaining (flat and sloping ground),conducting chain survey over an area. Recording the field data, plotting the chain survey, covenetional sign.Obstacles in chain surveying.

(a) Errors in chain surveying.
(b) Correction for erroneous length of chain, simple problems. Testing and adjustment of chain.
3. Compass Surveying :-Purpose of compass surveying. Construction and working of prismatic compass.Use of prismatic Compass, Method of setting and taking observations. Concept of following:
(a) Maridian - Magnetic, true and arbitrary.
(b) Bearing- Magnetic, true and arbitrary.
(c) Whole circle bearing and reduced Bearing,
(d) Fore and back bearing.
(e) Magnetic dip and declination
Local attraction-cuases, detection, errors and correction. Problems on local attraction,magnetic declination and calculation of included angles in a compass traverse. Concept of a traverse-Open and closed traverse.Traversing with a prismatic compass.Checks for an open and closed traverse.Plotting of a traverse - By included and deflection angles.Concept of closing error.Adjustment of traverse graphically by proportionate method.Errors in compass surveying.Testing and adjustment of a prismatic compass. Use of surveyers compass and its construction details, comparison with prismatic compass.
4. Levelling:-
Pupose of levelling, concept of a level surface, horizontal surface, vertical surface, datum,rduced level and bench marks. Principle and construction of dumpy, I.O.P. (tilting)levels. Concepts of line of collimation, axis of the buble tube, axis of the telescope and vertical axis. Levelling staff (i) single piece (ii) folding (iii) sopwith(iv) invar precision staff. Temporary adjustment:setting up and levelling, adjusting for parallax of Dumpy and I.O.P. level. Differential levelling, concept of back sight, fore sight, intermediate sight, station, change point, height of
instrument. Level book and reduction of levels by (a) Height of collimation method and (b) Rise and fall method. Arithmetical checks.Problem on reduction of levels. Fly levelling, check levelling and profile levelling (L-section and X-section) Errors in levelling, and precauations to minimise them and permissible limits. Reciprocal levelling.Difficulties in levelling.Concept of curvature and refraction.Testing and adjustment of dumpy and IOP level.Numerical problems.
5. Minor Instruments : Principle construction and uses of the following minor instruments:
(a) Abney's level
(b) Tangent clinometer
(c) CeyloneGhat Tracer
(d) Pentagraph
(e) Planimeter

[DCE-33P] SURVEYING-I LAB

Chain Surveying
Ex.(i) (a) Ranging a line.
(b Chaining a line and recording in the field book.
(c) Testing and adjustment of chain.
Ex.(ii) (a) Chaining of a line involving reciprocal ranging.
(b) Taking offsets and setting out right angles with cross staff and Indian optical
square. Ex.(iii) Chain survey of a small area. Plate I
Ex.(iv) Chaining a line involving obstacles in ranging. Compass Survey
Ex.(v) (a) Setting the compass and taking observations.
(b) Measuring angles between the lines meeting at a point by prismatic compass.
Ex.(vi) Traversing with the prismatic compass and chain of a closed traverse. (recording and plotting by included angles)
Plate II Setting a regular Pentagon of given side &
bearing Plate III
Ex.(vii) Traversing with the Prismatic compass and chain of a closed and open traverse (Recording and plotting by deflection angles) Plate IV
Ex.(viii) Determination of local attraction at a station by taking fore and back bearing.
Ex.(ix) To find true bearing of a line at a place.
Levelling:
Ex.(x) To find the difference of level between two distant points by taking staff readings on different stations from the single setting.

Ex.(xi) To find the difference of level between two points by taking atlest four change points.
Ex. (xii) Longitudinal sectioning of a road. Plate V
Ex.(xiii) Cross-sectioning of a road. Plate
VI Ex.(xiv) Setting a gradeint by IOP level.
Minor Instrument :
Ex.(xv) Setting and checking grades with Abney's level. Setting and checking grades with CeyloneGhat Tracer. Ex.(xvi) Finding heights by Indian Pattern Clinometer (Tangent Clinometer)
Ex.(xvii) Use of planimeter for computing areas.
Ex.(xviii) Enlargment/ reduction of a plan by the use of pentagraph.