Faculty of Engineering & Technology

P.K.University

Shivpuri (MP)

Department of Civil Engg.

Evaluation Scheme & Syllabus for

Diploma-(Civil Engg.)

(IV Semester)

(Effective from session 2025-26)

EVALUATION SCHEME

DIPLOMA CIVIL ENGG. (4 SEMESTER)

Study And Evaluation Scheme For Diploma Civil Engineering

YEAR 2ND /SEMESTER -4TH

SUBJECT CODE	SUBJECTS NAME	STUDY SCHEME Periods/Week			Credits	MARKS IN EVALUATION SCHEME						Total Marks of Internal& External
						INTERNAL ASSESSMENT			EXTERNAL ASSESSMENT			
		L	T	P		Th	Pr	Tot	Th	Pr	Tot	Int +Ext
DSOILCE401	Soil Mechanics & foundation Engg.	4	0	0	4	30	-	30	70	-	70	100
DBUILCE402	Building Construction & Maintenance Engg	4	0	0	4	30	-	30	70	-	70	100
DCONCCE403	Concrete Technology	4	0	0	4	30	-	30	70	-	70	100
DCIVICE404	Civil Engineering Drawing- I	4	0	0	4	30	-	30	70	-	70	100
DCIVICE405	Civil – II Lab	0	0	2	1	-	25	25-	-	25	25-	50
Total		16	0	2	17	120	50	145	280	25	305	450

Department Of Civil Engineering
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P.K. University, Shivpuri (MP)
II Year IV Semester

DSOILCE401
SOIL MECHANICS AND FOUNDATION ENGINEERING

L	T	P
4	0	0

1. Introduction

1.1 Definition of soil Mechanics and foundation engineering.

1.2 Soil formation - different kinds of soils and soil structures.

2. Fundamental Definitions and their Relationships

2.1 Graphical representation of soils as a three phase system.

2.2 Definitions of moisture content unit weight of soil mass such as bulk density, saturated density, submerged density and dry density, specific gravity, mass specific gravity, void ratio, porosity & degree of saturation, percentage air voids and their content, density index.

2.3 Relationships between various terms stated above.

2.4 Consistency limits Liquid limit, Plastic limit, Shrinkage limit, Plasticity index, Consistency index.

2.5 Grain size analysis - Sieve and Hydrometer analysis C.C. and C.U.

3. Classification of Soils

3.1 Particle size classification - M.I.T., and I.S., U.S. bureau of soils and U.S. P.R.A.

3.2 Textural classification chart, brief description of plasticity chart.

3.3 I.S. soil classification.

4. Permeability of Soils

4.1 Definition of permeability.

4.2 Interpretation of Darcy's law, definition of discharge velocity and seepage velocity and coefficient of percolation.

4.3 Factors affecting permeability.

4.4 Laboratory methods of falling head and constant head, field methods of pumping-out tests and pumping-in tests.

5. Compaction-

5.1 Definition of Compaction.

5.2 Standard & modified Proctor compaction test.

5.3 Different methods of compaction.

5.4 Factors affecting compaction.

5.5 Brief discription of field compaction methods.

5.6 Compacting equipments and field control.

5.7 Indian Standards.

6. Consolidation

6.1 Definition of consolidation and its importance on foundation settlement.

6.2 Difference between consolidation and compaction.

7. Shear Strength

7.1 Definition of shear strength.

7.2 Definition of Cohesive & noncohesive soil with reference to c and O (phy) soil.

7.3 Coulomb's equation.

7.4 Shear box and unconfined compression tests.

8. Earth Pressure and Retaining Structures

8.1 Definition of earth pressure, active and passive earth pressures, terms and symbols relating to a retaining wall.

8.2 Relation between movement of wall and earth pressure

8.3 Ka and Kb by Rankin's Method.

8.4 Simple earth pressure calculations without surcharge.

9. Shallow and Deep Foundations

9.1 Definitions of shallow and deep foundations

9.2 Application of Terzaghi's bearing capacity formulae for different types of foundations.

9.3 Factors affecting depth of shallow foundation

9.4 Plate load test for shallow foundations

10. Ground Improvement Techniques

Concept of stablization, materials used, advantages of lime & cement as stablizing agents. Strength of stablized soil. Deep compaction -Heavy tamping, Explosion, Grouting Reinforcement.

11.Soil Exploration and sampling

12.1 Methods of exploration

12.2 Types of soil samples and samplers

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DBUILCE402
BUILDING CONSTRUCTION AND MAINTENANCE ENGG.

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1. Introduction:

(i) Definition of a building, classification of buildings based on occupancy.
(ii) Different parts ofa building. Orientation of buildings. Site selection.
(iii) Exposure to building bylaws/master plan and building approval.

2. 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 masonry pillars and concrete columns, raft foundation, Grillage foundation and machine foundation.

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

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

3. Walls

(i) Purpose of walls
(ii) Classifcation of walls-Load Bearing and Non Load Beariang. Dwarf wall.
(iii) Classification of walls as per materials of construction, brick, stone, reinforced brick, reinforced concrete, precast hollow and solid concrete block and composite masonry walls.
(iv) **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 & quoin.

a) Bond-Meaning and necessity: Types of bond thier suitability (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.

(b) 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).

(c) Construction and Expansion Joints.

(v) Stone Masonry

(a) Glossary of terms-Natural bed of a surface, bedding planes, string course, corbel,

ornice, block-incourse, grouting, moldings, 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 rough tooled Ashler facing, specifcations for coarsed rubble masonry, principles to be observed in construction of stone masonry walls.

vi) Partition walls: Constructional details, suitability and uses of brick and wooden partition walls.(vii) Mortars-preparation, use and average strength of cement, lime, lime cement, lime surkhi and mud mortar (viii) Scaffolding:Constructional details and suitability of Mason's Brick Layers and Tubular scaffolding Centering & Shulteri (ix) Shoring & under pinning: Types and uses.(x) Safety in construction of low rise and high rise buildings.

4. Arches and Lintels

(i) Meaning and use of Arches and Lintels.

(ii) Glossary of terms used in Arches and Lintels-Abutment, Peir, Arch ringIntrados, 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) Arche:

(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.

5. Doors and windows:

(i) Glossary of terms, used in Doors and Windows.

(ii) Doors-Name;uses and sketches of Metal doors; Ledged and Battened Doors;Ledged, battened andbraced door; Framed andPanelled doors;glazedand panelled

doors;flush doors; collapsible doors; Rolling steel shutters, side sliding doors;Door frames, PVC shutters & metal doors.

(iii) Windows-names,uses and sketches of metal windows,fully paneled 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).

6. Damp Proofing

(i) Dampness and its ill effects on bricks, plaster, wooden fixtures, fixtures and reinforcement, damage to asthetic appearance. Damage heat insulating materials, Damage to stored articles and health. (ii) Types of dampness-moisture penetrating the building from outside e.g. rainwater, surface water, ground Moisture entrapped during constrcution i.e. moisture in concrete, masonry construction and plastering work etc. Moisture whichoriginates in the building itself i.e water in kitchen and bath rooms etc.

7. Floors

(i) Ground flow

(a) Glossary of terms-floor finish, topping, under layer,base course,rubble filling and their purpose.

(b) Types of floor finishes-cast in situ concrete flooring (monolithic, bonded) Terrazzo

tile flooring. Terrazzo flooring, Timber flooring. Description with sketches of the methods of construction of the floors and their specifications. Floor polishing equipment.

(ii) Upper floors:(a) Flooring on RCC Slab.(b) Flooring on R.B. Slab.

8. Roofs:

(i) Glossary of terms for pitched roofs-batten, eaves, barge, facia board, gable hip, lap, purlin,rafter, rag bolt, valley,ridge.

(ii) Pitched roof, steel trusses, fink truss, arched trusses, North light truss.

(iii) Roof coverings for pitched roofs-Asbestos sheeting, big six,Trafford sheets, Mangalore tiles, method of arranging and fixing to the battens, rafters, purlins-both steel and wooden.

(iv) Drainage arrangement for pitched roofs.

(v) Concept of Flat roofs, RCC, RB, Coffer & folded slabs.

(vi) Drainage arrangements for flat roofs.

9. Stairs and staircase:

(i) **Glossary of terms**: Stair case winders landing, strings, newel, user, riser, tread, width of staircase, hand rail, nosing.

(ii) **Planning and layout of staircase:** Relations between rise and tread, determination of width of stair, landing etc. Various types of layout-straight flight, dog legged, open well quarter turn, half turn, Newel and geometrical staircase). Bifurcated stair, spiral stair.

10. Surface Finishes:

(i) Plastering-Classification according to use and finishes like grit finish, rough cast, pebble dashed, plain plaster etc. Dubbing, Proportion of mortars used for different plasters, preparation of mortars, techniques of plastering and curing.

(ii) Pointing-Different types of pointing, mortar used and method of pointing.

(iii) Painting-preparation and application of paints on wooden, steel and plastered wall surfaces.

(iv) White washing, color washing and is tempering. Application of cement and plastic paints.

(v) Commonly used water repellants for exterier sufaces, their names and application.

11. Ventilation and Air Conditioning:

Natural and Artificial Ventilation. Requirements of comfort conditions, temperature control, mechanical ventilation, plenum system, exhaust system, air filter of different types, principle of Air Conditioning Plant

12. Fire Fighting: Causes of fire, spread of fire, fire fighting equipment and different method, of fire fighting, sprinklers, fire regulations and requirement. Fire insurance. Indian Standard.

13. Principles of Maintenance

13.1 Definition, of maintenance, decay and deterioration of building/building component's.

13.2 Sources and causes of deterioration and decay in building.

13.3 Factors influencing the decision to carry out maintenance of building.

14. Maintenance Practice

14.1 Defects, causes and repairs in structural elements of buildings such as

(i) Foundation (ii) Walls

(iii) Floors (iv) Roof

(v) Components such a doors, windows and ventilators etc.

14.2 Defects, causes and repairs in surface finishes such as
(i) White and colour washing (ii) Distempering
(iii)Cement Plastering, (iv) Painting of timber and steel surface

14.3 Defects, causes and repairs in building due to leakage and seepage & their prevention

14.4 Defects cuases and repair in internal environment of building such as
(i) Heating (ii) Ventilation and Air conditioning (iii) Lighting

14.5 P.W.D. Practices with respect to maintenance of building e.g. annual repairs, special repairs.

15. Safety in Maintenance : Necessity, specific safety measures at site e.g. barricades, signals, helmets.

16. Water Harvesting :

i. Causes of depletion of water label in state.
ii. Present scenario of ground water in state.
iii. Significance of hydrological parameters.
iv. Rain water harvesting.
v. Roof top rain water harvesting.
vi. Methods of ground water recharging.
vii. Precaution in ground water recharging.

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II Year IV Semester

DCONCCE403
CONCRETE TECHNOLOGY

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1. Introduction

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

2 Ingredients of Concrete:

(i) 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 colored cements.

(ii) 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:-Coars aggregate, fine aggregate; All in-aggregate; fineness modulus; interpretation of grading charts and combination of two aggregates.

(iii)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.

3. 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.

4. 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 Consist meter.

5. 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 Absorption, Workability Design data for moisture, bulk age, absorption and suitable fine aggregate and coarse aggregate ratio. Difference between ordinary and controlled concrete.

6. Form Work:

(i) Concept of factors affecting the design of form work (shuttering and staging)

(ii) Materials used for form work.

(iii) Sketches of form work for column, beams slabs.

(iv) Stripping time for form work as per IS
(No problems on the design of form work).

(v) Removal of formwork.

(vi) Precautions to be taken before, during and after RCC Construction.

(vii) Special type of formwork

7. Concrete Operations:

(i) Storing Cement:

(a) Storing of cement in the warehouse.

(b) Storing of cement at site.

(c) Effect of storage on strength of cement.

Aggregate:- Storing of aggregate on site for maintaining uniformity of moisture and cleanliness.

(ii) Batching:

(a) Batching of cement.

(b) Batching of aggregate: Batching by volume, using gauge box, selection of proper gauge box, Batching by weight-spring balances and by batching machines.

(c) Measurement of water.

(iii) Mixing

(a) Hand mixing

(b) Machine mixing-types of mixer, capacities of mixers, choosing appropriate size of mixers, operation of mixers, mixing of water.

(c) Maintenance and care of machines.

(iv) Transportation of Concrete:

Transportation with and situations of use of the following- pans, wheel barrows, truck mixers, chutes, belt conveyors, pumps, tower cranes.

(v) Placement of Concrete:

(a) Prior preparation before placement; when put on natural soil, rocky base, specially prepared sub-base (brick soling and water bound macadam base), hardened concrete base, checking of form work, checking provision for joints.

(b) Placement of concrete-precautions to be taken.

(vi) Compaction:

(a) Hand compaction-pavement, narrow and deep members.

(b) Machine compaction-types of vibrators (internal screed vibrators and form vibrators) Method of handling screed vibrations and immersion vibrations. Suitability of concrete mixes for compaction with vibrators. Selection of suitable vibrators for various situations.

(vii) **Finishing** -concrete slabs-screening, floating, and toweling.

(viii) **Curing-**Object of curing, Method of curing, shading concrete works, covering surfaces with hessian, gunny bags, sprinkling of water, ponding method and membrane curing, steam curing. Recommended duration for curing.

(ix**) Jointing** - Location of construction joints, treatment of construction joint before the concrete is poured, concreting at these joints. Expansion joints in concrete in buildings-their importance and location.

8. Properties of Concrete:

(i) Properties in plastic stage:

(a) Workability (b) Segregation. (c) Bleeding.

(ii) Properties of hardened concrete:

(a) Strength. Characteristic strength (b) Durability

(c) Impermeability. (d) Dimensional changes.

(iii) Admixture (uses and effect)

(a) Accelerators and retarders.

(b) Air entraining agents.

(c) Water reducing and set controlling agents.

9. Quality Control at site:-Control tests on cement, aggregate water and concrete. Concept of quality control.

10. Hot Weather Concreting:- Effect of high temperature on concrete strength with reference to mass concreting, cooling of concrete materials, precautions before, during and after concreting, Use of retarders.

11. Cold Weather Concreting-Effect of low temperature on concrete strength, concrete materials. Precaution before, during and after concreting. Use of Accelerators.

12. Repair and Maintenance

Method of repairing by grouting new and old concrete work for cracks and holes. Repairs underwater.

13. Special types of concrete

(i) General idea of special types of concrete , High strength concrete, fiber reinforced concrete, polymer concrete, fibrocement concrete. ready-mix concrete.

(ii) Recycle concrete.

(iii) High performance concrete.

Department Of Civil Engineering
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II Year IV Semester

DCIVICE404
CIVIL ENGINEERING DRAWING-I

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1. **Symbols and conventions of materials** and fittings used in Civil Engineering works.
2. **Symbols and conventions used for electrical fittings.**
3. **Foundations**:

Foundations, detials of a spread foundation for an external and internal masonry wall with basementshowing necessary damp proofing arrangements.

4. **Doors and Windows :**

(a) Doors: Elevation, sectional plan, sectional side elevation of ledged braced and battend door, glazed door and flush door with wire gauge shutter, partly panelled and glazed door, fully panelled door.

(b) Windows:(i) Elevation, sectional plan, sectional side elevation of fully glazed window and fully panelled window with fan light.

(ii) Elevation, sectional plan and sectional side elevation of a glazed steel window.

5. **Roofs-** King post & queen post roof trusses with roof covering and support details on wall. Section through RCC & RB flat roof showing details regarding arrangements for water proofing, drainage and heat insulation.

6. **Floors:** Detailed cross-sections of the following types of concrete flooring as per IS:2571-1970.

   (a) Concrete floor finish over ground floor.
   (b) Terrazo floor finish over ground floor.
   (c) Concrete floor finish with structured slab.
   (d) Terrazo floor finish structured slab.
   (e) Terrazo tile floor finish over ground.

7. **Working drawing of a two roomed building** with kitchen and bath having pitched roof.
8. **Working drawing of a three roomed building** from a given line plan and given data.
9. **Working drawing of a three bed room double storied flat** roofed residential building.
10. **Stair case-** a. Details of dog legged stairs (Wooden & RCC). b. Plans of remaining type of stairs.
11. a. Details plan and section of an inspection chamber and manhole.
    b. Detailed plan and cross section of a domestic septic and soak pit for 10 users as per IS:2470 Part I.
12. Detailed plan and cross section of bathroom, kitchen and W.C. connections.
13. Detailed drawing of pipe joints commonly used in water supply and sewerage system.
14. Two Room building working drawing with AutoCad-2007 on wards
15. Three Room building working drawing with AutoCAD .

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DCIVICE405
CIVIL-II LAB

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SECTION–A (SOIL MECHANICS LAB)

1. Determination of moisture content by oven drying method
2. Determination of specific gravity of soil particles by specific gravity bottle/pycnometer
3. Determination of soil particles size distribution by sieving
4. Determination of liquid limit and plastic limit of soil
5. Determination of permeability by constant Head Permeameter and falling head permeameter.
6. Shear strength of sand by Direct Shear test.
7. Unconfined compression test
8. Standard Proctor compaction text.
9. Determination of field density of soil by sand replacement and core cutter methods.
10. Demonstration of Standard Penetration Test.

SECTION –B BUILDING CONSTRUCTION & MAINTENANCE LAB

(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, Snowcap, etc. and calculation Of material in 100 Sqm. wall area
(f) Use of Special type of shuttering/crains/heavy machines in construction work.

SECTION –C CONCRETE TECHNOLOGY LAB

(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 aggregates (IS:2386 Part-III-1963) (for aggregates (40mm to 10mm)

(iv) Determination of bulk density and voids of aggregate (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-

(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.