

SOIL MECHANICS AND FOUNDATION ENGINEERING

(DCE-401)

L T P

3 1 0

UNIT-I

Definition of soil Mechanics and foundation

engineering.

Soil formation - different kinds of soils and soil structures.

Fundamental Definitions and their Relationships

Graphical representation of soils as a three phase system.

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 and degree of saturation, percentage air voids and their content, density index.

Relationships between various terms stated above.

Consistency limits Liquid limit, Plastic limit,

Shrinkage limit, Plasticity index, Consistency index.

Grain size analysis - Sieve and Hydrometer analysis,

C.C. and C.U.

UNIT-II

Classification of Soils

Particle size classification - M.I.T., and I.S., U.S.

bureau of soils and U.S. P.R.A.

Textural classification chart, brief description of plasticity chart.

I.S. soil classification.

Permeability of Soils

Definition of permeability.

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

Factors affecting permeability.

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

8

UNIT-III

Compaction

Definition of Compaction.

Standard & modified Proctor compaction test.

Different methods of compaction.

Factors affecting compaction.

Brief discription of field compaction methods.

Compacting equipments and field control.

Indian Standards.

Consolidation

Definition of consolidation and its importance on
foundation settlement.

Difference between consolidation and compaction.

8

UNIT-IV

Shear Strength

Definition of shear strength.

Definition of Cohesive & noncohesive soil.

with reference to c and ϕ (phy) soil.

Coulomb's equation.

Shear box and unconfined compression tests.

Earth Pressure and Retaining Structures

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

Relation between movement of wall and earth pressure

K_a and K_b by Rankin's Method.

Simple earth pressure calculations without surcharge.

8

UNIT-V

Shallow and Deep Foundations

Definitions of shallow and deep foundations

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

Factors affecting depth of shallow foundation

Plate load test for shallow foundations

Ground Improvement Techniques

Concept of stabilization, materials used, advantages of lime & cement as stabilizing agents. Strength of stabilized soil.

Deep compaction - Heavy tamping, Explosion, Grouting, Reinforcement.

Soil Exploration and sampling

Methods of exploration

Types of soil samples and samplers

10

Ref. Book:

“Soil Mechanics by B.C. Punmia

CIVIL ENGINEERING DRAWING-I

(DCE-402)

L T P

1 0 3

UNIT-I

Symbols and conventions of materials and fittings used in Civil Engineering works Symbols & conventions of electrical fittings

4

UNIT-II

Foundations:

Foundations, details of a spread foundation for an external and internal masonry wall with basement showing necessary damp proofing arrangements.

10

Doors & Windows:

1. Doors: Elevation, sectional plan, sectional side Elevation of ledged braced and battened door, glazed Door and flushed door with wire gauge shutter, partly Paneled and glazed door, fully paneled door.

Windows:

1. Elevation, sectional plan, sectional side elevation Of fully glazed window and fully paneled window with

Fan light

2. elevation, sectional plan and sectional side, elevation Of a glazed steel window.

Roofs: King post and Queen post roof trusses with roof Covering and support details on wall. Section through RCC and RB flat roof showing details regarding arrangements For water proofing, drainage and heat insulation (Details Of reinforcement need not to be shown.

Floors:

1. Detailed cross section 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 little floor finish over ground

UNIT-III

Working drawing of a two roomed building with kitchen and bath having pitched roof. Working drawing of a three roomed building from a given line plan and given data. 10

UNIT-IV

Working drawing of a three bed room double storyed flat roofed residential building. Stair case

- a. Details of dog legged stairs (Wooden & RCC).
- b. Plans of remaining type of stairs.
- c. Details plan and section of an inspection chamber and manhole.
- d. Detailed plan and cross section of a domestic septic and soak pit for 10 users as per IS:2470

Part I. 6

UNIT- V

Detailed plan and cross section of bathroom, kitchen and W.C. connections. Detailed drawing of pipe joints commonly used in water supply and sewerage system. Two Room building working drawing with AutoCad

Three Room building working drawing with AutoCad (Plate No. 14 & 15 should be prepared by AutoCad Alos) 10

Ref. Book

“Civil Engineering Drawing” – Gurucharan Singh

SURVEYING-I

(DCE-403)

L T P

3 1 0

UNIT-I

Concept of surveying, purpose of surveying, Measurements linear and angular, units of measurement, instruments used for taking these measurements. Classification of survey based on instruments. Basic principles of surveying. 6

UNIT-II

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, conventional sign. Obstacles in chain surveying.

(a) Errors in chain surveying.

(b) Correction for erroneous length of chain, simple problems. Testing and adjustment of chain. 8

UNIT-III

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) Meridian - 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-causes, 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 surveyors compass and its construction details, comparison with prismatic compass.

8

UNIT-IV

Levelling

Purpose of levelling, concept of a level surface, horizontal surface, vertical surface, datum, reduced level and bench marks. Principle and construction of dumpy, I.O.P. (tilting) levels. Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis. Levelling staff (i) single piece (ii) folding (iii) spirit level (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 precautions 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.

10

UNIT-V

Minor Instruments :

Principle construction and uses of the following minor instruments:

(a) Abney's level

- (b) Tangent clinometer
- (c) Ceylone Ghat Tracer
- (d) Pentagraph
- (e) Planimeter

8

Ref. Books:

1. "Surveying" Vol. I & II – Arora R. – Khanna Pub., Delhi
2. "Surveying" Vol. I & II – Arora K.P. – Standard Book House, Delhi
3. "Surveying" Vol. I & II. –B.C. Punmia

PUBLIC HEALTH ENGG.-II

(DCE-404)

L T P

3 1

0

UNIT-I

Introduction:

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.

Quantity of Sewage:

6

Sewage: Domestic, industrial and storm water. Volume of domestic sewage (DWF), variability of flow, limiting velocities in sewers. Use of table as per I:S 1742-1983 to determine relationship between gradient, diameter, discharge and velocity.

UNIT-II

Sewerage Systems:

Types of sewerage systems separate, combined and partially separate. Sewers : Stone ware, cast iron, concrete and masonry sewers their sizes and joints. Appurtenances: (Location, function and construction) manholes, drop manhole, lamp hole catch basin, inverted syphon, flushing tanks, ventilating shafts and storm water flows. 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. Construction of surface drains and different sections required.

8

UNIT-III

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

installation. Traps, seal in traps, causes of breaking of seal, precautions taken, Gully, Intercepting

and Grease traps. Testing of house drainage.

8

UNIT-IV

Rural Sanitation:

Drainage: Topography, alignment of lanes and bylanes, storm water, natural passage, development of drains, alignment, size and gradient. Phase Programme. Disposal of night soil and village latrines :

Collection and disposal of garbage and refuse. Septic tanks, cess pools/soak pit (design of septic tank, soak pit/cess pools), privy pit and bore hole latrines. Biogas plant, constructional details, uses and maintenance.

Guide lines for future development of village. 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.

8

UNIT-V

Sewage Disposal

General composition of sewage, importance & method of determination of O.D., B.O.D. and C.O.D.

Disposal methods. Land disposal, disposal by dilution and disposal in sea. Merits and demerits.

Nuisance due to disposal, self purification of streams, conditions of disposal.

Sewage Treatment:

Meaning and principle of primary and secondary treatment, constructional details of screening

chamber, grit chamber, clarifier, trickling filters, secondary clarifiers/aeration tank. Sludge treatment, sludge digestion, sludge drying; sludge disposal. Oxidation ponds.

Ref. Books:

1. "Public Health Engg. – S.K. Garg
2. "Public Health Engg. - Rangwala

BUILDING CONSTRUCTION AND MAINTENANCE ENGG.-II

(DCE-405)

L T P

3 1 0

UNIT-I

Damp Proofing

Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, damage to aesthetic appearance. Damage to heat insulating materials, Damage to stored articles and health.

Types of dampness-moisture penetrating the building from outside e.g. rainwater, surface

water, ground moisture. Moisture entrapped during construction i.e. moisture in concrete, masonry construction and plastering work etc. Moisture which originates in the building itself i.e. water in kitchen and bath rooms etc. Damp proofing materials and their specifications rich concrete and mortar, bitumen, bitumen mastic. Methods of damp proofing basement, ground floors, plinth and walls, special damp proofing arrangements in bathrooms, W.C. and Kitchen, Damp Proofing for roofs and window sills. Plinth Protection and Aprons.

UNIT-II

Floors

Ground floors:

Glossary of terms-floor finish, topping, under layer, base course, rubble filling and their purpose. Types of floor finishes-cast in situ concrete flooring (monolithic, bonded) Terrazo tile flooring. Terrazo flooring,

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

Upper floors:

Flooring on RCC Slab.

Flooring on R.B. Slab.

Roofs:

Glossary of terms for pitched roofs-batten, eaves, barge, fascia board, gable hip, lap, purlin,rafter, rag bolt, valley,ridge. Pitched roof, steel trusses, fink truss, arched trusses, North light truss. 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. Drainage arrangement for pitched roofs. Concept of Flat roofs, RCC, RB, Coffer & folded slabs. Drainage arrangements for flat roofs. 8

UNIT-III

Stairs and staircase:

Glossary of terms:Stair case winders landing, strings, newel, baluster,riser,tread,width of staircase, hand rail, nosing. 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. 6

UNIT-IV

Surface Finishes:

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

Painting-preparation and application of paints on wooden,steel and plastered wall surfaces. White washing, colour washing and distempering. Application of cement and plastic paints. Commonly used water repelants for exterior surfaces,their names and application. 8

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 (no construction detail). 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.

UNIT-V

Principles of Maintenance

Definition, of maintenance, decay and deterioration of building/building camponents. Sources and cuases of deterioration and decay in building. Factors influencing the decision to carry out maintenance of building.

Maintenance Practice 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.

10

Ref. Book:

“Building Construction” – B.C. Punmia

CONCRETE TECHNOLOGY-II

(DCE-406)

L T P

3 1 0

UNIT-I

Form Work:

Concept of factors affecting the design of form work (shuttering and staging) Materials used for form work.

Sketches of form work for column, beams slabs. Stripping time for form work as per IS (No problems on the design of form work). Removal of formwork. 6

UNIT-II

Precautions to be taken before, during and after RCC Construction. (vii) Special type of formwork

Concrete Operations: Storing

Cement:

Storing of cement in the warehouse.

Storing of cement at site.

Effect of storage on strength of cement.

Aggregate:

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

Batching:

Batching of cement.

Batching of aggregate:

Batching by volume, using gauge box, selection of proper gauge box,

Batching by weight-spring balances and by batching machines.

Measurement of water.

Mixing

Hand mixing

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

Maintenance and care of machines.

Transportation of Concrete:

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

Placement of Concrete:

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 vibrators and immersion vibrators. Suitability of concrete mixes for compaction with vibrators. Selection of suitable vibrators for various situations.

(vii) Finishing concrete slabs-screeding, floating, and trowelling.

(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.

UNIT-III

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

Impermeability.

Dimensional changes.

(iii) Admixture (uses and effect)

Accelerators and retarders.

Air entraining agents.

Water reducing and set controlling agents.

UNIT-IV

Quality Control at site:

Control tests on cement, aggregate water and concrete. Concept of quality control.

Hot Weather Concreting:

Effect of high temperature on concrete strength with refernce to mass concreting, cooling of concrete materials, precautions before, during and after concreting, Use of retarders.

Cold Weather Concreting:

Effect of low temperature on concrete strength,

Heating of concrete materials. Precaution before, during and after concreting. Use of accelerators. 8

UNIT-V

Repair and Maintenance

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

Special types of concrete

General idea of special types of concrete ,

High strength concrete, fibre reinforced concrete, polymer concrete, ferrocement concrete.

readymix concrete.

6

Ref. Book :

“Concrete Technology” Theory & Practice – Shetty M.S. – S. Chand & Co. Ltd.

SOIL MECHANICS LAB

(DCE-451)

L T P

0 0 3

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 test.
9. Determination of field density of soil by sand replacement and core cutter methods.
10. Demonstration of Standard Penetration Test.

SURVEYING-I LAB

(DCE-453)

L T P

0 0 3

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 atleast 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 Ceylone Ghat 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.

PUBLIC HEALTH ENGG. LAB

(DCE-454)

L T P

0 0 3

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 and calculate
Oxygen Demand (OD), Biological Oxygen Demand (BOD)
Chemical Oxygen Demand (COD)
 5. To determine and Calculate
 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 hardness of water.
 10. To determine available chlorine in bleaching powder.
 11. To perform field test for the detection of nitrate 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 Population 1lacs)
 - b. Sewage treatment plant for 5 lac to 10 lac population

- c. Sewage disposal work
- d. Construction site for layout of water supply & sewerage system.
- e. Industrial effluent treatment plant