

3.5 BUILDING CONSTRUCTION

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RATIONALE

Diploma holders in Civil Engineering are supposed to effectively supervise construction of buildings. Effective supervision is essential to obtain/provide a fault free service from contractors to users. To perform above task, it is essential that students should have knowledge of various sub components of buildings like foundations, walls, roofs, staircases, floors etc., and their constructional details as well as preventive, remedial and corrective methods of common construction faults. Therefore, the subject of Building Construction is very important for Civil Engineering diploma holders.

COURSE OUTCOMES

After undergoing the subject, the students will be able to:

- CO1: Explain different types of walls, scaffolding, shoring, underpinning and their constructional methodology
- CO2: Carry out the construction of brick wall.
- CO3: Supervise rubble and ashlar types of stone masonry construction
- CO4: Select different types of doors, windows, floors and stairs cases in building
- CO5: Recognize different parts of roof trusses and drainage system of roofs
- CO6: Evaluate the possible reason of dampness at various level in building and remedial means

DETAILED CONTENTS

UNIT I

1. Foundation

- 1.1 Introduction: Definition of a building, Different parts of a building, classification of buildings
- 1.2 Types of foundation – Shallow foundation (thumb rules for depth and width of foundation) and Deep foundation

- 1.3 Excavation of foundation – Trenches, Shoring, Underpinning, Timbering and De-watering
- 2. Walls**
- 2.1 Classification of walls based on load - Load bearing, non-load bearing, retaining walls
- 2.2 Classification of walls as per materials of construction
- 2.3 Partition walls: Constructional details, suitability and uses of brick and wooden partition walls
- 2.4 Scaffolding, construction details and suitability of mason's brick layers and tubular scaffolding.

UNIT II

3. Masonry Work

- 3.1 Glossary of terms used in brick masonry - Header, Stretcher, Queen closer, King closer etc.
- 3.2 Brick Masonry Bonds – English and Flemish Bonds
- 3.3 Construction of brick walls – New wall Construction, Methods of bonding new brick work with old (Toothing and Raking Methods)
- 3.4 Mortars: types, selection of mortar and its preparation

4. Arches and Lintels

- 4.1 Glossary of terms used in arches -Intrados, Extrados, Crown, Key stone etc.
- 4.2 Types of Arches – Semi-circular, Segmental and Parabolic arches
- 4.3 Lintels – Cast-in-situ and pre-cast lintels

UNIT III

5 Doors and Windows

- 5.1 Glossary of terms used – Door Frame, Door Shutter, Hold fast, Horns, Jamb, Reveal, Soffit, Styles, Rails: Top, Bottom and Lock rails etc.
- 5.2 Doors and window frames – Materials and Sections, Fixtures and Fasteners
- 5.3 Doors – Framed and Panelled door, Glazed or sash door, Flush door, Sliding door, Rolling steel shutter doors
- 5.4 Windows – Fixed window, Sliding window, Glazed or sash window, Corner window
- 5.5 Ventilators

6. Damp Proofing and Water Proofing

- 6.1 Dampness and its ill effects in buildings
 - 6.2 Sources of dampness in building
 - 6.3 Damp proofing of basement, Plinth and walls, Kitchen, Washroom, Roof
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UNIT IV**7. Floors**

- 7.1 Glossary of terms used – Floor finish, Topping, Under layer, Base course, Rubble filling and their purpose
- 7.2 Types of floor finishes – Concrete flooring, Ceramic tile flooring, Stone (marble and kota) flooring, Wooden flooring
- 7.3 Special emphasis on level / slope / reverse slope in bathrooms, toilets, kitchen, balcony

8. Roofs

- 8.1 Types of roofs, concept of flat and pitched roofs
- 8.2 Glossary of terms for pitched roofs – Batten, Eaves, Facia board, Gable, Hip, Lap, Purlin, Rafter, Rag bolt, Ridge, Rain water gutter, Anchoring bolts
- 8.3 False ceilings – Gypsum false ceiling, POP false Ceiling, PVC false ceiling, Wooden false ceiling, Cellotex false ceiling

UNIT V**9. Stairs**

- 9.1 Glossary of terms used in stairs: Landing, Stringer, Newel, Baluster, Riser, Tread, Width of staircase, Hand-rail, Nosing
- 9.2 Types of stairs on the basis of materials used: RCC and Steel stairs
- 9.3 Various types of layout – Straight flight, Dog legged, Quarter turn, Half turn
- 9.4 Ramps and Elevators – Excavation and construction
- 9.5 Escalators pits and landings – Excavation and construction

10. Surface Finishes

- 10.1 Plastering – Plain plaster, Stone cladding and Tile work
- 10.2 Pointing – Different types of pointing and their methods
- 10.3 Painting – Preparation of surface, Primer coat and application of paints on wooden, steel and plastered wall surfaces
- 10.4 Selection of appropriate paints/finishes for interior and exterior surfaces

PRACTICAL EXERCISES

- 1. Demonstration of tools and plants used in building construction
 - 2. To prepare Layout of a building: 2BHK with front verandah
 - 3. To construct brick bonds (English Bond) in One, One & half and Two brick thick:
 - (a) Walls for L, T and Cross Junction
 - (b) Columns
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4. To construct brick bonds (Flemish Bond) in One, One & half and Two brick thick:
 - (a) Walls for L, T and Cross Junction
 - (b) Columns
5. Demonstration of “Timbering of Excavated Trenching” through a model and visit at construction site
6. Demonstration of “Laying Damp Proof Courses” through a model and visit at construction site
7. Demonstration of “Construction of Masonry Walls” through a model and visit at construction site
8. Demonstration of “Brick Layers Scaffolding” through a model and visit at construction site
9. Demonstration of “Steel Scaffolding” through a model and visit at construction site
10. Demonstration of “Laying of Vitrified Tile Flooring” through visit at construction site
11. Demonstration of “Plastering and Pointing Exercise” through visit at construction site
12. Demonstration of “Constructing RCC work – Foundations, Columns, Beams and Slabs” through visit at construction site
13. Demonstration of “Pre-construction and post construction termite treatment of building and woodwork” through visit at construction site
14. Demonstration of “False Ceiling” through visit at construction site
15. Demonstration of “Interlocking Tiles” through visit at construction site

RECOMMENDED BOOKS

1. SC Rangwala, "Building Construction", Charotar Book Stall, Anand.
2. GJ Kulkarni, "A Text Book of Building Construction", Ahmedabad Book Depot.
3. SP Arora, and SP Bindra, "A Text Book of Building Construction", Dhanpat Rai and Sons, New Delhi.
4. Sushil Kumar, "Building Construction", Standard Publishers Distributors, Delhi.
5. SP – 62 “Hand Book of BIS”.
6. B.I.S. – 6313 Part 1, 2, 3
7. National Building Code
8. PN Khanna, “Handbook of Civil Engineering”.
9. Video films on Damp proofing, water proofing, surface finishes
10. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR

SUGGESTED WEBSITES

1. <http://swayam.gov.in>

INSTRUCTIONAL STRATEGY

While imparting instructions in this subject, teachers are expected to take students to work site and explain constructional process and special details for various sub-components of a buildings. It is also important to make use of audio visual aids/video films (if available) to show specialised operations. The practical work should be given due importance and efforts should be made that each student should perform practical work independently. For carrying out practical works, polytechnics should have construction yard where enough raw materials is made available for students to perform practical work. This subject contains five units of equal weightage.