BUILDING SERVICES I

ENCE 358

Lecture	**: 2**	**Year : III**
Tutorial	**: 0**	**Part : II**
Practical	**: 3/2**	

Course Objectives:

The objective of this course is to provide foundation to design and integrate building-level water supply and sanitary systems within architectural projects of varying types, including internal plumbing, water supply and external drainage within the building and its site.

1 Building Plumbing Systems (2 hours)

- 1.1 Definition and scope
- 1.2 Water supply and sanitary drainage (Cold water, hot water, wastewater, soil water)
- 1.3 Components of building plumbing system (Supply, distribution, collection, disposal)
- 1.4 Plumbing fixture units, symbols and drawing standards

2 Water Sources and Service Entry (2 hours)

- 2.1 Water sources: Rainwater, surface and groundwater
- 2.2 Service connections to buildings: Municipal supply, tanker supply
- 2.3 Water conservation at the building level
  - 2.3.1 Rainwater harvesting: Roof-top collection and recharge
  - 2.3.2 Grey water reuse: Basic concept

3 Water Demand and Storage (4 hours)

- 3.1 Water demand for building: Residential and public buildings
- 3.2 Peak demand and usage variation
- 3.3 Demand forecasting and standards
- 3.4 Storage systems: Underground tank (UGT), overhead tank (OHT)

4 Water Supply and Distribution (5 hours)

- 4.1 Direct and indirect supply systems
- 4.2 Down-feed and up-feed systems
- 4.3 Pipe materials, fittings and valves
- 4.4 Internal distribution layout: Horizontal and vertical routing
- 4.5 Multi-storey pressure zoning: Conceptual understanding
- 4.6 Hot and cold-water systems: Basic integration
- 4.7 Leakage prevention and maintenance

5 Wet Core Planning and fixtures (2 hours)

5.1 Planning principles for toilets and kitchens
5.2 Fixture placement standards and usability
5.3 Vertical shafts and wet core alignment
5.4 Slab drop coordination
5.5 Slab drops and waterproofing interfaces

6 Sanitary Drainage and Vent Systems (5 hours)

6.1 Sources and characteristics of wastewater
6.2 Soil and waste pipe systems
6.3 One-pipe, two-pipe and single-stack systems
6.4 Pipe materials, gradients and fittings
6.5 Traps (P-trap, S-trap, floor trap, bottle trap, gully trap)
6.6 Horizontal branch drainage system: Fixture drains and branch pipes
6.7 Anti-siphonage and venting principles
6.8 Vertical stacks: Soil, waste and vent

7 External Drainage within Plot (4 hours)

7.1 Transition from building to external drainage
7.2 Inspection chambers and manholes: Location, spacing, function
7.3 House drainage layout within the plot
7.4 Pipe alignment and gradients
7.5 Stormwater and sewage: Basic separation
7.6 Disposal methods: Municipal sewer, septic tank, soak pit

8 On-Site Sanitation and Sustainable Water Management (3 hours)

8.1 Septic tank: Working principle, size and layout
8.2 Soak pits and recharge systems
8.3 Greywater reuse strategies at the building level; Constructed wetland
8.4 Rainwater harvesting integration
8.5 Water-efficient fixtures and demand reduction

9 Stormwater, Rainwater and Solid Waste Management (3 hours)

9.1 Stormwater drainage within the site
9.2 Recharge pits and surface drainage
9.3 Runoff estimation: Conceptual approach
9.4 Solid waste flow system and design integration

Practical (22.5 hours)

1. Preparation of site plan showing manhole, septic tank, soak pit, underground and overhead storage
2. Detailed plan: Lay out diagram of water supply system and layout of complete wastewater treatment system

3. Floor plan: Kitchen and toilet showing appliances and appurtenances
4. House plumbing layout system
5. Miscellaneous detail: Septic tank, soak pit, overhead tank, pipe layout, sedimentation tank, filtration, screening, drainage system, different appliances, fitting and appurtenance, rainwater collection from different types of buildings, solar heating
6. Solid waste collection container lay out map, chute from high rise building

Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapter	Hours	Mark distribution*
1	2	2
2	2	2
3	4	4
4	5	5
5	2	2
6	5	5
7	4	4
8	3	3
9	3	3
Total	**30**	**30**

* There may be minor deviation in marks distribution.

References

1. Barry, R. (2005). The construction of buildings (Vol. 5): Building services. Blackwell Publishing.
2. Birdie, G. S., Birdie, J. S. (2010). Water supply and sanitary engineering. Dhanpat Rai & Sons.
3. Ching, F. D. K. (2019). Building construction illustrated. John Wiley & Sons.
4. Kumar, S., Clark, R. (2020). Water supply engineering. McGraw-Hill Education.
5. Panchadhari, A. C. (2014). Water supply and sanitary installations. New Age International Publishers.
6. Tyagi, S., Sharma, R. (2018). Rainwater harvesting: Techniques and applications. Springer.
7. Tchobanoglous, G., Burton, F. L., & Stensel, H. D. (2014). Wastewater engineering: Treatment and resource recovery. McGraw-Hill Education.