BUILDING TECHNOLOGY

ENCE 255

Lecture : 2 **Year : II**
Tutorial : 2 **Part : II**
Practical : 0

Course Objectives:
To introduce functional requirement of building, its component, special work, special treatment in building and sustainable building

1 Introduction (2 hours)

1.1 Built environment
1.2 History of building technology and Nepalese buildings
1.3 Classification of building based on occupancy, storey and height
1.4 Loads on building

2 Functional Requirement of Building (5 hours)

2.1 Orientation and planning of building (factors and site selection)
2.2 Lighting and thermal performance (daylight, artificial lighting, heat phenomena, thermal comfort and thermal performance)
2.3 Ventilation and air conditioning (functional requirement, natural and mechanical ventilation, air conditioning)
2.4 Sound and acoustic (characteristics, types, common defect)

3 Sub-structure and Superstructure Works (6 hours)

3.1 Sub-structure (Site exploration; foundation and its types; excavation of foundation on soft soil, hard rock, wetland and sloppy land; trenches for pipes and refiling works)
3.2 Load bearing structure
  3.2.1 Stone masonry (Rubble and ashlar); composite, hollow block, autoclaved aerated cement block and compressed stabilized earthen block masonry; cavity wall; concrete 3D printing
  3.2.2 Wall finishes (Tools, methods and defects in plastering; pointing types; painting on wooden, metal and masonry surface)
3.3 Frame Structure
  3.3.1 Reinforced cement concrete structure (Precast and cast-in-situ construction; formwork for wall, slab, staircase, beam and column; slip formwork; timbering for trenches; partition and parapet wall)

3.3.2 Steel Construction (Advantage and disadvantage, steel section, bolted and welded connection)
3.3.3 Joint types (expansion, construction and seismic); location and sealing of joint

4 Building Components and services (7 hours)

4.1 Doors and windows (Location, shape, size, terminology and fixing process; types based on shutter and working mechanism; ventilators)
4.2 Horizontal and vertical circulation (Corridors; ladder and its types; stair types and planning; lift and escalator; ramps)
4.3 Flooring (Solid and suspended floor; flooring types)
4.4 Roof (Terminology; types of pitched roof; roof covering)
4.5 Building services
4.5.1 Plumbing (water distribution system, sanitary fittings, septic tank and soak pit)
4.5.2 Electrification (wiring systems, lightening arrester and safety precaution)

5 Special Works on Building (7 hours)

5.1 Shoring, scaffolding and underpinning
5.2 Fire Protection (Fire resistant walls and columns, floors and roof, openings; fire extinguishing equipment)
5.3 Moisture movement, damp proofing methods and materials
5.4 Termite types and anti-termite treatment process
5.5 Thermal insulation (Insulating material; insulation of roofs, exposed walls, door and windows)
5.6 Sound insulation (Sound absorption and absorbents; insulating material; wall and floor insulation)
5.7 Seismic safety requirements (Building configuration; size and location of openings; earthquake resisting elements)
5.8 Repair and restrengthening (Structural and non-structural cracks; repair of cracks; retrofitting techniques for masonry and reinforced cement concrete structures)
5.9 Demolition of structures (steps before demolition and methods)

6 Sustainable Building (3 hours)

6.1 Concept and principles; rating system
6.2 Sustainable building construction methods (techniques and strategies)

Tutorial (30 hours)

There shall be related tutorials exercised in class and given as regular homework exercise. Tutorial can be as following for each specified chapters

1. Site plan, trench plan, floor plan and elevation
2. Foundation structure

3. Brick bonds (1 and 1-1/2 brick) and tools for masonry structures
4. Parapet wall and cavity wall detail
5. Timbering of trenches
6. Formwork and its components for slab, column beam and staircase
7. Detailing of door frames and shutters
8. Staircase plan, section and layout
9. Isometric view, plan and sections of lift and escalators
10. Isometric view, plan and section of scaffolding, shoring and underpinning
11. Pipe layout, septic tank and soak pit
12. Plumbing and electrical network
13. Case study on sustainable 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	Marks distribution*
1	2	2
2	5	5
3	6	6
4	7	6
5	7	7
6	3	4
Total	**30**	**30**

* There may be minor deviation in marks distribution.

References

1. McKay, W. B., McKay, J. K. (1961). Building Construction. United Kingdom: Longmans.
2. Chudley, R., Greeno, R. (2016). Building Construction Handbook. United Kingdom: CRC Press.
3. Reid, E. (2013). Understanding Buildings a Multidisciplinary Approach. United Kingdom: CRC Press.
4. Punmia, B. C. (2008). Building Construction. India: Laxmi Publications Pvt Limited.
5. Kumar, S. (2006). Building Construction. India: Standard Publishers Distributors.
6. Kubba, S. (2012). Handbook of Green Building Design and Construction: LEED, BREEAM, and Green Globes. Netherlands: Elsevier Science.
7. Kibert, C. J. (2016). Sustainable Construction: Green Building Design and Delivery. United Kingdom: Wiley.
8. Building Codes