Building System, Safety and Services

01CI0719

Objective of the Course:

- To equip students with comprehensive knowledge and understanding of maintenance and repair issues in civil engineering, emphasizing plumbing and electrical systems.
- To familiarize students with the practical aspects of plumbing systems, including water storage, distribution, and maintenance, as well as electrical system installations and safety measures.
- To introduce students to safety protocols and regulations in the construction industry, emphasizing the importance of safety management in Indian construction practices.
- To provide students with hands-on experience and practical skills in implementing safety measures across different phases of construction projects, focusing on substructure, superstructure, and finishing phases.

Credit Earned: 03

Pre-Requisite: Building Construction, Building Planning and Drawing

Student's learning outcomes:

After successful completion of the course, it is expected that students will be able to,

1. Identify and address maintenance and repair challenges in Plumbing and Electrical systems within a civil engineering career area.
2. Demonstrate practical skills in designing, installing, and maintenance of plumbing systems such as water storage, distribution, and drainage systems.
3. Recognize safety regulations and emergencies in the building construction industry or any other construction field.
4. Apply safety measures from the ground level and up to the completion stage is a notable aspect that comes with completion of the substructure, superstructure, and finishing field of specialization.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	00	00	03	50	30	20	25	25	150

Detailed Syllabus

Sr. No.	Title of the unit	Number of Hours
1	**Introduction**	**03**
	Definitions, Objectives and uses of services, Applications of services for different types of building considering, Classification of building services, Types of services, and selection of services	02
	Role and Responsibility of Building Service Engineering, Building Management Services, Basic Concept of Smart Building.	01
2	**Building System and Services**	**15**
	Plumbing: Importance, Water storage & distribution, heating method, Hot and Cold-water supply, dual pumping, pipe fittings, maintenance of plumbing systems, drainage system components, types & design, Different Pipe material, joints, fitting and valves.	03
	Electrical: Electrical system installations, technical terms and symbols for electrical installations and Accessories of wiring, electrical controls and safety devices like fuse, circuit breakers, lighting arresters etc., electrical wiring systems- material & specifications, electrical layout for residence, industrial and commercial buildings, school building.	03
	Lighting and Ventilation: Natural and artificial lighting principles and factors, Arrangement of luminaries, Distribution of illumination, Installation of lights, Lamp selection based on size of room, and Utilization factors. Necessity of Ventilation, Types, Natural and Mechanical, Factors to be considered in the design of Ventilation	03
	Vertical Transportation: Different types of elevators and Escalators, Freight elevators, Passenger elevators, Hospital elevators, Uses of different types of elevators Escalators, Design Considerations, Location, Sizes, Component of Lifts, Necessity of Ramps, Design Consideration, Gradient Calculation for Ramp, Layouts and Special Features for Physically Abled and Elder people.	03
	Air Conditioning: Definition, Purpose, Principles, Temperature Control, Air Velocity Control, humidification, dehumidification, air circulation, Humidity Control, Air Distribution system, Cleaners, Filters, Spray washers, Electric preceptors, Types of Air Conditioners, Central type, Window Type, Split Unit.	03
3	**Miscellaneous Services**	**10**
	Solar water Heating: Concept of Solar water heating, components, design principle, installation, maintenance, life cycle energy assessment.	02
	Acoustics: Building Acoustics, Requirement of good Acoustic, Objective, Acoustic Control in building, material like absorber and cavity resonators.	02
	Fire Protection: Causes of fire and Effects of fire, General Requirements of Fire Resisting building as per IS and NBC 2005, Characteristics of Fire Resisting materials, Fire Fighting Installations for Horizontal Exit, Roof Exit / Fire Lifts, and External Stairs.	03

	Rain Water Harvesting: Concept, Application, Methods, Case Studies.	03
4	**Building Safety**	**14**
	Introduction to Indian Construction Industry, Importance & requirement of Construction Safety Management in Indian construction industry.	03
	Site requirement: site access, site boundary, site security, work's safe passage. Safety plan: emergency procedures, planning for the emergency, fire safety, first aid, on-site regulation.	03
	Substructure Phase: survey, site clearance, earthwork, Foundation work safety, welding and cutting work safety. Superstructure Phase: scaffolds, temporary structures, ladder safety and lift operation.	04
	Finishing Phase: roofing work, Painting and Plastering work, electrical safety, testing and commissioning. General requirement: hand power tool, traffic management, working over water, work permit.	04
	Total	**42**

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve an effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
15%	25%	20%	20%	15%	5%

Instructional Method and Pedagogy:

1. At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
2. Lectures will be taken in class room with the use of multi-media presentations, white board– mix of both.
3. Attendance is compulsory in lectures and laboratory which carries a 5% component of the overall evaluation.
4. Minimum two internal exams will be conducted and average of two will be considered as a part of 15% overall evaluation
5. Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval. It carries a weightage of 5%.
6. Surprise tests/Quizzes will be conducted which carries 5% component of the overall evaluation.

Recommended Study Material

1. A text book on Building Services, R. Udaykumar, Eswar Press, Chennai
2. Building Services, S. M. Patil, Seema Publication, Mumbai

3. National Building Code of India, Bureau of Indian Standards, New Delhi.
4. Building construction, B. C. Punamia, Laxmi Publication.
5. Building construction, P. C. Varghese, PHI Learning Ltd.
6. The A to Z of Building Construction and its management, Sandeep Mantri, Satya Prakashan.
7. Plumbing Design and Practice, S. G. Deolalikar, Mac-Graw Hill, New Delhi, 2004.
8. Principle of Fire Safety Engineering: Understanding fire and fire protection, Akhil Kumar Das, PHI Learning Ltd, 2014.
9. Construction Site Safety Handbook, Published by The Real Estate Developers Association of Hong Kong and The Hong Kong Construction Association
10. Introduction to Health and Safety at work by Phil Hughes, Ed Ferrett Third Edition, Published by Elsevier Limited.
11. Construction Safety Management by Raymond E.Levitt, Nancy M. Samelsove, 2nd Edition, Published by Wiley Publication Ltd.
12. Handbook of Health and Safety in Construction, 3rd Edition, published in 2006 by HSG150
13. SP70 Handbook on construction safety practices published Bureau of Indian Standards.
14. Building services handbook, Fred Hall, Roger Greeno, Butterworth-Heinemann, 2005

Web Links:

1. https://www.bis.gov.in/
2. https://bmsbuildingservice.com/
3. https://plumbingservices.com/