

Branch Name:	Civil Engineering
Semester/Year:	Semester VI / Third Year
Subject Title:	Building Services and Maintenance (Elective - I)
Subject Code:	1ET1060607
Pre-requisite:	Basic knowledge of Building Construction and Materials.

Course Objective:

- Understand basic concepts and principles of building services,
- Understand how buildings are utilized by users and circulation principles,
- Identify physical aspects of mechanical and electrical necessities in buildings,
- State fire safety requirements and regulations,
- Provide information about building services and their maintenance.
- Create awareness and impart knowledge about importance of maintenance of building services.

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
03	00	02	04	70	30	30	20	150

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	<u>Introduction:</u> Definitions, Classification of building services, Types of services and selection of services, Objective and uses of services.	02	5
2	<u>Building Water Supply and Drainage System:</u> Types of pipes used, laying jointing, testing, testing for water tightness plumbing system for building, internal supply in buildings, municipal bye laws and regulations, Sanitation in buildings, pipe systems, storm water drainage from buildings, septic tanks soak pits	06	15
3	<u>Electrification of Building:</u> Types of wires, wiring systems and control gears, planning electrical wiring for building, main and distribution boards.	04	10
4	<u>Ventilation and Air-conditioning:</u> Ventilation and its importance, natural and artificial systems, Air Conditioning: Definition, Purpose, Principles, Types of Air Conditioners, Window type and packaged air-conditioners, Central type, Window Type, Split Unit, chilled water plant, fan coil systems, water piping, Temperature Control, Air Velocity Control, Humidity Control, Air Distribution system, Cleaners, Filters, Spray washers.	08	18

5	<u>Safety in buildings:</u> Safety, Ability of systems to withstand fire, Preventive systems, Fire escape system design, planning considerations in buildings like Noncombustible materials, construction, staircases and A.C. systems, heat and smoke detectors, dry and wet risers, Automatic sprinklers, Capacity determination of OHT and UGT for firefighting needs.	05	12
6	<u>Mechanical Services in Buildings:</u> Lift- Types of Lifts, Freight elevators, Passenger elevators, Hospital elevators, Uses of different types of elevators Design Considerations, Location, Sizes, Component parts, Lift Well, Pit, Hoist Way, Machine, Buffer, Door Locks, Suspended Rope, Lift Car, Landing Door, Call Indicators, Call Push. Dumbwaiters- Different types of Dumbwaiters Uses of different types of Dumbwaiter. Escalators- Different types of Escalators. Conveyors- Different types of Conveyors moving ramps and walks, and their uses.	07	15
7	<u>Acoustic and Sound Insulations:</u> Requirement of good Acoustic, Factors to be followed for noise control in buildings	03	10
8	<u>Maintenance:</u> Definition, Need, Types of Maintenance, Maintenance of various services in buildings.	07	15

Course Outcome:

After learning the course the students should be able to:

1. Manage building services provisions in big construction sites.
2. Synchronize the construction activities with installation of building services.
3. Select the suitable electrical as well mechanical services for particular requirements of buildings.
4. Acquire knowledge of building services.
5. Supervise various building services maintenance.
6. Achieve overall performance and maintainability of building services.

Reference Books:

1. Building Services - By Prof. S. M. Patil
2. Text book on Building Services– By R. Udaykumar, Eswar Press, Chennai, ISBN- 13, 9788178740638. ISBN-10, 817874063X
3. Water supply and sanitary engineering – By S. C. Rangwala
4. Water supply and sanitary engineering – By G. S. Birdi
5. Plumbing: design and practice – By Deolalikar, S. G
6. Plumbing, By F Hall. F.A.
7. A.F.C. Sherratt, “Air-conditioning and Energy Conservation”, The Architectural Press, London,
8. National Building Code
9. Fire Safety in Buildings by V. K. Jain, New Age International, ISBN : 978-81-224- 3083-7 Publication Year : 2010
10. Designing for Fire Safety by E.C. Butcher and A.C. Parnell, John Wiley and Sons, 1993.
11. National Electrical code.
12. Electrical technology (part I,II & III) – By B.L. Theraja, A.K. Theraja
13. Principles of power systems – By V.K. Mehta
14. Handbook of electrical engineering – By S.L. Bhatia
15. Energy Economics and Build Design– by William T. Mayer, McGraw-Hill Book, Company, 1983.
16. Maintenance of Buildings By A C Panchdhari, 2006, New Age International, ISBN: 812241012X, 9788122410129
17. William H.Severns and Julian R.Fellows, “Air-conditioning and Refrigeration”, John Wiley and Sons

IS Codes

1. IS: 1172 - 1972, Basic requirements for water supply, drainage and sanitation.
2. IS: 2065 – 1983, Code of practice for water supply in buildings.
3. IS: 2064 – 1983 ,Code of practice for selection, installation & maintenance of sanitary Appliances

LIST OF PRACTICALS :

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills (outcomes in psychomotor and affective domain) so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

- 1 Draw scheme for water supply for a given building
- 2 Draw detailed scheme for house drainage and sanitary fixtures for a given building
- 3 Plan and draw in detail ventilation and air-conditioning for a given building
- 4 Design acoustics for a given building.
- 5 Plan movement facilities: Lifts, escalators, ramps etc. for a given public building

E - Resources:

1. www.nptel.ac.in