Lok Jagruti Kendra University
University with a Difference

Diploma in Civil Engineering

LJ Polytechnic

Course Code:025050504

Building Services

Programme / Branch Name			Diploma in Civil Engineering			
Course Name	Building Services				**Course Code**	025050504
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses BSC: Basic Science Courses
ESC: Engineering Science Courses PCC: Program Core Courses
OEC: Open Elective Courses PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week				Evaluation Scheme			
L	**T**	**P**	**Total Credit**	**CCE**	**SEE (Th)**	**SEE (Pr)**	**TOTAL**
3	0	2	4	50	50	50	150

Legends:
L: Lectures T: Tutorial P: Practical
CCE: Continuous & Comprehensive Evaluation
SEE (Th): Semester End Evaluation (Theory)
SEE (Pr): Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Construction Technology
- ✓ Civil Engineering Workshop

3. Rationale

A building should be designed such that it provides better lighting, comfortable space, temperature, and air quality, convenient power and communication capability, and reliable systems for the protection of life and property. Building services enhance the dwelling experience, making the building work. An electrical services, mechanical services such as air conditioning, ventilation, fire protection and sound insulation, have become the most essential services for buildings. No building can be put into effective utilization without all these services. Understanding building services requires a basic knowledge of the essentials and the current trend in technology to acquire the needs of humans. The new advanced construction is adopted by engineers, architects, designers. Therefore civil engineering students must understand the basic principles, installations, operations and maintenance of building services.

4. Objectives

- ✓ To gain knowledge about fire protection.
- ✓ To understand the general fire safety requirements for building.
- ✓ To understand requirements of ventilation in building.
- ✓ To understand thermal insulation for various components of building.
- ✓ To gain knowledge about acoustics and sound insulation.
- ✓ To prepare plumbing plan for building.
- ✓ To get basic knowledge about electricity supply.

5. Contents

Unit No.	Unit Name	Topics	Learning Outcomes	% Weightage	Hours
1.	**Fire Protection**	1.1. Introduction 1.2. Fire Hazards 1.3. Fire Load 1.4. Grading of Structural Elements 1.5. Grading of Buildings According to Fire Resistance 1.6. Characteristics of Fire Resisting Materials 1.7. Fire Resisting Properties of Common Building Materials 1.8. General Fire Safety Requirements For Building 1.9. Fire Resistant Construction 1.10. Fire Alarms 1.11. Fire Exitinguishing Equipments	• Explain Importance of Fire Safety Requirements in Building. • Understand Fire Resisting Property of Common Building Materials. • Understand the General Fire Safety Requirements for Building.	20	10
2.	**Ventilation, Air Conditioning and Thermal Insulation**	2.1. Ventilation 2.1.1. Ventilation: Definition and Necessity 2.1.2. Functional Requirements of Ventilation System 2.1.3. Systems of Ventilation 2.1.4. Natural Ventilation 2.1.5. Mechanical Ventilation 2.2. Air Conditioning 2.2.1. Essentials of Comfort Air Conditioning 2.2.2. Systems of Air Conditioning 2.2.3. Essentials of Air Conditioning System 2.3. Thermal Insulation 2.3.1. Heat Transfer : Basic Definitions 2.3.2. Thermal Insulating Materials 2.3.3. General Methods of Thermal Insulation	• Understand Necessity of Ventilation, Air Conditioning and Thermal Insulation in Building. • Explain Function Requirements of Ventilation System. • Understand Methods of Air Conditioning and Thermal Insulation.	25	12

		2.3.4. Thermal Insulation of Roof 2.3.5. Thermal Insulation of Exposed Wall 2.3.6. Thermal Insulation of Exposed Doors and Windows			
3.	**Acoustics and Sound Insulation**	3.1. Introduction 3.2. Characteristics of Audible Materials 3.3. Behaviour of Sound in Enclousers 3.4. Reflection of Sound 3.5. Reverberation 3.6. Absorption 3.7. Acoustical Design of Halls 3.8. Acoustics of Studios 3.9. Sound Insulation	• Understand Characteristics of Audible Materials. • Learn about Acoustical Design of Hall. • Knowledge about Sound Insulation.	20	7
4.	**Plumbing for Buildings**	4.1. Introduction: Plumbing Services 4.2. Water Distribution System 4.3. Materials for Service Pipes 4.4. Service Connection 4.5. Size of Service Pipe 4.6. Water Meter 4.7. Valves 4.8. Storage Tank 4.9. House Drainage : General Principles 4.10. Pipe and Traps 4.11. Sanitary Fittings 4.12. System of Plumbing 4.13. House Drainage Plan	• Knowledge about Plumbing Services. • Understand House Drainage Principles. • Explain System of Plumbing. • Knowledge about Sanitary Fittings.	20	7
5.	**Electricity Supply**	5.1. Planning of Electrical Supply System 5.2. Location of Main Switches 5.3. Wiring 5.4. Materials and DevicesUsed in Wiring 5.5. Earthing 5.6. Inspection and Testing of Installation	• Understand Planning of Electrical Supply System. • Knowledge about Materials and Devices Used in Wiring. • Understand Inspection and Testing of Installation.	15	6
				Total Hours	**42**

6. List of Practicals / Exercises

The practicals/exercises have been properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/programme outcomes. Following is the list of practicals/exercises.

Sr. No.	Practical / Exercises	Key Competency	Hours
1.	Prepare a report on fire safety requirements for buildings as per IS: 1641-1960.	Understand the Measures of Fire Safety.	2
2.	Prepare a report of case study for the fire fighting services for commercial building in the nearby area.	Understand the Fire Fighting Service.	4
3.	Prepare a report on a functional requirements of ventilation system.	Knowledge about Functional Requirements of Ventilation.	2
4.	Prepare a report on an air conditioning systems and essentials of air conditioning system.	Understand Systems of Air Conditioning.	2
5.	To carry out market survey for various acoustics materials and prepare a report.	Knowledge about Acoustic Materials and Availability.	4
6.	Prepare a design considerations for acoustical design of halls.	Design of Acoustic Hall.	2
7.	To carry out market survey for various thermal insulating materials and prepare a report.	Knowledge about Thermal Insulating Materials and Availability.	4
8.	Prepare a report on sound insulating materials.	Microsoft Word Skill.	2
9.	To conduct a residential or commercial site visit where electric and plumbing work are in progress and prepare a report on it.	Knowledge about Electrification work, Plumbing work.	6
		Total Hours	**28**

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	App %	C %	E %	An %
1.	Fire Protection	30	30	35	0	5	0
2.	Ventilation, Air Conditioning and Thermal Insulation	30	35	30	5	0	0
3.	Acoustics and Sound Insulation	20	40	35	5	0	0
4.	Plumbing for Buildings	25	40	30	5	0	0
5.	Electricity Supply	25	40	30	5	0	0

Legends: R: Remembering U: Understanding
App: Applying C: Creating
E: Evaluating An: Analyzing

8. Textbook

1) Building Construction by Dr. B.C. Punmia, Laxmi Publications Ltd.

9. Reference Books

1) Building Construction by S.P. Arora and Bindra, Dhanpat Rai Publications.
2) Building Construction by S.S Bhavikatti, Vikas Publishing House Pvt. Ltd.
3) Building Construction by S.C. Rangwala, Charotar Publishing House Pvt. Ltd.

10. Open Sources (Website, Video, Movie)

1) www.nptel.ac.in
2) https://nmc.gov.in/assets/admin/upload/download/National_Bild_CODE.pdf