

COURSE TITLE : BUILDING MAINTANANCE AND SERVICE
COURSE CODE : 5011
COURSE CATEGORY : E
PERIODS/WEEK : 4
PERIODS/SEMESTER : 52
CREDITS : 4

TIME SCHEDULE

MODULE	TOPICS	PERIODS
1	Durability of building	13
2	Failure and repair of building	13
3	Maintenance of building	13
4	Building services	13
Total		52

COURSE OUTCOME

Sl.	Sub	Student will be able to
1	1	comprehend expected life period of building by considering the different durability problems
	2	Understand the causes of failure of a building
	3	Understand the different methods of repair and retrofitting
2	1	Comprehend various methods of building maintenance.
	2	Understand different building services including new methodologies
	3	Plan and design various building services required in residential and commercial buildings.

SPECIFIC OUTCOME

MODULE – I

- 1.1.0 Understand the factors affecting durability and role of maintenance**
- 1.1.1 State the importance of durability of structures
 - 1.1.2 List the factors affecting the durability of a structure.
 - 1.1.3 State the expected durability of structures.

- 1.1.4 Identify the environmental factors that affect the durability of structures.
- 1.1.5 State the effect of various environmental factors on the durability structures.
- 1.1.6 Explain the effect of usage of structures on its durability
- 1.1.7 State the importance of maintenance on increasing the durability.
- 1.1.8 List different types of maintenance.
- 1.1.9 Explain each type of maintenance with an example.
- 1.1.10 Explain the economic aspects of maintenance.
- 1.1.11 Identify the planning aspects of maintenance.

MODULE – II

2.1.0 Understand the common defects in building components

- 2.1.1 Identify the types of cracks in building
 - 2.1.2. Identify defects in foundation, masonry, plastering, painting, flooring and in concrete (PCC & RCC)
 - 2.1.3. Identify deterioration of wooden structures
 - 2.1.4. Identify corrosion in steel structures & reinforcement.
 - 2.1.5. Identify the structural damages due to fire
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- 2.2.0 Analyse the causes, preventive and remedial measures for the defects in building components
 - 2.2.1 List the various factors influencing the defects in building components
 - 2.2.2 Explain the preventive and remedial measures for defects in building components
 - 2.2.3 List the causes of fire
 - 2.2.4 Explain the methods of rectification of structures subjected to fire

MODULE - III

3.1.0: Understand the common defects in building services, its causes, preventive and remedial measures.

- 3.3.1 Identify the common defects in staircase, water supply, sanitary, drainage and electrical systems.
 - 3.3.2 List out the preventive measures to avoid the common defects in building services.
 - 3.3.3 Explain the rectification measures for the common defects in building services.
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- 3.2.0 Understand the common terminologies and uses of components used in lifts, electrical installations, domestic wiring and LPG connection.
 - 3.2.1 Explain the common terminologies and uses of components used in lifts, electrical installations, domestic wiring and LPG connection.

MODULE – IV

4.1.0 Understand the retrofitting, restoration and conservation of buildings and heritages.

- 4.1.1 Define the terms retrofitting, restoration and conservation with regard to buildings and heritages.
- 4.1.2 State the need for retrofitting, restoration and conservation of buildings and heritages.

4.1.2 Explain different methods of retrofitting, restoration and conservation of buildings and heritages.

COURSE CONTENT

MODULE – I

Durability of civil engineering structures: – Importance of durability – Factors affecting durability of buildings – life expectancy of different classes of buildings. Environmental factors that affect the durability of structures – Effect of natural agents (Air, sun, rain, frost and biological agents such as vegetation & insects) – Environmental pollution – Effect of pollution of air, water and soil – Location effect (Marine, Industrial area etc.) – Usage aspects (Structures subjected to dynamical loading & abrasive condition) - Preventive and remedial measures.

Role of maintenance in durability and serviceability of buildings: – Necessity of maintenance – Economic aspects of maintenance. Different types of maintenance – Preventive maintenance – Remedial maintenance – Routine maintenance – Pre-monsoon maintenance - Special maintenance – Planning aspects of maintenance.

MODULE – II

Cracks in buildings – Defects in foundation, masonry, plastering, Painting, flooring, doors and windows, concrete (RCC and PCC) and wooden roof - Corrosion of reinforcement and steel structures – structural damage due to fire - Causes – Preventive and remedial measures

Cracks in buildings – Causes - Preventive and remedial measures

Defects in foundation – Causes - Preventive and remedial measures.

Defects in masonry – Causes - Preventive and remedial measures

Defects in wooden roof – Causes - Preventive and remedial measures

Defects in concrete (RCC and PCC) - Causes – Preventive and remedial measures

Corrosion of reinforcement and steel structures – Causes – Preventive measures.

Defects in plastering – Causes – Preventive and remedial measures

Defects in flooring – Causes – Preventive and remedial measures

Defects in doors and windows – Causes – Preventive and remedial measures

Defects in Painting – Causes – Preventive and remedial measures

Defects due to fire - Causes – Preventive and remedial measures

MODULE – III

Defects in Stair case, water supply system, sewage and sullage system, in drainage system and electrical system - Causes – Preventive and remedial measures. Defects in Stair case – Causes – Preventive and remedial measures.

Defects in water supply system – Causes – Preventive and remedial measures.

Defects in sewage and sullage system - Causes – Preventive and remedial measures.

Defects in drainage system - Causes – Preventive and remedial measures.

Defects in electrical system - Causes – Preventive and remedial measures. Building Services

Introduction to other building services (Topics under this section needs only brief description to understand their basic functions and requirements. Explanations with sketches are sufficient)

Lift – Location – RTT – Number of lifts – lift well and shaft – Machine room. Air conditioning system: Types of A/C – Capacity determination – Requirements for an A/C room. Electrical installations: Panel board & Buss bar, rising mains – distribution boards – MCB – ELCB – DP - TP and change over switch switches - Telephone and TV connectivity – Requirements of domestic gas pipeline.

MODULE – IV

Retrofitting and restoration of building – Need for retrofitting and restoration – Common retrofitting works carried out – Shoring and underpinning – Different methods of retrofitting and restoration – Challenges in retrofitting and restoration works.

Deterioration of monumental and historical buildings – Common causes – Preventive measures – Restoration works – Conservation of world heritages.

REFERENCE

1. S.P 25-1984 - Hand book on causes and prevention of cracks in buildings
1. Philip.H.Perkins: Concrete Structures-repair water proofing and protection; Elsevier Science Ltd
2. S. Champion :Failures and repair of concrete structures ; John Wiley & Sons
3. Jacob Feld :Construction failures ; Wiley
4. Shetty M.S. : Concrete technology - ; S.Chand
5. P.K.Guha : Maintenance and repair of buildings - ; New Central Book Agency
6. B.S.Nayak : A book on Maintenance Engineering ; Khanna Publishers