Reg. No.															

Question Paper Code	14087

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025

Third Semester

Civil Engineering

24CEPC304 - SUSTAINABLE CONSTRUCTION MATERIALS

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Which of the following best describes the concept of carbon footprint? (a) The total amount of renewable energy consumed by a system (b) The total amount of carbon dioxide and other greenhouse gases emitted directly or indirectly by an activity (c) The total embodied energy used in producing a material (d) The process of recycling waste materials into new products	1	K1	CO1
2.	The main purpose of using sustainability indicators such as carbon footprint and embodied energy is to: (a) Increase the cost of construction (b) Evaluate the environmental performance of materials and processes (c) Design more aesthetic buildings (d) Reduce the structural strength of materials	1	K1	CO1
3.	Efflorescence test on bricks is conducted to determine: (a) The compressive strength of the brick (b) The presence of soluble salts that cause whitish deposits (c) The amount of clay used in brick manufacturing (d)The water absorption capacity of the brick	1	K1	CO2
4.	The main criterion for selecting a stone as a building material is: (a) Its decorative appearance only (b) Its strength, durability, and resistance to weathering (c) Its availability in local markets (d) Its color and texture alone	1	K1	CO2
5.	The soundness test on cement is conducted to determine: (a) The strength of cement after setting (b) The ability of cement to resist volume change after setting (c) The fineness of cement particles (d) The time required for initial setting	1	K1	CO3
6.	The slump test on fresh concrete is performed to measure: (a) The strength of hardened concrete (b) The consistency and workability of fresh concrete (c) The durability of concrete under load (d) The tensile strength of concrete	1	K1	CO3
7.	Fal-G blocks are considered eco-friendly because they are made using: (a) Cement and sand only (b) Fly ash, lime, and gypsum utilizing industrial waste materials (c) Clay and coal for high-temperature burning (d) Crushed stone and steel fibers	1	K1	CO4

8.	The main advantage of using locally available sustainable building materials is: (a) They increase the overall construction cost (b) They reduce transportation energy and environmental impact (c) They require complex manufacturing technologies (d) They are less durable than imported materials	*1*	*K1*	*CO4*
9.	Salvaged and recycled materials such as timber, glass, and metal are used in sustainable construction mainly to: (a) Increase the aesthetic value only (b) Reduce waste generation and conserve natural resources (c) Replace modern building materials completely (d) Increase the weight of structures	*1*	*K1*	*CO5*
10.	Non-government organizations such as TERI and Auroville promote alternative building materials primarily to: (a) Conduct commercial sales of conventional bricks (b) Encourage sustainable construction practices and environmental conservation (c) Limit the use of renewable materials in construction (d) Promote luxury housing projects only	*1*	*K1*	*CO6*

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

11.	What is the main objective of a Green Building and its rating systems like GRIHA or LEED?	*2*	*K1*	*CO1*
12.	Explain in brief the purpose of using carbon footprint and embodied energy as sustainability indicators.	*2*	*K2*	*CO1*
13.	Differentiate between first-class and second-class bricks based on their properties and uses.	*2*	*K2*	*CO2*
14.	Explain why water absorption test is important for bricks in construction.	*2*	*K2*	*CO2*
15.	Describe the relationship between slump and workability in fresh concrete and why it is important for construction.	*2*	*K2*	*CO3*
16.	Summarize the importance of the slump test in assessing concrete workability.	*2*	*K2*	*CO3*
17.	Distinguish between adobe and rammed earth in terms of construction technique and thermal performance.	*2*	*K2*	*CO4*
18.	Interpret how cellulose insulation contributes to energy efficiency and indoor comfort in buildings.	*2*	*K2*	*CO4*
19.	Distinguish between the use of post-consumer waste and industrial waste in building materials, giving one example of each.	*2*	*K2*	*CO5*
20.	Interpret the benefits of using salvaged timber and glass from construction & demolition waste in new building projects.	*2*	*K2*	*CO5*
21.	Distinguish between government-promoted and NGO-promoted alternative building materials in terms of objectives and examples.	*2*	*K2*	*CO6*
22.	Describe how non-government organizations like Auroville and TERI contribute to sustainable construction practices.	*2*	*K2*	*CO6*

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23.	a)	Assess the long-term environmental consequences if global warming trends continue unchecked in your region.	*11*	*K5*	*CO1*
		OR			
	b)	With the help of a case study, interpret how Life Cycle Analysis (LCA) helps in achieving sustainability in construction.	*11*	*K5*	*CO1*
24.	a)	Demonstrate the procedure for preparing lime mortar and explain how its properties can be improved for masonry applications.	*11*	*K3*	*CO2*

OR

	b)	Illustrate the steps involved in the manufacturing of clay bricks and relate how each stage influences the final compressive strength.	*11*	*K3*	*CO2*
25.	a)	Apply your understanding of cement composition to explain how variations in the proportion of lime and silica affect the setting and strength characteristics of cement.	*11*	*K4*	*CO3*
		OR			
	b)	Elaborate the tests on hardened concrete.	*11*	*K4*	*CO3*
26.	a)	Develop an innovative walling system using a combination of Fal-G blocks and cellulose insulation to enhance both thermal comfort and environmental sustainability.	*11*	*K6*	*CO4*
		OR			
	b)	Develop in detail the step-by-step process involved in constructing a wall using adobe bricks. Include the preparation of materials, foundation requirements, bricklaying techniques, reinforcement, and finishing methods. Highlight why each step is important for the durability and sustainability of the wall.	*11*	*K6*	*CO4*
27.	a)	Develop a construction strategy for urban redevelopment projects that integrates salvaged materials to reduce demolition waste and promote circular construction.	*111*	*K6*	*CO5*
		OR			
	b)	Propose an innovative product or system that converts post-consumer waste into functional and durable building components for affordable housing applications.	*11*	*K6*	*CO5*
28.	a)	Assess the environmental and economic impact of implementing BMTPC and HUDCO-promoted sustainable materials in large-scale urban construction schemes.	*11*	*K5*	*CO6*
		OR			
	b)	Explain with a case study about alternative materials developed and promoted by non-government organizations like DA.	*11*	*K5*	*CO6*