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B.Tech DEGREE EXAMINATION, DECEMBER 2023

Fifth, Sixth and Seventh Semester

18MEO103T - ENERGY SYSTEMS FOR BUILDINGS

(For the candidates admitted during the academic year 2020 - 2021 & 2021 - 2022)

Note:

i. **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.

ii. **Part - B** and **Part - C** should be answered in answer booklet.

Time: 3 Hours **Max. Marks: 100**

PART - A (20 × 1 = 20 Marks)

Answer **all** Questions

		Marks	BL	CO
1.	Double glazed windows are suitable for (A) Good conduction (B) Good insulation (C) Good radiation (D) Moderate radiation	1	2	1
2.	The transfer of heat in the form of electromagnetic waves is called as (A) Conduction (B) Radiation (C) Evaporative cooling (D) Convection	1	2	1
3.	Photons are converted into electrical energy in case of ---------- . (A) Solar water heater (B) Wind energy conversion (C) Solar Photovoltaics (D) Geothermal energy systems	1	2	1
4.	Which system produces forced ventilation? (A) Doors (B) Chimneys (C) Windows (D) Fans	1	2	1
5.	The thermal storage wall system absorbs and stores heat during the day time is called as (A) Direct Gain wall (B) Indirect Gain wall (C) Trombe wall (D) Isolated wall	1	2	2
6.	An underground heat exchanger that can capture heat from and/or dissipate heat to the ground is called as (A) Earth Coupling (B) Water wall (C) Roof Ponds (D) Solar Chimney	1	2	2
7.	SI unit of thermal conductivity is ---------- . (A) W/sq.m K (B) Wm/K (C) W/mK (D) WmK	1	2	2
8.	Which part of a house receives the majority of solar radiation? (A) Side walls (B) Roof (C) Doors (D) Floor	1	2	2
9.	The unit for luminous intensity is (A) Lux (B) Candela (C) Lumen (D) Lambert	1	2	3
10.	Which instrument is used to measure the illumination? (A) Ammeter (B) Millivolt meter (C) Lux meter (D) PH meter	1	2	3

11.	Which of the following l needs the highest level of illumination? (A) Railway platforms (B) Proof reading (C) Bed rooms (D) Hospital wards	1	2	3
12.	The efficacy of lambs is measured in (A) Lumens Per watt (B) Lux per watt (C) Watt per Lumens (D) Watt per Lux	1	2	3
13.	A building's ability to minimize solar heat gain is measured by (A) Indoor Air Quality (B) Overall thermal transfer value (C) Reduce environmental impact (D) Environmental impact assessment	1	2	4
14.	Which of the following has the lowest thermal conductivity? (A) Water (B) Air (C) Steel (D) Window glass	1	2	4
15.	Identify the very good insulator. (A) Glass wool (B) Asbestos sheet (C) Water (D) Copper	1	2	4
16.	The entry of outdoor air through an open door or window is considered as (A) Ventilation (B) Psychrometric (C) Exfiltration (D) Infiltration	1	2	4
17.	What does LEED stand for? (A) Leadership in ecological and environmental design (B) Leadership in efficiency and environmental design (C) Leadership in energy and emission design (D) Leadership in energy and environmental design	1	2	5
18.	Which of the following is the green building materials? (A) Cement (B) Brick (C) Bamboo (D) Iron	1	2	5
19.	Which of the following shows the poor energy performance activities? (A) LEED home (B) Average existing home (C) Zero energy home (D) High energy star appliances	1	2	5
20.	GRIHA means that (A) Green Rating for Integrated Habitat Assessment (B) Green Rating for Information Habitat Assessment (C) Green Rating for Indian Habitat Assessment (D) Green Rating for International Habitat Assessment	1	1	5

PART - B (5 × 4 = 20 Marks)

Answer **any 5** Questions

		Marks	BL	CO
21.	Differentiate conventional and energy-efficient buildings.	4	2	1
22.	How do you determine the internal and external loads in buildings?	4	2	1
23.	What are the characteristics of thermal insulating materials?	4	2	2
24.	List out the various design factors influencing the thermal design of buildings.	4	2	2
25.	What are the various properties of optical materials?	4	2	3
26.	Differentiate between natural and mechanical ventilation.	4	2	4
27.	List out any six green building construction materials.	4	2	5

PART - C (5 × 12 = 60 Marks)

Answer **all** Questions

		Marks	BL

28.	(a) Explain the concepts of energy-efficient buildings and systems using renewable energy sources.	12	3	1
	(OR)			
	(b) An air-conditioned room that stands on a well-ventilated basement measures 3 m wide, 3 m high and 6 m deep. One of the two 3 m walls faces west and contains a double-glazed glass window of size 1.5 m ×1.5 m, mounted flush with the wall with no external shading. There are no heat gains through the walls other than the one facing west. If an external load is 3812 W, calculate the internal load, the total heat gains on the room, and the room sensible heat factor from the following information. What is the required cooling capacity? Occupancy: 4 (90 W sensible heat/person), (40 W latent heat/person) Lighting load: 33 W/sq.meter of floor area Appliance load: 600 W (Sensible) + 300 W(latent)			
29.	(a) Explain the five key elements of solar passive design with a neat sketch.	12	2	2
	(OR)			
	(b) Explain the construction and working of a solar chimney with a neat sketch.			
30.	(a) Explain the principle and components of the day lightning factor with a neat sketch.	12	2	3
	(OR)			
	(b) Explain the techniques used in daylight-integrated buildings with their merits and demerits.			
31.	(a) Explain about central mechanical supply ventilation process with a neat sketch. Mention its advantages and disadvantages.	12	2	4
	(OR)			
	(b) Explain the different heat transmission components in buildings with a neat sketch.			
32.	(a) Explain the environmental, economic, and social benefits of green buildings.	12	2	5
	(OR)			
	(b) Describe the LEED assessment standards and the various steps involved in LEED certification process.			

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