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**Question Paper Code:92P06**

B.E./B.Tech. DEGREE EXAMINATION, MAY 2022

Second Semester

Civil Engineering

19UPH206– BUILDING PHYSICS

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

PART A (Answer Any Ten)

10\*2 = 20 Marks

1. Illustrates the benefits of thermal insulation CO2 – U
2. A black wood stove with surface area 4.6 m<sup>2</sup> is made from cast iron which is 4 mm thick. Its interior wall is at 650°C while the exterior is at 647°C. Calculate the rate of heat loss by radiation from the stove? CO1 – U
3. Give a short note on Heat Exchange processes between a building and the external environment CO2 – U
4. A spherical container of negligible thickness having heat loss by ventilation is 6K and by infiltration is 10K. The total heat loss is about 15K. Estimate the overall heat loss. CO1 – U
5. The intensity of sound produced by thunder is 0.1 Wm<sup>-2</sup>. Calculate the intensity level in decibel. CO1 – U
6. Prove that an increase of sound intensity level by 1 dB would increase the intensity by 26% CO5– App
7. List out the characteristics of musical sound. CO2 –U
8. Classify sound waves based on the frequency. CO2– U
9. Illustrates the advantages of shape memory alloys. CO2– U
10. State the disadvantages of shape memory alloys. CO2– U
11. Give classification of ceramics based on crystal structure. CO2 – U
12. Mention the steps for the processing of ceramic materials. CO2– U
13. Mention different forms of nanomaterials CO2 – U

- 14 What are two routes through which nanoparticles can be synthesized? CO2 – U
- 15 Mention few techniques for synthesis of nano phase materials. CO2– U

PART B (5\*16=80 Marks)

16. (a) The walls are constructed from an inner fire brick wall 25 cm thick of thermal conductivity 0.4 W/mK. Calculate the rate of heat loss through the vertical walls of a boiler furnace of size 4 m breadth 3 m high. Its overall heat transfer coefficient 1000 and the inside temperature of the fire brick layer was measured at 6000°C and the temperature of the outside of the insulation 600°C. CO1-App (16)

Or

- (b) Discuss the factors affecting thermal performance of buildings. CO2- U (16)

- 17 i) A hall has a volume of  $1.3 \times 10^5 \text{m}^3$ . It has a reverberation time of 1.4 second. What is the average absorption coefficient of the surface if total absorbing surface is  $25,000 \text{m}^2$ . CO5-App (16)

ii) Calculate the reverberation time for an auditorium in which sound decays by absorption through 40 dB in 1.2 second.

Or

- (b) A hall has a volume of 2265 m<sup>3</sup>. Its total absorption is equivalent to 92.9 m<sup>2</sup> of open window. What will be the effect on reverberation time if audience fills the hall and

there by increases the absorption by another 92.9 m<sup>2</sup>.

- 18 Derive expressions for growth and decay of energy density inside a hall and hence deduce Sabine's formula for the reverberation time of the hall. CO2- U (16)

Or

- (b) Explain the principle, construction and working of central heating system CO2- U (16)

- 19 Explain the preparation, types, properties and applications of metallic glasses. CO2- U (16)

Or

- (b) Describe the type, properties and applications of shape memory alloys. CO2- U (16)

20 (a) Describe the carbon nano tubes with properties and applications. CO2- U (16)

Or

(b) Explain with necessary diagram the synthesis of nanomaterial's using the following methods CO2- U (16)

1. Chemical vapour deposition

2. Pulsed laser deposition