HEAT AND THERMODYNAMICS

Subject Code: 4340004 **Date: 2025-04-16**

Subject Name: ENGINEERING PHYSICS

Time Duration: 46.0 minutes **Total Marks: 92**

Instructions:

1. Ensure you have a stable internet connection (for online mode).
2. Keep your calculator, pen, and rough sheet ready.
3. Login using your correct credentials (if on Cloud Exam platform).
4. Read each question carefully before answering.
5. There is no negative marking, unless specified.

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1. An ice box of Styrofoam (Thermal Conductivity = 0.01 J/m.s.K)is used to keep liquid cool. It has a total wall area including lid of 0.8 m² and wall thickness of 2.0 cm. A bottle of water is placed in the box and filled with ice. If the outside temperature is 30°C. The rate of flow of heat into the box is _____.

2

○ 10 J/s ○ 10 J.s ◉ 12 J/s ○ 12 J.s

2. In which of the following process, convection does not take place primarily ?

2

- ○ Boiling of water
- ○ Heating air around a furnace
- ○ Sea and Land Breeze
- ◉ Warming of glass of bulb due to filament

3. Heat from the filament is transmitted through _____.

2

○ conduction ◉ radiation ○ convection ○ uv rays

4. A steel ball is brought with an identical ball of wood, then they will be equally hot or cold at what temperature ?

2

○ 98.4° C ○ 98.4° K ◉ 98.4° F ○ Room Temperature

5. A sphere, a cube and a thin circular plate. all of same materials and same mass are heated to same high temperature which of them will cool fastest.

2

◉ Plate ○ Sphere ○ Cube ○ All of them at same time

6. A big piece of glass is first heated and then is allowed to cool. On cooling down a crack is developed in it . One of the possible reason for this is _____.

2

- ○ High melting Point
- ○ Large Thermal Conductivity
- ○ Large Specific Heat
- ◉ Small Thermal Conductivity

7. At Atmospheric pressure, when equilibrium is established between pure water and its vapour temperature is taken ___ K

2

○ 273.15 ○ 100 ◉ 373.15 ○ 0

8. At what temperature do the fahrenite and Celcius scales concides ?

2

○ 0°F and 0°C ○ 40°C and 40°F ○ -40°C and 40°F ◉ -40°C and -40°F

9. Boiling point of water, which is used as one of the fixed point in the internation practical scale K is given by _____ K.

2

○ 100 ○ 212 ○ 273.15 ◉ 373.15

10. Freezing point of water, which is used as one of the fixed point in the internation practical scale K is given by _____ K.

2

○ 0 ○ 100 ◉ 273.15 ○ 373.15

11. A person weighing 60kg takes in 2000 kcal diet in a day. If this energy were to be used in heating the person without any losses. What would be the rise in temperature ? Given specific heat of human body is 0.83 cal g^{-1} $°C^{-1}$

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○ 4.016°C ◉ 40.16°C ○ 104.3°F ○ Both B and C

12. Which of the following statements is true regarding thermal and electrical conductivity?

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- ○ A good thermal conductor is always a poor electrical conductor.
- ◉ A good electrical conductor is also a good thermal conductor
- ○ A good thermal conductor is always an insulator
- ○ There is no relationship between thermal and electrical conductivity

13. The value of co-effcient of thermal conductivity (K) depends on _____.

2

◉ Nature of the solid ○ Temperature of solid ○ Both A and B ○ None

14. C.G.S unit of K

2

○ erg cm^{-1} s^{-1} $°C^{-1}$ ○ erg cm^{-1} s^{-1} K^{-1} ○ cal cm^{-1} s^{-1} K^{-1} ◉ All of Above

15. $\frac{\Delta Q}{\Delta t}$ K = ---------- A × ($\frac{\Delta T}{\Delta x}$) Here the .....

2

- ○ K is thermal capacity, and temperature gradient is $\Delta T + \Delta x$
- ○ K is thermal resistivity, and temperature gradient is $\Delta T \times \Delta x$
- ○ K is thermal conductivity and temperature gradient is $\frac{\Delta Q}{\Delta t}$
- ◉ K is coefficient of thermal conductivity, and temperature gradient is $\frac{\Delta T}{\Delta x}$

16. What does the temperature gradient represent in heat transfer?

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- ○ The ratio of heat energy to mass of the substance
- ○ The total heat energy stored in a material
- ◉ The fall of temperature with distance between two faces in the direction of heat flow
- ○ The increase in temperature with time in a body

17. Which of the following is a mode of heat transfer that does not require a medium ?

2

○ conduction ◉ Radiation ○ Convection ○ Expansion

18. Specific heat is the heat capacity per unit _____ .

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◉ Mass ○ Volume ○ Area ○ Temperature

19. Which temperature scale is an absolute temperature scale ?

2

○ Celcius ◉ Kelvin ○ Fahrenhiet ○ Rankine

20. Which material would have generally have the highest thermal conductivity ?

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○ Wood ◉ Aluminium ○ Styrofoam ○ Rubber

21. The mathematical formula for specific heat is _____ .

2

◉ $C = Q/m\Delta T$ ○ $Q = C/m\Delta T$ ○ $Hc = Q/\Delta L$ ○ $Q = Hc/\Delta T$

22. A person is having fever of 104°F. Convert it in Celcius.

2

○ 38°C ◉ 40°C ○ -40°C ○ -38°C

23. In which of the following process of heat transfer material is transported from one region to another ?

2

○ Conduction ◉ Convection ○ Radiation ○ None of These

24. The lowest theroectical possible temperature in nature is _____ .

2

◉ -273.15°C ○ 0°C ○ -100°C ○ 0°F

25. Heat energy required to increase temperature by 1K is called ____.

2

- ◉ Heat Capacity or Thermal Capacity
- ○ Latent Heat
- ○ Specific Heat
- ○ Internal Heat

26. SI unit of co-effecient of thermal conductivity is _____ .

2

○ $Wm^{-1}C^{-1}$ ○ $Jm^{-1}C^{-1}$ ◉ $Wm^{-1}K^{-1}$ ○ $Jm^{-1}K^{-1}$

27. SI unit of heat is _____ .

2

◉ Joule ○ Calorie ○ kWh ○ erg

28. The coefficient of linear thermal expansion of a material depends on _____ .

2

- ○ length of material
- ○ temperature difference
- ○ mass of the material
- ◉ nature of the material

29. Heat is transffered from one place to other due to difference in _____ .

2

○ Height ○ Energy ◉ Temperature ○ Electric Current

30. At what temperature do the Fahreneheit and Celsius scales coincide ?

2

○ 0 ○ 20 ○ 40 ◉ -40

31. 101°F = _____ °C

2

◉ 38.33 ○ 311.33 ○ 101 ○ 37

32. Which of the following is a unit of the rate of heat transfer ?

2

◉ Kelvin ○ Newton ○ Pascal ○ Watt

33. In Liquids and gases, heat transmission is primarily cause by _____ .

2

○ Conduction ◉ Convection ○ Radiation ○ Both A and B

34. In which phase of a substance does conduction mode of heat transfer take place ?

2

◉ solid ○ liquid ○ gaseous ○ all of above

35. What is the condition for conduction mode of heat transfer between two bodies ?

2

- ○ The two bodies must be in physical contact
- ○ There must be temperature gradient between two bodies
- ◉ both a and b
- ○ none of above

36. The fastest mode of heat transfer is _____.

2

○ Conduction ○ Convection ◉ Radiation ○ All are equally fast

37. Which of the following will expand most for the same rise in temperature ?

2

◉ Alumnium ○ Wood ○ Glass ○ All will expand

38. Woolen clothes are used in winter season because woolen clothes are

2

- ○ good sources for producing heat
- ○ absorbs heat from surroundings
- ◉ are bad conductor of heat
- ○ provide heat to body continously

39. By which mode of heat transfer does earth receive heat energy from sun ?

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○ Conduction ○ Convection ◉ Radiation ○ All of these

40. Temperature of two ends of 2 m long metallic rod are 50°C and 100°C respectively. Find temperature gradient of the rod.

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◉ 25°C/m ○ 50°C/m ○ 25°Cm ○ 50°Cm

41. SI unit of coeffecient of linear thermal expansion is _____ .

2

○ $°C^{-1}$ ○ $°F^{-1}$ ○ $°K^{-1}$ ◉ Both A and C

42. _____ is the measure of degree of hotnes or coldness of a body.

2

◉ Temperature ○ Thermometer ○ Humidity ○ Heat

43. What is the freezing point of water on the Celsius scale ?

2

○ 32°C ○ 273°C ○ 100°C ◉ 0°C

44. The process of heat transfer due to the temperature difference the adjacent parts of the object is called heat _____ .

2

◉ conduction ○ convection ○ radiation ○ refraction

45. The thermal conductivty of which material is highest ?

2

◉ Diamond ○ Silver ○ Aluminium ○ Copper

46. The thermal conductivity of which metal is highest ?

2

○ Diamond ◉ Silver ○ Alumnium ○ Copper