

Time: One Hour

Max. Marks: 25

## Instructions

- Solve any 25 questions from Q.1 to Q.30

- Thermal conduction in metal takes place by  
(A) Free electron (B) bond electron (C) Vibrations of molecules (D) none of above
- In the steady state of temperature, the flow of heat across the body depends  
(A) Only upon its thermal conductivity (B) Upon its thermal conductivity and thermal capacity (C) Upon its thermal capacity only (D) Neither upon thermal conductivity nor upon thermal capacity
- The coefficient of thermal conductivity of metal depends upon,  
(A) Temperature difference between the two sides (B) Area of the plate (C) Thickness of metal plate (D) None of the above
- The SI unit of thermal conductivity is:  
(A)  $\text{Jsm}^{-1}\text{ }^{\circ}\text{C}$  (B)  $\text{Jsec.m.}^{\circ}\text{C}$  (C)  $\text{J}^{\circ}\text{C}\text{sec.m}$  (D)  $\text{J.m}\text{sec.}^{\circ}\text{C}$
- A metallic rod is heated at one end continuously, after some time steady state is reached. The flow of heat in the steady state does not depend upon,  
(A) the area of cross section of the rod (B) the mass of the rod (C) the temperature gradient (D) the time of flow of heat
- Four rods with different radii 'r' and length 'l' are used to connect two reservoirs of heat at different temperatures. Which one will conduct most heat?  
(A)  $r=1\text{cm}, l=1\text{m}$  (B)  $r=2\text{cm}, l=2\text{m}$  (C)  $r=2\text{cm}, l=0.5\text{m}$  (D)  $r=1\text{cm}, l=0.5\text{m}$
- If the density of the material is  $\rho$ , specific heat is S, diffusivity is D, then its thermal conductivity K is.  
(A)  $K=$  (B)  $K=SD\rho$  (C)  $K=$  (D)  $K=$
- Correction for pressure 'p' is inversely proportional to \_\_\_\_  
(A) V (B)  $V^2$  (C)  $V^{-1}$  (D)  $V^3$
- At the critical constant point the rate of change of pressure with volume is,  
(A) Zero (B) One (C) Two (D) None of above
- Van der Waal's equation put for the condition \_\_\_\_  
(A) Low temperature and low pressure (B) High temperature and low pressure (C) Low temperature and high pressure (D) High temperature and high pressure
- The calculation value of critical coefficient of a gas is  
(A)  $8/3$  (B)  $3/8$  (C)  $1/8$  (D)  $1/3$
- The entropy of a system in an irreversible process  
(A) decreases (B) increases (C) remains constant (D) Remains zero
- Thermal conductivity is independent on  
(A) Volume (B) Temperature (C) Pressure (D) Density
- The critical constant of volume ( $V_c$ ) =  
(A) b (B)  $2b$  (C)  $3b$  (D)  $4b$
- An adiabatic process occurs at constant  
(A) Temperature (B) heat (C) pressure (D) none of these
- An engine works between the temperature 300k and 3000k what is its efficiency  
(A) 50% (B) 47% (C) 90% (D) 10%
- Heat engine is practical machine which converts:  
(A) heat into mechanical work (B) heat into energy (C) mechanical work into heat (D) none of these.
- The door of running refrigerator inside a room is left open. Mark the correct statement  
(A) The room will be cooled slightly. (B) The room will be warmed up gradually. (C) The temperature of the room will remain unaffected. (D) The room will be cooled to the temperature inside the refrigerator.
- In Carnot's cycle, the first step is:  
(A) Isothermal expansion (B) Isothermal compression (C) Adiabatic expansion (D) Adiabatic compression
- A reversible heat engine can be 100% efficient, If the temperature of the sink is:  
(A) less than that of source (B) equal than that of source (C)  $0^{\circ}\text{C}$  (D)  $0^{\circ}\text{K}$
- The efficiency of a reversible Carnot's engine working between temperature  $T_1$  &  $T_2$  ( $T_1 > T_2$ ) is  
(A) 1 (B) 2 (C)  $(1 - \frac{T_2}{T_1})$  (D)  $(-1)$
- The entropy of a system in an irreversible process  
(A) increases (B) decreases (C) remains zero (D) remains constant
- In a reversible adiabatic process entropy  
(A) Increases (B) remains unchanged (C) decreases (D) none of these
- Entropy is maximum in which state.  
(A) Solid (B) liquid (C) gas (D) can be any

## Examination October 2020

25 Entropy remains constant in

- (A) adiabatic process                      (B) isothermal process                      (C) isochoric process                      (D) isolated process.

26 Which of the following represents a reversible process?

- (A)  $dS < 0$                       (B)  $dS = 0$                       (C)  $dS > 0$                       (D) none of these.

27 Four rods with different radii 'r' and length 'l' are used to connect two reservoirs of heat at different temperatures. Which one will conduct most heat?

- (A)  $r=2\text{cm}, l=2\text{m}$                       (B)  $r=1\text{cm}, l=1\text{m}$                       (C)  $r=1\text{cm}, l=0.5\text{m}$                       (D)  $r=2\text{cm}, l=0.5\text{m}$

28 The unit of entropy is

- (A) Joule/Kelvin                      (B) cal/Kelvin                      (C) both a & b                      (D) none of above.

29 The mean free path of gas raises with absolute temperature (T) as,

- (A)  $T$                       (B)  $T^2$                       (C)  $T^{-1}$                       (D)  $T^4$

30 Heat is flowing through two cylindrical rods of same material. The diameter of the rods are in the ratio 1:2 and their lengths in the ratio 2:1. If the temperature difference their ends is the same, then the ratio of amount of heat conducted through them per unit time will be;

- (A) 1:1                      (B) 2:1                      (C) 1:4                      (D) 1:8