

Seat
No.

SW-461

Total No. of Pages : 3

B.Sc. (Part-II) (Semester-III) (New) (CBCS)

Examination, November - 2019

PHYSICS

Thermal Physics and Statistical Mechanics-I (DSC-C1) (Paper - V)

Sub. Code : 73301

Day and Date : Thursday, 28 - 11 - 2019

Total Marks : 50

Time : 12.00 noon to 2.00 p.m.

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Use of calculators/logarithmic tables is allowed.
 - 4) Draw neat diagrams wherever necessary.

Q1) Select the correct alternative from the following: [10]

a) The average kinetic energy of a molecule in each degree of freedom is _____ .

- | | |
|----------------------|---------------------|
| i) $\frac{1}{2}KT$ | ii) KT |
| iii) $\frac{3}{2}KT$ | iv) $\frac{5}{2}KT$ |

b) Mayors relation for specific heat of gas is _____ .

- | | |
|----------------------|---------------------|
| i) $C_p = C_v$ | ii) $C_p - C_v = R$ |
| iii) $C_p + C_v = R$ | iv) Non of these |

c) The coefficient of viscosity of gas at absolute temperature T is proportional to _____ .

- | | |
|---------------|-------------------|
| i) \sqrt{T} | ii) $\frac{1}{T}$ |
| iii) T | iv) T^2 |

d) On Fahrenheit scale ice point is marked at _____ .

- | | |
|--------------------------|-------------------------|
| i) 0°F | ii) 32°F |
| iii) 492°F | iv) 273°F |

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- e) Thermo e.m.f. Produced in a thermocouple is of the order of _____.
- i) Microvolt
 - ii) Milivolt
 - iii) Volt
 - iv) Kilovolt
- f) _____ remains constant during adiabatic process.
- i) Pressure
 - ii) Volume
 - iii) Temperature
 - iv) Entropy
- g) For diatomic gas the ratio $\frac{C_p}{C_v} =$ _____.
- i) 1.4
 - ii) 2.4
 - iii) 1.67
 - iv) 1.33
- h) The chemical equilibrium of thermodynamic system refers to constancy of _____.
- i) Temperature
 - ii) Pressure
 - iii) Density
 - iv) Composition
- i) All natural process are _____.
- i) Isothermal
 - ii) Adiabatic
 - iii) Reversible
 - iv) Irreversible
- j) Heat conduction through a body is example of _____ process.
- i) Reversible
 - ii) Irreversible
 - iii) Isothermal
 - iv) Adiabatic

Q2) Attempt any two of the following: [20]

- a) Define adiabatic process? Obtain adiabatic relations for perfect gas.
- b) Explain Carnot's ideal heat engine. Obtain expression for efficiency of Carnot's heat engine working between the temperatures T_1 and T_2 .
- c) Explain transport of thermal energy in gases. Obtain an expression for thermal conductivity of the gas.

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[20]

Q3) Attempt any four of the following .

- a) State properties of mercury suitable for its use in thermometer.
- b) Explain the term free path and mean free path with suitable diagram.
- c) State advantages and disadvantages of thermoelectric thermometer.
- d) Explain experiment verifying Maxwell's law of distribution of velocities.
- e) Calculate the work done when a 1 k mole of a perfect gas expands isothermally at 27°C to double its original volume. (Given $R=8.3\text{J/k-mole }^{\circ}\text{K}$)
- f) Give physical significance of entropy.

