



**2019/TDC/ODD/SEM/
PHSHCC-302T/073**

TDC (CBCS) Odd Semester Exam., 2019

PHYSICS

(3rd Semester)

Course No. : PSHHCC-302T

(Thermal Physics)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

Answer **all** questions

UNIT—I

1. Answer any *two* of the following questions :

2×2=4

- (a) State the Zeroth law of thermodynamics.
- (b) Explain why gases have two specific heats while solids have only one.
- (c) What are reversible and irreversible processes?



(2)

2. Answer either [(a) and (b)] or [(c) and (d)] :

(a) State the first law of thermodynamics. Explain how first law of thermodynamics leads to the concept of internal energy.

1+2=3

(b) Show that, for one mole of an ideal gas $C_p - C_v = R$. (Symbols have their usual meanings)

3

(c) Write the second law of thermodynamics as stated by Kelvin-Planck and Clausius and discuss their equivalence.

3

(d) State and prove Carnot's theorem.

3

UNIT—II

3. Answer any two of the following questions :

2×2=4

(a) State the concept of entropy.

(b) Give the second law of thermodynamics in terms of entropy.

(c) Narrate the third law of thermodynamics.

(20J/1106)

(Continued)

(3)

4. Answer either [(a) and (b)] or [(c) and (d)] :

(a) Show that the entropy of a perfect gas remains constant in a reversible process.

3

(b) Discuss in brief the entropy of the universe.

3

(c) State and explain the temperature-entropy diagram for Carnot's cycle.

3

(d) Define the following :

3

(i) Enthalpy

(ii) Helmholtz free energy

(iii) Gibb's free energy

UNIT—III

5. Answer any two of the following questions :

2×2=4

(a) What do you mean by Joule-Kelvin coefficient for ideal gas?

(b) Discuss in brief the change of temperature during adiabatic process.

(c) Define phase transition. What is first order phase transition?

(20J/1106)

(Turn Over)



(4)

6. Answer either [(a) and (b)] or [(c) and (d)] :

- (a) Deduce Maxwell's first thermodynamic relations using the laws of thermodynamics. 3
- (b) From the consideration of Maxwell's thermodynamic relations, show that $C_p - C_v = R$ (here the symbols have their usual meanings). 3
- (c) Derive the Clausius-Clapeyron equation. 3
- (d) Explain how the boiling point of a liquid and melting point of a solid are affected with the change of pressure. 3

UNIT—IV

7. Answer any two of the following questions :

2×2=4

- (a) What do you mean by RMS and most probable speeds of an ideal gas?
- (b) State the law of equipartition of energy.
- (c) Define specific heats of gases.

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(Continued)

(5)

8. Answer either [(a) and (b)] or [(c) and (d)] :

- (a) Using Maxwell-Boltzmann distribution law of velocities find an expression for the mean speed in an ideal gas. 3
- (b) What do you mean by Doppler broadening of spectral lines? 3
- (c) Related to the transport phenomenon in ideal gases, give a brief concept of the following : 3
- (i) Viscosity
- (ii) Thermal conductivity
- (iii) Diffusion
- (d) Discuss in brief the Brownian motion and its significance. 3

UNIT—V

9. Answer any two of the following questions :

2×2=4

- (a) What do you mean by Boyle temperature?
- (b) State the law of corresponding states.
- (c) What is temperature of inversion?

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(Turn Over)

