QP CODE: 25800346

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Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, JANUARY 2025

First Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

CORE - IPH1CR04 - THERMAL PHYSICS

2021 Admission Onwards

63F79DF3

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Give the relation between temperature and pressure in an adiabatic system.
2. Define equation of state of a thermodynamic state.
3. Define the extensive components of a thermodynamic system.
4. Define first law of thermodynamics.
5. What is law of increase of entropy?
6. What is meant by zero point energy?
7. State Stefan's law.
8. Which process of heat transmission is prominent in liquids and gases?
9. Write down the expression by which we can calculate the coefficient of thermal conductivity using the theory of radial flow of heat.
10. State Rayleigh-Jean's law.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Derive the relation between heat capacity at constant volume and constant temperature.
12. Describe the working of a heat engine.
13. Prove that efficiency of an engine does not depend on the properties of working ubstance.
14. Prove that T-S diagram represents the amount of heat converted into useful work in one cycle.

15. Find the change in entropy when 1 gm of ice at 0 degree Centigrade changes to water at 100 degree Centigrade.

16. Prove the thermodynamic relation $(\partial T/\partial V)_S = -(\partial P/\partial S)_V$

17. Calculate the maximum amount of heat which may be lost per second by radiation from a sphere of 5cm in diameter at a temperature of 600K when placed in an enclosure at a temperature of 300K. (σ=5.7X10 $^{-12}$). M

18. Give any five applications of heat radiations.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Derive the expressions for the work done during an isothermal and adiabatic process.

20. Define Carnot's engine and explain various processes involved in the Carnot's cycle.

21. Derive TdS equations.

22. Define solar constant. Describe any one experimental method to determine solar constant. Comment on the sources of energy in the sun.

(2×5=10 weightage)