**QP CODE: 24801182**

24801182

**Reg No :** .....

**Name :** .....

# INTEGRATED MSC DEGREE EXAMINATION, FEBRUARY 2024

## First Semester

INTEGRATED MSC BASIC SCIENCE-PHYSICS

## CORE - IPH1CR04 - THERMAL PHYSICS

2021 Admission Onwards

3B3DD9C1

Time: 3 Hours Weightage: 30

### Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. What are the conditions for a process to be reversible?
2. Define temperature of a system.
3. Define the intensive components of a thermodynamic system.
4. Define heat capacity of a system.
5. Briefly explain the concept of entropy.
6. Write any two T.dS equations.
7. Write the applications of heat radiations.
8. Write down the expression by which we can calculate the coefficient of thermal conductivity in spherical shell method.
9. What are pyrheliometers?
10. Give a plot of intensity of the radiations with wavelength for a given temperature of the source.

(8×1=8 weightage)

### Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Explain the work done in an isothermal change of a system.
12. Describe the working of a heat engine.
13. Describe two statements of second law of thermodyanmics.

14. Derive the entropy of a perfect gas in terms of volume and temperature.

15. One gram molecule of a gas expands isothermally to four times its volume. Calculate the change in its entropy in terms of the gas constant.

16. A bar of length 30cm and uniform area of cross section $5cm^2$ consists of 2 halves AB of copper and BC of iron welded together at B. The end A is maintained at 2000 C and the end C at $0^0$ C. The sides of bar are thermally insulated. Find the rate of heat along the bar when the steady state is reached. (Thermal conductivity of copper is 0.9 and thermal conductivity of iron is 0.12 CGS unit) .

17. State and explain Stefan's law of radiation.

18. An aluminium foil of relative emittance 0.1 is placed in between two concentric spheres at temperatures 300K and 200K respectively. Calculate the temperature of the foil after the steady state is reached. Assume that the spheres are perfect black body radiators. Also calculate the rate of energy transfer between one of the spheres and foil.

(6×2=12 weightage)

**Part C (Essay Type Questions)**

*Answer any **two** questions.*

*Weight **5** each.*

19. Explain the concept of internal energy and its changes in isothermal and adiabatic process. Derive the relation between slopes of adiabatic and isothermal.

20. Descibe the second law of thermodynamics and explain the concept of entropy and available energy.

21. Derive Maxwell's thermodynamic relations.

22. Define the terms coefficient of thermal conductivity and temperature gradient. Discuss Lee's method for finding the coefficient of thermal conductivity of wood.

(2×5=10 weightage)