QP CODE: 26800170

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Reg No : .....

Name : .....

INTEGRATED M.Sc. DEGREE EXAMINATION, DECEMBER 2025

First Semester

INTEGRATED M.Sc. BASIC SCIENCE-PHYSICS

CORE - IPH1CR04 - THERMAL PHYSICS

2021 Admission Onwards

706E8E82

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Define irreversible process.
2. What do you mean by internal energy of a system?
3. Define heat capacity of a system.
4. Define isothermal expansion.
5. Entropy of an isolated system can't decrease, it can only increase. Is this true? Why?
6. Write the applications of heat radiations.
7. What is Stefan's constant? What is its unit?
8. Define the coefficient of thermal conductivity of a material.
9. Mention any two applications of heat radiations.
10. Comment on the sources of energy in the sun.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Explain zeroth law of thermodyanmics and the concept of temperature.
12. Prove that adiabatic curve is steeper than isothermal curve at a point where two curves interact each other.
13. Describe the working of a heat engine.
14. Prove that internal energy remains unchanged in one Carnot cycle.

15. 1 kg of water at 273 K is brought in contact with a heat reservoir at 373 K. Then (1) What is the change in entropy of the water when its temperature reaches 373K (2) What is the change in entropy of (i) the reservoir and (ii) the universe.

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

17. An ice box is built of wood of 1.75 cm thick, lined inside with cork of 3cm thick. If the temperature of the inner surface of cork is 00 C and that of outer surface of wood is 120 C. What is the temperature of interface? The thermal conductivity of wood and cork are 0.0006 and 0.00012 CGS units respectively.

18. Derive Planck's formula for the distribution of energy in the spectrum of a black body.

(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. What is the physical significance of entropy? Describe the temperature entropy diagram.

21. Define internal energy. a) Derive internal energy equations. b) Derive internal energy equations for an ideal gas and Vander Waal's gas?

22. Discuss the cylindrical flow of heat. Describe an experiment to find the coefficient of thermal conductivity of rubber.

(2×5=10 weightage)