Reg No:..... K25FY2470 C
Name :.....

Second Semester FYUGP Physics Examination
APRIL 2025 (2024 Admission onwards)
KU2DSCPHY124 (HEAT AND THERMODYNAMICS)
(DATE OF EXAM: 2-5-2025)

Time : 90 min Maximum Marks : 50

Part A (Answer any 6 questions. Each carries 2 marks)

1. Explain how heat transfer is related to temperature difference between objects. 2

2. Explain the concept of work. Define positive work and negative work? 2

3. How is randomness or disorder related to the direction of the thermodynamic process? 2

4. Draw a schematic diagram of a heat engine. 2

5. What do you mean by thermal efficiency of a heat engine? Write an expression for the efficiency of a Carnot engine? 2

6. Explain how entropy is related to the disorder of a system. 2

7. Distinguish between macroscopic state and microscopic state of a system. 2

8. What is the microscopic expression for entropy? 2

Part B (Answer any 4 questions. Each carries 6 marks)

9. Explain the construction of a Celsius scale and Fahrenheit temperature scale, derive a relationship for converting Celsius temperature value and Fahrenheit value. 6

10. Apply the First law of thermodynamics in Isothermal, adiabatic,isochoric and isobaric thermodynamic processes. 6

11. Which of the following combinations of statements is correct? Explain why any statement is incorrect.
    i) P and Q only
    ii) P only
    iii) P and R only
    iv) R only 6

12. A Carnot engine operates between two temperatures, 800 K and 300 K. Calculate its efficiency. 6

13. Obtain an expression for the change in entropy when n moles of an ideal gas at temperature T and volume V undergoes free expansion to volume 2V. 6

14. Give any two examples which show that entropy is related to the disorder of a system. 6

Part C (Answer any 1 question(s). Each carries 14 marks)

15. Discuss the process of phase changes, including melting, freezing, evaporation, condensation, and sublimation. Write the equation for heat energy involved in melting and evaporation, and explain why temperature remains constant during a phase change. Provide real-life examples of phase transitions. 14

16. (a) Derive the expression for work done in changing the volume of a thermodynamic system. Explain the relation between PV diagram and work done. 7

    (b) Using the first law of thermodynamics derives the relationship between C_p and C_v for an ideal gas. 7