K26FY1598 Pages: 2 Reg No:.....
Name:.....

Second Semester FYUGP Degree (Reg/Sup/Imp) Examination April 2026

KU2DSCPHY124 - HEAT AND THERMODYNAMICS

2024 Admission onwards

Time : 1.5 hours Maximum Marks : 50

Section A

Answer any 6 questions. Each carry 2 marks.

1. Explain how heat transfer is related to temperature difference between objects.
2. Discuss the principle used for making a Celsius temperature scale.
3. Derive the expression for work done in changing the volume of a thermodynamic system.
4. Draw the PV diagrams for a) an isothermal process, b) an isochoric process.
5. State Kelvin -Planck statement of the second law of thermodynamics.
6. What do you mean by thermal efficiency of a heat engine? Write an expression for the efficiency of a Carnot engine?
7. How will you calculate the entropy change in an irreversible process?
8. Explain the concept of entropy in terms of energy dispersal.

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Section B

Answer any 4 questions. Each carry 6 marks.

9. Draw a neat schematic energy flow diagram of a refrigerator and derive the expression for its coefficient of performance of a refrigerator.
10. A refrigerator absorbs 1200 kJ of heat from a cold body at$-13^{\circ}C$ and rejects 1800 kJ of heat to a hot body at$37^{\circ}C$. Calculate its coefficient of performance (COP).
11. A heat engine absorbs 2500 kJ of heat from a high-temperature source at $527^{\circ}C$ and rejects 1500 kJ of heat to a low-temperature sink at $27^{\circ}C$. Calculate: (a) The efficiency of the heat engine. (b) The maximum possible efficiency of the heat engine.
12. Show that entropy change during any reversible cycle is zero.
13. Give any two examples which show that entropy is related to the disorder of a system.

14. Calculate the entropy change in the free expansion process of n moles of an ideal gas at temperature T using the number of microstates in the initial and final macroscopic states.

Section C

Answer any 1 questions. Each carry 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.

16. Derive the relation connecting pressure and volume for an infinitesimal adiabatic process in an ideal gas. and also calculate the work done.

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