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Reg. No. : .....

Name : .....

V Semester B.Sc. Degree (CBCSS- Reg./Sup./Imp.) Examination,

November-2019

(2014 Admn. Onwards)

Core Course in Physics

5B 07 PHY: THERMAL PHYSICS

Time : 3 Hours Max. Marks : 40

Note: Write answers in English only.

SECTION - A

Answer **ALL** - Very short answer type. Each question carries **ONE** mark. **(4×1=4)**

1. Entropy is a ---------- function.
2. Phonons obey ---------- statistics.
3. During an adiabatic process ---------- is constant.
4. Helmholtz free energy of a system remains constant during --------- process.

SECTION - B

Answer any **SEVEN** - Short Answer type. Each question carries **TWO** marks. **(7×2=14)**

5. What is a quasi-static process?
6. State the third law of thermodynamics.
7. What is equipartition theorem?
8. Derive the first and second TdS equations.

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9. What is meant by a thermodynamic system?
10. What is a refrigerator and define its coefficient of performance?
11. What do you mean by an indicator diagram? Explain it.
12. Draw the T-S diagram for the Carnot cycle.
13. Show that the work done during an isochoric process is always zero.
14. Distinguish between bosons and fermions.

SECTION - C

Answer any **FOUR** - Short Essay/Problem type- Each question carries **Three** marks. **(4×3=12)**

15. Using Maxwell's equation show that for an ideal gas $\left[\frac{\partial Cv}{\partial v}\right]_T = 0$
16. A gas occupying 1 litre at 80 cm of Hg pressure is expanded adiabatically to 1190cc. if the pressure falls to 60 cm of Hg in this process, deduce the value of γ?
17. A Carnot engine takes 200 calories of heat from a source at temperature 400K and rejects 150 calories of heat to sink. What is the temperature of the sink? Also calculate the efficiency of the engine.
18. Show that entropy is a state function.
19. A metal sphere 4cm in diameter whose emissivity is 0.25 is heated in a furnace to 500°C. at what rate does it radiate?
20. Derive an expression for work done during an adiabatic process.

SECTION - D

Answer any **TWO** - Long essay type. Each question carries **Five** marks. **(2×5=10)**

21. Deduce thermodynamic potentials and derive Maxwell's relations.
22. Using first law of thermodynamics derive Mayers relation.

23. State and prove clausius theorem for entropy and write down clausius mathematical statement of second law.

24. Describe Carnot's cycle and obtain an expression for the efficiency of an ideal heat engine in terms of temperatures.
