Reg. No.:

Name:

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

November-2019

November-2019
(2014 Admn. Onwards)
Core Course in Physics
5B 07 PHY: THERMAL PHYSICS

Time: 3 Hours

Note:

Max. Marks: 40

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. (4x3=12)

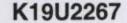
- **15.** Using Maxwell's equation show that for an ideal gas $\left[\frac{\partial Cv}{\partial v}\right]_r = 0$
- 16. A gas occupying 1 litre at 80 cm of Hg pressure is expanded adiabatically to 1190cc. if the pressure falls to 60 cm of Hg in this process, deduce the value of \(\gamma \)?
- 17. A Carnot 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. (2x5=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.

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