



K24U 2761

Reg. No. :

Name :

**V Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/
Improvement) Examination, November 2024
(2019 to 2022 Admissions)
CORE COURSE IN PHYSICS
5B08 PHY : Thermodynamics and Statistical Mechanics**

Time : 3 Hours

Max. Marks : 40

PART – A

(Short answer questions. Answer **all** questions. **Each** carries **1** mark.)

1. Define extensive parameter. Give 2 examples.
2. Give the differential form of first law of thermodynamics and explain the symbols.
3. Define efficiency of a heat engine.
4. What is Helmholtz free energy ?
5. Write the working principle of pressure cooker.
6. Give two postulates of kinetic theory of ideal gas. (6×1=6)

PART – B

(Short essay questions. Answer **any six** questions. **Each** carries **2** marks.)

7. State and explain zeroth law of thermodynamics.
8. Explain Stefan-Boltzmann law.
9. What is the principle of Carnot's refrigerator ?
10. Give two merits and two demerits of diesel engine.
11. Draw the TS diagram of a Carnot cycle and explain.
12. Explain second order phase transition with an example.
13. Distinguish between Bosons and Fermions.
14. Write a note on entropy and disorder. (6×2=12)

P.T.O.



PART – C

(Problems. Answer **any four** questions. **Each** carries **3** marks.)

15. 200 cm^3 of a gas at a pressure of 1 atmosphere is compressed to 50 cm^3 . Find the resultant pressure if it is done
- Under isothermal conditions
 - Under adiabatic condition ($\gamma = 1.67$).
16. The efficiency of a Carnot engine working between two temperatures is 0.2. When the temperature of the source is increased by 25°C , the efficiency increases to 0.25. Find the temperature of the source and sink.
17. a) At what temperature do the Kelvin and Fahrenheit scales coincide ?
b) At what temperature do the Celsius and Fahrenheit scales coincide ?
18. An ideal refrigerator takes heat from a cold body and rejects to a hot reservoir at 300K. Calculate the amount of work which must be done in order to remove one calorie of heat, when the cold body is at a) 290 K b) 1K.
19. Calculate the change in entropy of 5Kg water at 100°C when changes into vapour. Latent heat of vapourisation = 540 cal/g.
20. Find the rms speed of Oxygen molecules at 0°C . (4×3=12)

PART – D

(Long Essay. Answer **any two** questions. **Each** carries **5** marks.)

21. With neat diagrams, explain the working of a Diesel engine.
22. Distinguish between Maxwell Boltzmann, Bose Einstein and Fermi Dirac statistics.
23. Deduce Maxwell's thermodynamic relations.
24. Derive the expression for the work done during an
- isothermal process
 - adiabatic process. (2×5=10)
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