

E 7124

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Reg. No.....

Name.....

**B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2017**

**Fifth Semester**

Core Course—THERMAL AND STATISTICAL PHYSICS

(Common for Model I and Model II B.Sc. Physics, B.Sc. Physics EEM  
and B.Sc. Physics Instrumentation)

[2013 Admission onwards]

Time : Three Hours

Maximum Marks : 60

**Part A**

*Answer all questions.*

*Each question carries 1 mark.*

1. An adiabatic wall ——— isolates the system from the surroundings.
2. The ——— of a Carnot's reversible engine does not depend on the nature of the working substance.
3. The efficiency of the ——— is independent of the properties of the working substance.
4. Due to higher compression ratio diesel engine has ——— efficiency than the petrol engine.
5. Entropy remains ——— in adiabatic changes.
6. What are degenerate energy levels ?
7. Give the name of two boson particles.
8. What is the basic unit of phase space ?

(8 × 1 = 8)

**Part B**

*Answer any six questions.*

*Each question carries 2 marks.*

9. Obtain the expression for slope of an isothermal.
10. Distinguish between reversible and irreversible changes.
11. State and explain the Kelvin's statement of second law.
12. Obtain TS diagram of a thermodynamic process.
13. Explain the significance of entropy.
14. What is thermal elasticity ? Explain.
15. What is an electron gas ?
16. Explain the unattainability of absolute zero.

**Turn over**

17. What are the features of macro states ?
18. What is statistical probability ?

(6 × 2 = 12)

### Part C

*Answer any four questions.  
Each question carries 4 marks.*

19. Derive the equation for the work done during irreversible process.
20. Determine the efficiency of an engine working between 230° C. and 30° C.
21. Calculate the increase in entropy when one kg. of ice at - 10° C. is converted to ice at 0° C.
22. Show that for a perfect gas  $\left(\frac{\partial u}{\partial v}\right)_t = 0$ .
23. Give a comparison between Carnot and Otto engines.
24. The Fermi energy of a metal is 10 eV. Calculate the corresponding classical temperature.

(4 × 4 = 16)

### Part D

*Answer any two questions.  
Each question carries 12 marks.*

25. Discuss on diesel engine and obtain the expression for efficiency.
26. Obtain the expression for entropy of a perfect gas in terms of pressure, volume and specific heats.
27. Describe Lee's disc experiment for oil with Mathematical support.
28. Compare and contrast all the three distributions associated with particles.

(2 × 12 = 24)