E 1766 (Pages : 2) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2015

Fifth Semester

Physics

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 Admissions]

Time : Three Hours Maximum : 60 Marks

Part A

Answer all *questions briefly.*
Each question carries 1 *mark.*

Fill up the blanks :

1. During an isothermal process ———— remains a constant.
2. All the reversible engines working between the ———— temperature limits have the same efficiency.
3. For the same compression ratio the efficiency of an Otto engine is more than a ———— engine.
4. For a irreversible process the ———— always increase.
5. A black body completely absorbs heat radiations of all ———— lengths.
6. Bosons are ———— particles.
7. MB distribution allows all the particles to access all ———— levels.
8. Fermions are characterised by ———— wave functions.

(8 × 1 = 8)

Part B

Answer any six *questions.*
Each question carries 2 *marks.*

9. State and explain Carnot's theorem.
10. What is meant by absolute zero ? Explain.
11. Obtain work done during an isothermal process.
12. Explain the change in entropy during a reversible process.
13. Briefly explain adiabatic elasticity.
14. What is TS diagram ? Explain.

Turn over

15. State and explain Rayleigh - Jeans law.
16. What are micro states ? Explain.
17. What is phase space ? Explain.
18. What is thermodynamic probability ?

(6 × 2 = 12)

Part C

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

19. Calculate the work done during an isothermal expansion.
20. A Carnot's engine working between 127° C and 27° C. What is the thermal efficiency of the engine ?
21. Determine the change in entropy when 100 gram of ice at zero degree centigrade is converted into water at the same temperature.
22. Calculate the maximum amount of energy lost per second by radiation by a sphere 10cm diameter at 227° C when placed in an enclosure at 27° C.
23. Obtain Clausius - Clapeyron equation from Maxwell-Boltzmann law.
24. Compare FD and MB statistics.

(4 × 4 = 16)

Part D

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

25. Describe the working of a Carnot's heat engine. Derive an expression for its efficiency.
26. Describe with diagrams the working of a diesel engine and obtain the expression for efficiency.
27. Deduce the Maxwell equations and use them to obtain Tds equations.
28. Derive the MB distribution law.

(2 × 12 = 24)