E 3214 (Pages : 2) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, OCTOBER 2016

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 : 60 Marks

Part A

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

Fill up the blanks :

1. The work done during a cyclic process is ————.
2. The ———— of a Carnot's reversible engine does not depend on the nature of the working substance.
3. According to Kelvin-plank statement no engine can have ———— efficiency.
4. For a reversible cyclic process the change in ———— is zero.
5. In a ———— process initial and final enthalpies are equal.
6. Stefan's law is applicable for ———— temperatures of a hot body.
7. Fermions have ———— integral spins.
8. Bosons are characterised by ———— wave functions.

(8 × 1 = 8)

Part B

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

9. What is an indicator diagram ? Explain.
10. What is Carnot's cycle ?
11. State and explain the third law of thermodynamics.
12. Explain an adiabatic process of your own interest.
13. Arrive at entropy during an irreversible process.
14. What is isothermal elasticity ? Explain.
15. Write down Clausisus - Clapeyron equation and applications.

Turn over

16. State and explain Stefan - Boltzman law.
17. What are macro states ? Explain.
18. What is Gibbs paradox ?

(6 × 2 = 12)

Part C

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

19. Calculate the work done during an adiabatic expansion.
20. Determine the efficiency of a Carnot's engine working between steam point and ice point.
21. Show that the slope of an adiabatic is greater than that of an isothermal.
22. One gram molecule of a gas expands isothermally to four times its volume. Calculate the change in entropy in terms of gas constant.
23. Obtain the most probable speed of ideal gas molecules by MB law.
24. Compare FD and BE statistics.

(4 × 4 = 16)

Part D

Answer **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 operations of an Otto engine and support with theory.
27. Deduce the Clausius - Clapeyron equation and discuss the effect of change of pressure on the melting and boiling points.
28. Derive the expression for the FD distribution of electrons among the energy states in a metal.

(2 × 12 = 24)