E 5029 (Pages : 3) Reg. No.....

Name.....

B.Sc. DEGREE (C.B.C.S.S.) EXAMINATION, APRIL 2013

Sixth Semester

Core Course—EQUILIBRIUM AND KINETICS

(Common for B.Sc. Chemistry Model I, Model II and B.Sc. Petrochemicals and B.Sc. Chemistry Environment and Water Management)

Time : Three Hours Maximum Weight : 25

Section A

Answer **all** *questions.*
A bunch of **four** *questions carries a weight of* 1.

I. 1. Inversion temperature is the temperature at which ———.

2. An open system is a system which can change ——— ———.

3. ——— an example for extensive reaction.

4. The Clausius Clapeyron equation is ———.

II. 5. Criteria for a spontaneous reaction in AG is ———.

6. Third law of thermodynamics states that at absolute zero of temperature ———.

7. One example for Parallel reaction is ———.

8. The state function is a property of a thermodynamic system which has ———.

III. 9. Arrhenius equation is ———.

10. $t_{½}$ of a second order relation is related to concentration as $t_{½}$ = ———.

11. If a one component system has two phases with each other, the degree of freedom will be ———.

12. Polymorphism is ———.

IV. Match the following :

In the following Bunch of **four** *questions match the correct form :*

A	B
13. Gibbs Helmholtz equation	$E + S \rightleftharpoons ES \rightarrow EP \rightarrow E + P$.
14. Gibbs Duhem equation	$AG = AH + T\left(\frac{\delta AE}{\delta T}\right)_P$
15. Michaelis–Menten equation	$K_2 = \frac{kbT}{h} e^{AS^{0}/R} e^{-AH^{0}/RT}$.
16. Erying equation	$\Sigma\, nid\, \mu\, i = 0$.

(4 × 1 = 4)

Turn over

Section B

Answer any **five** *questions.*
Each question carries a weight of 1.

17. Show that the time for half change in a third order reaction is inversely proportional to the square of initial concentration of reactants.
18. Give the Physical significance of Entropy.
19. Show that $k_p = k_C(RT)^{\Delta n}$.
20. Sketch and Label the phase diagram of sulphur system.
21. Explain the term partition function.
22. What are consecutive reaction ? Give *one* example.
23. What is meant by Triple Point ?
24. Show that maximum work is obtained from a reversible process.

$(5 \times 1 = 5)$

Section C

Answer any **four** *questions.*
Each question carries a weight of 2.

25. Explain the theories of surface catalysis.
26. Calculate the change in entropy accompanying the isothermal expansion of 5 moles of an ideal gas at 330 K till the volume has increased six times.
27. A reversible Carnot engine produces 3.36×10^4 J of work by taking up 41.84 kJ heat. If the temperature of the source is 527°C. What would be the temperature of the sink ?
28. Sketch the phase diagram of acetic acid–chloroform water system and explain.
29. Discuss the Thermodynamic criteria for equilibrium.
30. Derive Van't Hoff's equation. Giving quantitatively the effect of temperature on chemical equilibrium.

$(4 \times 2 = 8)$

Section D

Answer any **two** *questions.*
Each question carries a weight of 4.

31. Briefly outline the absolute reaction rate theory.

32. Sketch the phase diagram of Ferric–Chloride–Water System and discuss. Also explain congruent and incongruent Melting point.

33. (a) Derive Gibbs Helmholtz equation.

    (b) How does the enthalpy of a reaction vary with temperature ? Derive Kirchhoff's equation.

$(2 \times 4 = 8)$