[Total No. of Questions - 9]   [Total No. of Printed Pages - 3]
(2064)

14613

B. Tech 2nd Semester Examination

Applied Chemistry (O.S.)

AS-1004

Time : 3 Hours   Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five question in all selecting one question from each section A, B, C and D. Section E is compulsory.

SECTION - A

1. (a) Give the statements of second law of thermodynamics.
                                                                    (4)

    (b) Derive Gibb's Helmholtz equation.   (6)

    (c) Derive the conditions for spontaniety of a process in terms of entropy.   (6)

    (d) Gibb's free energy of a reaction at 27°C and 37°C are −29.0 Kcal and −10 Kcal respectively. Calculate the free energy at 330K.   (4)

2. (a) Explain the following terms: (i) Phase, (ii) Component, (iii) Degree of freedom.   (6)

    (b) Discuss the phase diagram of water system.   (8)

    (c) Write short notes on: (i) Eutectic paint, (ii) Reduced phase rule.   (6)

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SECTION - B

3. (a) Discuss the ion-exchange process for water softening.
(6)

   (b) Distinguish between hard water and soft water. What is break point chlorination? (6)

   (c) Write short note on Cottrele's electrostatic precipitator.
(4)

   (d) Write short note on: (i) Ozone depletion, (ii) greenhouse effect. (4)

4. (a) Define corrosion of metals? What are different types of corrosion? Explain electrochemical theory of wet corrosion.
(8)

   (b) Write short notes on: (i) Pitting corrosion, (ii) Role of sacraficial anode in corrosion controls. (6)

   (c) Give an account of tinning and galvanising. (6)

SECTION - C

5. (a) Define the term lubrication and lubricants. What are different types of lubricants. (10)

   (b) What are greases and under what situation are they employed? Discuss the composition and uses of:

   (i) Calcium based, (ii) Soda-based, (iii) axle grease. (10)

6. (a) What is meant by cracking of petroleum? Explain fluidized-bed catalytic method of obtaining gasoline. Give its mechanisms. (10)

   (b) How can power alcohol be useful in fuel crisis? (10)

SECTION - D

7. (a) What are Miller indices? Calculate the Miller indices of a crystal plane which cut the cell axis $\left(\frac{1}{2}a, \frac{2}{3}b, \infty\right)$.   (10)

(b) What are instrinsic semiconductor? Explain the conduction in n-type and p-type semiconductor.   (10)

8. (a) Explain the following:

(i) Auto catalysis, (ii) Promoters, (iii) Negative catalysis, (iv) Acid-base catalyst, (v) Enzyme catalysis.   (10)

(b) Write short note on homogeneous and heterogeneous catalysis.   (10)

SECTION - E

9. (a) What is ppm?

(b) Distinguish between gross and net calorific value of fuel.

(c) What is meant by knocking?

(d) What is BOD and COD?

(e) Name the three gases in atmosphere which cause acid rain.

(f) Give an application of Pb-Ag system.

(g) What type of lubricants are used for transformers?

(h) Which of the following three conditions is valid for spontaneous reaction?

(i) $\Delta G > 0$,   (ii) $\Delta G = 0$,   (iii) $\Delta G < 0$

(i) Why is germanium doped with antimony called an n-type semiconductor?

(j) What is a super conductor?   (2×10=20)