

[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 spontaneity 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 point, (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 Cottrelle'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 sacrificial 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 intrinsic 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)