



GIET Main Campus (Autonomous)

Gunupur-765 022

Reg.No.:

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B.TECH. DEGREE EXAMINATION-NOV-DEC-2018

End Semester Examination

BCHPC3030-Physical and Analytical Chemistry (Regulations 2017) (Chemical Engineering Branch)

Time : 3 Hours

Maximum : 100 Marks

Question Code:171012

Answer ALL Questions

PART A - (10 X 2 = 20 Marks)

1. (a) Which of the following can act as a protective colloid: [CO1][PO1]
 - a) gelatin
 - b) silica gel
 - c) oil-in-water-emulsion
 - d) all correct

- (b) The process of passing of a precipitate into colloidal solution, on adding an electrolyte is called: [CO1][PO1]
 - a) dialysis
 - b) peptisation
 - c) electrophoresis
 - d) electrosmosis

- (c) Smoke is a dispersion of: [CO1][PO7]
 - a) gas in gas
 - b) gas in solid
 - c) solid in gas
 - d) liquid in gas

- (d) The electric charge for electrode deposition of gram equivalent of a substance is [CO2][PO1]
 - a) 1 ampere per second
 - b) 96500 C per second
 - c) 1 ampere for 1 hour
 - d) Charge on one mol of electrons

- (e) In an electrochemical cell that functions as a voltaic cell, [CO2][PO1]
 - a) electrons move from the cathode to the anode
 - b) electrons move through a salt-bridge
 - c) electrons can move either from the cathode to the anode or from the anode to the cathode
 - d) reduction occurs at the cathode

- (f) In adsorption of oxalic acid on activated charcoal, the activated charcoal is called [CO3][PO1]
 - a) adsorbate b) adsorber c) absorber d) adsorbent



- (g) Amount of gas absorbed per g of adsorbent increases with pressure, but after certain limit is reached, adsorption becomes constant, It is where: [CO3][PO1]
a) multilayers are formed
b) desorption take place
c) temperature is increased
d) absorption also starts
- (h) Which of the following is not characteristics of chemisorptions? [CO3][PO1]
a) It is irreversible
b) it is specific
c) it is multi-layer phenomenon
d) is independent of temperature
- (i) The molecules which is IR-inactive but Raman-active is [CO4][PO1]
a) HCl b) N_2 c) SO_2 d) protein
- (j) Raman effect is [CO4][PO1]
a) absorption of light
b) emission of light
c) elastic scattering of light
d) inelastic scattering of light

PART B - (10 X 2 = 20 Marks)

2. (a) What is chemical potential? [CO1][PO1]
- (b) Differentiate between hydrophilic and hydrophobic system? [CO1][PO1]
- (c) Explain briefly about Galvanization process with neat diagram? [CO2][PO1]
- (d) What is pitting corrosion? [CO2][PO1]
- (e) Mention the advantage of fuel cells? [CO2][PO1]
- (f) Differentiate between adsorption and absorption? [CO3][PO1]
- (g) What are the general features of absorption spectrometer? [CO3][PO1]
- (h) Write about rotational and vibration of molecules? [CO4][PO1]
- (i) What is an invariant system? Give an example. [CO4][PO1]



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- (j) The equivalent conductance of $1.028 \times 10^{-3} (N)$ acetic acid is $38.15 \text{ ohm}^{-1} \text{ cm}^{-1} \text{ eq}^{-1}$ at 298 K. Its equivalent conductance at infinite dilution is $380.5 \text{ ohm}^{-1} \text{ cm}^{-1} \text{ eq}^{-1}$. Calculate the degree of dissociation of acetic acid. [CO4][PO2]

PART C - (4 X 15 = 60 Marks)

3. (a) (i) Differentiate between Lyophilic and Lyophobic colloids. [5][CO1][PO1]
(ii) Draw the well labeled phase diagram of water and describe in details. [10][CO1][PO1]
(or)
- (b) (i) Briefly explain the applications of colloidal chemistry in pollution control and industries. [7][CO1][PO1]
(ii) Write short notes on
i. Zeta potential
ii. Electrophoresis. [8][CO1][PO1]
4. (a) (i) What do you mean by fuel cell? With a neat levelled diagram explain the construction and working principle of a fuel cell. [10][CO2][PO1]
(ii) Write a short note conductometric titration. [5][CO2][PO1]
(or)
- (b) (i) What is single electrode potential? Derived the Nernst equation for single electrode potential and its use. [8][CO2][PO1]
(ii) What are concentration cells? Describe the construction and working of $\text{CH}_3\text{OH}/\text{H}_2$ fuel cell with neat diagram. [7][CO2][PO1]
5. (a) (i) What are the principal features of Freundlich isotherm, the adsorption of a dye from solution on charcoal is governed by the Freundlich isotherm, in which $n=2$ and $k=6.8$. The concentration of the dye is expressed in milimoles/c.c and the amount adsorbed in milimoles/gm. If 10gm of charcoal be shaken with a 0.1 M solution of the dye, what will be the eqm. Concentration of the solution? [10][CO3][PO1]
(ii) Differentiate between physical and chemical adsorption with suitable examples. [5][CO3][PO1]
(or)
- (b) (i) What is the working principle of BET theory of multilayer adsorption. How surface area area measured? [5][CO3][PO1]
(ii) Which factor does effects adsorption of gases on solid? [10][CO3][PO1]
6. (a) (i) What is chromatography? Briefly explain the working principle of column chromatography with a neat sketch [10][CO4][PO1]
(ii) Explain principles of NMR and IR absorption spectroscopy. [5][CO4][PO1]
(or)
- (b) (i) What is the working principle of mass spectroscopy? With a neat schematic diagram explain the working principle of mass spectrometer. [10][CO4][PO1]
(ii) State the Beer Lambert's law and deduce the mathematical expression for same. [5][CO4][PO1]