

BACHELOR OF SCIENCE (CBCS-2018 COURSE)
T. Y. B. Sc. Sem-V :SUMMER- 2022
SUBJECT : CHEMISTRY : PHYSICAL CHEMISTRY-I

Day : Monday
Date : 4/7/2022

S-18414-2022

Time : 11:00 AM-02:00 PM
Max. Marks : 60

N.B.

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Use of log table / scientific **CALCULATOR** is allowed.
- 4) Draw neat diagrams **WHEREVER** necessary.

Q.1 Attempt **ANY TWO** of the following : **(12)**

- a) What is principle of colorimetry? What are the advantages of colorimetry?
- b) Define the terms adsorbate and adsorbent. Distinguish between adsorption and absorption.
- c) Explain hydrogen electrode in detail.

Q.2 Attempt **ANY TWO** of the following : **(12)**

- a) What are the assumptions of BET theory? Give the physical significance of the terms involved in BET equation.
- b) Derive Nernst's equation for the electrode potential.
- c) Explain the Harkins and Jura method for the determination of surface area of adsorbent.

Q.3 Attempt **ANY TWO** of the following : **(12)**

- a) Draw neat diagrams of physical adsorption isotherms.
- b) Define the terms transmittance, opacity and absorbance.
- c) Elaborate on reversible and irreversible cells.

Q.4 Attempt **ANY THREE** of the following : **(12)**

- a) Calculate the equilibrium constant for the reaction :
$$\text{Cu}_{(s)} + 2\text{Ag}^+_{(aq)} \longrightarrow \text{Cu}^{+2}_{(aq)} + 2\text{Ag}_{(s)}$$
$$E^0_{\text{cell}} = 0.46 \text{ V} ; \frac{2.303RT}{F} = 0.059 \text{ V}$$
- b) A solution of KMnO_4 shows 0.08 absorbance at wavelength 540 nm. Express the measurement in terms of transmittance unit.
- c) Calculate the electrode potential of the following electrode at 298 K
 $\text{Zn}^{2+}_{(aq)}, 0.1 \text{ M} | \text{Zn}_{(s)}$ $E^0_{\text{Zn}} = -0.761 \text{ V}$.
- d) Calculate the emf of the cell without transference,
 $\text{Pt} | \text{H}_2(\text{g}, \text{atm}) | \text{HCl} (a=0.1) | \text{Hg}_2\text{Cl}_2(\text{s}) | \text{Hg}_{(l)} | \text{Pt}$,
std. potential of calomel electrode is 0.268 V at 298 K.

Q.5 Attempt **ANY FOUR** of the following : **(12)**

- a) Mention the methods used for colour comparison.
- b) What do you understand by adsorption isotherm?
- c) Explain black body radiation.
- d) What is photoelectric effect? What are its characteristics?
- e) Give Schrodinger wave equation.
- f) List the applications of Beer's law.
