Day: Wednesday		Time: 03.00 P.M. To 06.00 P.M
Date: 10/10/2018	**W-2018-0740**	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) Give definitions of absorbance, molar extinction coefficient and extinction coefficient.

b) Derive $\Delta S = nF\left(\dfrac{dE}{dT}\right)_p$.

c) Derive the Langmuir adsorption isotherm.

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

a) State and derive the Beer's law.

b) Explain BET theory for multilayer adsorption.

c) Define adsorption isotherm. Give a brief account of Freundlich adsorption isotherm.

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

a) Discuss the applications of emf measurement in determination of solubility and solubility product of sparingly soluble substances.

b) Obtain the emf equation for chemical cell without transference.

c) Distinguish between physical and chemical adsorptions.

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

a) Prove that $A = 2 - \log \% T$.

b) A solution of $KMnO_4$ of concentration $1.4 \times 10^{-5} M$ shows an absorbance of 0.55 at 540 nm when placed in cuvette of 1 cm path length. Calculate the concentration of $KMnO_4$ solution, showing an absorbance of 0.81 in the same cuvette.

c) Calculate emf of the cell at 298 K.

$Pt \mid Cl_{2(g, 0.5\, atm)} \mid HCl_{(aq)} \mid Cl_{2(g, 3\, atm)} \mid Pt$

d) Calculate the electrode potential of the following electrode at 298 K.

$Fe^{2+}_{(a=1)}, \; Fe^{3+}_{(a=0.1)} \mid Pt, \quad E^0_{Fe^{2+}/Fe^{3+}} = 0.771 V$.

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

a) What is electrochemistry? What are electrolytic and Voltaic cells?

b) Describe the applications of emf measurement in the determination of pH of the solution.

c) Compare the simple colorimeter and photoelectric colorimeter.

d) Describe in short de Broglie hypothesis.

e) Explain quantum theory of radiation. What is Planck's constant?

f) Write a precise note on, "Photoelectric effect".

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