Sundarban Mahavidyalaya

B. Sc Part -2 Examination 2020

Subject: Physical chemistry F.M :25

Give the answer any five questions

1. (a) $\Psi = \Psi_1 + \sqrt{3}\Psi_2$ where $\Psi_1 \; and \; \Psi_2$ are normalized and mutually orthogonal function normalized Ψ . 3

(b) $\left[\frac{d^2}{dx^2}, \hat{x}\right]$ find this commute or not? 2

2. (a) If two hermitian operator $\hat{A} \; and \; \hat{B}$ have all the eigen function common .Then show that,

$\left[\hat{A}, \hat{B}\right] = 0$, Assume that all the eigen states of $\hat{A} \; and \; \hat{B}$ are non degenerate and show that all the eigen values of $\hat{A}$ are real.

2+3

3. (a) 20.85 gm of PCl_5 is taken in a 4 litre closed vessel at 250℃ . The equillibrium pressure of the mixture is found to be 1.825atm. Find out the partial pressure of Cl2 and value of K_p.

3

(b)' K_p is independent of pressure and temperature for all gaseous reaction' – Justify 2

4. (a) show that $\frac{\partial\left(\frac{E^0}{T}\right)}{\partial\left(\frac{1}{T}\right)} = \frac{\Delta H^0}{nF}$ Where the terms have their usual significance. 2

(b) A potentiometer equipped with a glass saturated calomel electrode gave a reading of 0.0232 V at 25 ℃ for a P^H 2.5 buffer. What is the P^H of another buffer for which the same potentiometer reads 0.111 V ?

3

5. (a)Construct the galvanic cell where net reaction is $H^+ + OH^- = H_2O$ 2

(b) Set up a reversible cell without transference , for the process –

$CuSO_4(a_1) \rightarrow CuSO_4(a_2) \; (a_1 > a_2)$ find out the emf of the cell. 3

6. (a) Equal volume of aqueous solution of 0.1 M $Pb(NO_3)_2$ and 0.1 M K_2SO_4 are mixed together. Calculate the ionic strength of the resulting solution.

3

(b)Justify the use of alternating current and platinized electrodes in conductance measurement in aqueous medium. 2

7.(a) Derive the expression for the energy of particle moving in ID box , using De-Borglie. 3

(b) Verify the Operator ∇^2 is linear or not? 2