Roll No. .....

41202

B. Sc. (Pass Course) 4th Semester Examination – May, 2019

CHEMISTRY - II (Physical Chemistry)

Paper : CII-402

Time : Three hours] *[Maximum Marks : 30*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, including Question No. **1** which is ***compulsory***. Select ***one*** question from each Section. All questions carry equal marks.

1. ***Compulsory Questions*** : 1,1, 1, 1, 1, 1

(a) State second law of thermodynamics.

(b) Define residual entropy.

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(c) What are reversible and irreversible cells ? Give examples.

(d) Under what conditions ΔG becomes equal to ΔA.

(e) What are the limitations of quinhydrone electrode ?

(f) Why the efficiency of heat engine cannot be greater than one ?

SECTION – A

2. (a) Describe Carnot cycle and derive an expression for the efficiency of a heat engine working between temperatures T_1 and T_2. 4

(b) What is the criterion of spontaneity in terms of entropy ? 2

3. (a) Derive an expression for entropy as a function of V & T and P & T where V, P, T are volume, pressure and temperature respectively. 5

(b) What is the criterion of spontaneity in terms of entropy ? 1

SECTION – B

4. (a) State third law of thermodynamics. How does i help in the determination of absolute entropies o chemical compounds at desire temperature ? 2

(b) The free energy change (ΔG) accompanying a given process is –85.77 KJ at 25°C and –83.68 K. at 35°C. Calculate the change in enthalpy (ΔH) fo the process at 30°C. 4

5. (a) Derive Gibb's Helmholtz equation. 5

(b) What is the difference between Helmholtz function and Gibb's function ? Under what conditions ΔG becomes equal to ΔA. 1

SECTION – C

6. (a) Derive the Nernst equation for EMF of a complete electrochemical cell. 4

(b) Write a short note on single electrode potential. 2

7. (a) Calculate the EMF of a Zinc-silver cell at 30°C when the activity of Zn^{2+} ions is 0.5 and the activity of Ag^{+} ions is 10. Standard reduction potential at 30°C is (i) Ag^{+}/Ag = 0.799 V (ii) Zn^{2+}/Zn = –00.76 V. 4

(b) Derive an expression for calculating mean ionic activity coefficient. 2

SECTION – D

8. Explain Concentration Cell (a) with transference (b) without transference. 3, 3

9. (a) Discuss the application of EMF measurement in potentiometric titrations. 4

(b) Calculate the EMF of the following concentration cells T25°C. Ag|0.001N $AgNO_3$||0.1 N $AgNO_3$; assuming the activities of silver ions to be equal to the concentrations. 2