

Roll No. _____

M. Sc CHEMISTRY
SCHOOL OF CHEMICAL AND LIFE SCIENCES
SEMESTER I EXAMINATION 2019
PAPER TITLE: PHYSICAL CHEMISTRY-I
PAPER CODE: MCHCC-101

(Write your roll no. at the top immediately after receipt of this question paper.)

Time: 3h

Max Marks: 75

Attempt all the questions. All parts of a question must be attempted in continuation.
Start answer of a fresh question on a new page.

Q1. Attempt ALL of following:

10 x 1.5 = 15

- A. What are partial molar properties?
- B. Define phase, component & Degree of freedom.
- C. Define Electrified Interface.
- D. What is over potential?
- E. What is Tafel Plot?
- F. What is Li-battery?
- G. What is quantum mechanics?
- H. What are the applications of quantum mechanics?
- I. What is Eigen Value & Eigen function?
- J. What is 'Tears of Wine' phenomenon?

Q2. Attempt ANY THREE of the following:

3 x 5 = 15

- A. Derive Debye-Hückel equation for activity coefficient.
- B. What are the applications of phase rule of three component?
- C. Explain second order phase transitions.
- D. What are Excess functions? What is the physical significance of Excess Function?
- E. How will you determine the Fugacity & Partial molar volume?

Q3. Attempt ANY THREE of the following:

3 x 5 = 15

- A. Explain Graham-Devanathan-Mottwatts model of electrified interfaces.
- B. Derive Butler-Volmer equation

- C. Explain Electrocardiography & Electrodialysis.
- D. Explain the principal & function of Polarography.
- E. Explain Debye-Herum model & derive Lippmann equation.

Q4. Attempt ANY THREE of the following:

3 x 5 = 15

- A. Explain the various postulates of Quantum mechanics.
- B. Discuss the solution of rigid rotator & Hydrogen atom
- C. Derive angular momentum operator and find out the commutator between position & momentum
- D. Derive the expression of normalized Ψ for particle in One Dimensional box.
- E. Determine the position & momentum of particle in one dimensional box from Ψ expression.

Q5. Attempt ANY THREE of the following:

3 x 5 = 15

- A. Derive Laplace equation.
 - B. Derive Kelvin equation.
 - C. Derive B.E.T equation.
 - D. What are surface films on liquids? Explain the mechanism of its formation & two applications.
 - E. What are Nano catalysts? Explain their application in industry.
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