



RAN-1903080202030001

M. Sc. (Sem.-II) Examination September - 2025

Chemistry: Physical Chemistry (Paper-III)

Time: 3 Hours]
[Total Marks: 70

સૂચના : / Instructions (1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી. Fill up strictly the above details on your answer book (2) All questions are compulsory. (3) Figures to the right indicate full marks of the questions.	Seat No.: <table border="1"> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table> Student's Signature						

Q.1. Answers any three of the following. (18)

- Explain qualitative approach of Debye-Huckel theory briefly. Discuss electrophoretic effect.
- How approximate EMF method can be used to determine dissociation constant of the weak mono basic acid?
- Define the term: Overvoltage, Hydrogen overvoltage, Polarization, Concentration polarization.
- Calculate the ionic strength of a solution containing 40ml of 0.03M nitric acid and 60ml of 0.02M calcium phosphate solution.

Q.2. Answers any three of the following. (18)

- Derive the Gibbs adsorption equation.
- Explain orientation of surfactants on the surface of solution.
- Derive BET equation.
- Explain surface pressure in detail.

Q.3. Answers any three of the following. (18)

- Explain origin of charges on colloidal particles.
- Describe phase separation model of micellization.
- Write a note on solubilization of micelle and different types of micro- emulsion.
- Show how DLVO theory explains the stability colloids.

Q.4. Answers any three of the following. (16)

- Explain vibrational transitions for fundamental band, first overtone and second overtone.
- Explain techniques and instrumentation of rotational spectrum.
- Discuss the effect of the isotropic substitution in a diatomic molecule in the rotational spectra.
- The internuclear distance means bond length of CO molecule is $1.13 \text{ \AA}$. Calculate the energy in Joule in the first excited rotational level.

$$[N = 6.023 \times 10^{23}, h = 6.626 \times 10^{-34} \text{ Js}]$$