Registration No.: | | | | | | | | | | |

Total Number of Pages: 01 **Course: M.Sc.I**

Sub_Code: FCYC802

8th Semester Regular Examination: 2024-25

SUBJECT: Physical Chemistry-VI

BRANCH(S): M.Sc.I(AC)

Time: 3 Hours

Max Marks: 70

Q.Code: S062

Answer Question No.1 (Part-I) which is compulsory, any five from rest (Part-II)

The figures in the right hand margin indicate marks.

Part-I

Q1 **Answer the following questions :** **(2 x 10)**

a) Define the term 'explosion limit' with an example.
b) What is the Rice-Herzfeld mechanism?
c) Write any two assumptions of the Lindemann mechanism.
d) Define the primary and secondary salt effects.
e) What are diffusion-limited reactions?
f) State Fick's first law of diffusion.
g) Explain the term "critical micelle concentration (CMC)."
h) State Kasha's rule in photochemistry.
i) Define Krafft temperature.
j) What is Förster type energy transfer?

Part-II

Long Answer Type Questions (Answer Any five)

Q2 **a)** Explain the mechanism of a consecutive reaction with suitable examples. **(5 + 5)**
b) Discuss the transition state theory from both thermodynamic and statistical perspectives.

Q3 **a)** Describe the effect of solvent and ionic strength on reaction rates in solution. **(5 + 5)**
b) Discuss the theory of diffusion-limited reactions to study fast reactions.

Q4 **a)** Derive Fick's second law and explain its physical significance. **(5 + 5)**
b) Derive Einstein's relation and explain the terminologies involved.

Q5 **a)** Explain the process of micellization and the factors affecting CMC. **(5 + 5)**
b) Describe the thermodynamics of micelle formation.

Q6 **a)** Write a note on reverse micelles and microemulsions. **(5 + 5)**
b) Explain surface catalytic activity and electrokinetic phenomena.

Q7 **a)** Describe fluorescence and phosphorescence with Jablonski diagram. **(5 + 5)**
b) Explain mirror image symmetry in fluorescence spectra.

Q8 **a)** Explain Förster and Dexter energy transfer mechanisms. **(5 + 5)**
b) Discuss the factors affecting quantum yield in photochemical processes.