



**MCHT 3.3**

**III Semester M.Sc. Degree Examination, September 2016**  
**CHEMISTRY**  
**Physical Chemistry – III**

Time : 3 Hours

Max. Marks : 80

**Instruction :** Answer **any eight** questions from Part – I and **any four** full questions from Part – II.

**PART – I**

**(8×2=16)**

- a. State the Zucker-Hammett hypothesis of acid base catalysis.
- b. What are auto catalyzed reaction ? Give an example.
- c. What is linear free energy relationship ? Mention two isokinetic energy relationships.
- d. Explain the irreversible electrode process with example.
- e. What is mass transport ?
- f. Write the mechanism for H<sub>2</sub> overvoltage.
- g. What is twinning ?
- h. Define mole fraction of a solute.
- i. What is vapour pressure of liquid ? Explain its significance.
- j. Describe chemical potential and give its significance.

**PART – II**

1. a) Derive the expression for kinetics of acid-base catalysis.
- b) What are oscillatory chemical reactions ? Explain with an example.
- c) Explain temperature-Jump and pressure-Jump method for determination of rate of fast reactions. **(4+6+6=16)**

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2. d) Explain different types of over voltages.  
e) Explain the method for identification of metal ion in solution (quantitative analysis) by using polarography.  
f) Explain Tafel's theory for activation over voltage. **(6+6+4=16)**
  3. g) Explain stacking faults with an example.  
h) How n-type semiconductors are prepared ? Explain their mode of conductivity.  
i) What is Josephson effect ? How energy gap of super conductors can be manifested ? **(5+5+6=16)**
  4. j) The vapour pressure of pure water at 0° C is 3.579 mm of Hg. A solution of lactose containing 6.45 g lactose in 100 g of water has a vapour pressure of 4.559 mm of Hg at the same temperature. Calculate the molecular weight of lactose.  
k) Derive the expression for relation between depression of freezing point and lowering of vapour pressure.  
l) Explain desalination of seawater by reverse Osmosis method. **(6+4+6=16)**
  5. m) Derive the expression for the kinetics of acid-base catalysis.  
n) Derive the equation for concentration over potential at the stationary surface.  
o) What is explosion ? Discuss gas-phase auto oxidation reaction. **(6+4+6=16)**
  6. p) Write a note on Type-I and Type-II super conductors.  
q) Explain the mechanism of electrochemical corrosion by inhibitors method.  
r) What are p-n junctions ? Discuss its formation and significance. **(6+4+6=16)**
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