IV Semester M.Sc. Degree Examination, July 2016

CHEMISTRY

MCHT 4.3: PHYSICAL CHEMISTRY - IV

Time: 3 Hours **Max. Marks: 80**

PART – I

1. Answer any Eight questions. **(2x8=16)**

i) Explain the term thermodynamic probability (W) with suitable example.

ii) Compare Maxwell-Boltzmann (M-B) and Fermi-Dirac (F-D) Statistics.

iii) Write the equation of total partition function (Q).

iv) What is Debye characteristic temperature (θ)?

v) List out the general characteristics of radioactive decay.

vi) Write the Geiger-Nuttal rule.

vii) What is meant by repeating units? How they differ from Monomers.

viii) Write the Difference between Vulcanized rubber and Natural rubber.

ix) Differentiate between single-walled carbon nanotubes and multi-walled carbon nanotubes?

x) Explain the advantages of hydrothermal method.

PART – II

Answer any Four full questions.

2. a) Calculate the translational partition function for O_2 at 1 atm and 298 K in a vessel of volume 24.4 cm^3
   b) Deduce Maxwell-Boltzmann distribution equation.
   c) Derive Sackur – Tetrode equation for a monatomic gas.

(4+6+6=16)

P.T.O

3. d) Find the recoil energy of ^{128}I following the emission of a 4.8 Mev photon.
   e) Define the term with example i) Isotopes ii) isobars and iii) isofones.
   f) How do you determine the age of a specimen by using ^{14}C dating.

(4+6+6=16)

4. g) What is meant by Glass transition temperature (Tg)? Explain its significance
   h) Discuss the kinetics of condensation polymerization (Step wise polymerization).
   i) Derive the expression of Entropy of mixing of polymer solution.

(4+6+6=16)

5. j) What are the properties change for nanomaterials compare to Macromolecules?
   k) Explain the photo-degradation of dye and industrial effluents by nano ZnO or TiO_2.
   l) What are aerogels? How they are prepared by sol-gelmethod.

(4+6+6=16)

6. m) Drive the expression for translational partition function
   n) Explain the use of radio isotopes in structural investigations with one example.
   o) Define the following terms and give the relationship between them
      i) Half life period
      ii) Disintegration constant and
      iii) Secular and transient equilibrium

(4+6+6=16)

7. p) Discuss the molecular weight of polymers and its distribution.
   q) Explain the molecular weight determine of polymers by Sedimentation velocity method.
   r) Discuss the application of nanomaterials in colored glasses and renewable energy.

(4+6+6=16)