No. of Printed Pages: 2

(A-8) Seat No: _____

SARDAR PATEL UNIVERSITY
T.Y.B.Sc. (NC)
SEMESTER V EXAMINATION
Saturday, 14th May, 2016
10.30 to 1.30 pm
PHYSICAL CHEMISTRY: US05CCHE05

Maximum marks : 70

Q 1 MULTIPLE CHOICE QUESTIONS [10]

1. Transmittance is equal to
   a) I_o / I_t b) I_t / I_o
   c) $\log I_t / I_t$ d) None of these
2. In Lambert- Beer's law when concentration of solution is other than molar the term 'ε' is replaced by
   a) c b) t
   c) b d) a
3. Incandescence is a process in which thermal energy is converted into _____ energy.
   a) Electrical b) Magnetic
   c) Light d) Solar
4. Tetragonal crystal system has the following unit cell dimensions
   a) $a = b = c$ and $\alpha = \beta = \gamma = 90^0$ b) $a \neq b = c$ and $\alpha = \beta = \gamma = 90^0$
   c) $a = b \neq c$ and $\alpha = \beta = \gamma = 90°$ d) $a \neq b \neq c$ and $\alpha = \beta = \gamma = 90°$
5. In the powder diffraction matter, the diffracted X-rays patterns are collected on _____
   a) Screen b) Photographic plates
   c) Camera d) Blank Paper
6. If the number of atoms per unit in a crystal is 2, the structure is
   a) Simple cubic b) Face centered cube
   c) Body centered cube d) None of these
7. Which of the following is not an initiator for free radical addition polymerization?
   a) Benzoyl peroxide b) Per sulphate
   c) Lewis-acids d) None of the above
8. The formation of a condensation polymer generally involves _____.
   a) The addition of a plasticizer b) The mixing of sulfur with an addition polymer
   c) The elimination of a small molecule d) None of the above
9. Which of the following technique is based on number average molecular weight?
   a) Viscometry b) Osmometry
   c) Light scattered method d) Ultra centrifugation
10. Which of the following additives is added during the polymerization
    a) Plasticizers b) Thermal stabilizers
    c) Chain transfer agents d) None

Q.2 ANSWER ANY TEN [20]

1. Define intersystem crossing and photochemical reaction.
2. What is meant by Luminescence. Explain various types of Luminescence.
3. State Grotthus – Draper law and Law of Photochemical equivalence.
4. Define (i) Ionic radii and (ii) Covalent radii.
5. Write the Bragg's equation and describe each term involved in it.
6. State the law of rational indices. How are the miller indices obtained.
7. What is meant by Bravis lattice. Give the unit cells of Bravis lattice.
8. Write down the meaning of Constitutional isomerism and give the different polymers obtain from the monomer having the formula C_2H_4O.
9. Give two differences between Addition and Condensation polymers.
10. Write the characteristic property of free radical polymerization.
11. Name the polymers produce from (a) bulk polymerization (b) suspension polymerization

(P.T.O.)

(c) solution polymerization (d) emulsion polymerization.

12. In how many ways can the polymer of Isoprene be arranged? To which isomerism will t belonged?

Q. 3

a. What is meant by Photoluminescence. Give the characteristic properties and examples of various types of Photoluminescence. [10]

OR

Q. 3

a. What is meant by Quantum Yield ? With suitable examples give reasons for low Quantum Yield. State the factors affecting Quantum Yield. [10]

Q. 4

a. Discuss how the density of crystal is determined from the powder crystal diffraction method. X-ray diffraction studies of NaCl crystal gives the cubic unit cell dimensions as 564 pm. The density of NaCl is 2.165 gm/ml Calculate the number of NaCl units in the unit cell. [5]

b. Calculate the Miller indices of crystal planes which cut through the crystal axes at [5]
(i) (2a, 3b c) (ii) (a, b, c) (iii) (6a, 3b, 3c) (iv) 2a, -3b,-3c)

OR

Q. 4

a. Derive Bragg's equation to determine the spacing between the successive parallel planes in a crystal. What are the limitations of this equation. [5]

b. The density of Li metal is 0.53 gm/cm and the seperation of (100)nplanes of the metal is 350 pm. Determine whether the lattice is FCC or BCC. M(Li) = 6.941 gm/mol. [5]

Q. 5

a. "The rate of anionic polymerization is second order with respect to monomer concentration, first order with respect to catalyst concentration and inversely related to concentration of inhibitor" Justify. [5]

b. Derive Carother's equation. Explain the kinetics of uncatalysed polycondensation reaction. [5]

OR

Q. 5

a. Explain the free radical mechanism for polymerization of vinyl monomer. Give the salient features. [5]

b. Differentiate between thermoplasts & thermosets. [5]

Q. 6

a. Calculate the relative, specific , reduced and inherent viscocity of 0.5% solution. Time for the solvent flow between two appropriate marks was 60 sec and that for solution was 80 sec. [5]

b. List out the types of polymerization technique. Discuss the Bulk polymerization technique. [5]

OR

Q. 6

a. Discuss the membrane osmometry method for the determination of molecular weight of polymer. [5]

b. For a solution of methacrylate in toluene at 25°C. The value of K is 7.1×10^{-5} and $\alpha = 0.7$. The intrinsic viscosity of solution s 1.5. Calculate the molar mass of given polymer. [5]

BEST OF LUCK

— × —

(2)