Retd 18-12-2013

Exam Code: 220403 **Paper Code: 3216-R**

Programme: Master of Science (Chemistry)

Semester - III

Course Title: Surface and Polymer Chemistry

Course Code: MCHL-3083

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

Note: - Attempt five questions in all, selecting at least one question from each section. The fifth question may be attempted from any Section. Each question carries 16 marks. The students are allowed to use non-programmable calculators.

SECTION – A

1. (a) What is BET theory, how does it explain Multilayer adsorption? What is its mathematical expression? (12)

   (b) What is Surface Tension and how can it be explained? (4)

2. (a) Derive an expression for vapour pressure of droplets (Kelvin equation)? (8)

   (b) Write a short note on capillary action. (5)

   (c) Define detergent action of soaps. (3)

SECTION – B

3. (a) Explain the following:

   (i) Micro emulsion (ii) Reverse micelles (8)

   (b) Derive an expression for Mass action model? (8)

4. (a) What is interaction in surfactant? Give their classification briefly. (8)
   (b) Outline the characteristic feature of surfaceactive agents. (4)
   (c) Explain briefly the concept of micellization? (4)

SECTION – C

5. (a) Determine molecular weight of polymers by using Osmometry method. (8)
   (b) Derive equation of kinetics of self-catalysed polymerization reaction. (8)

6. Write note on –
   (a) Electrically conducting polymers
   (b)Liquid crystal polymers
   (c) Fire retardant polymers
   (d) Thermosetting and thermoplastic polymers (16)

SECTION – D

7. (a) Explain the factors affecting melting point of polymers. (8)
   (b) What do you understand by plasticizer and chain topology? Write its uses. (8)

8. (a) What is glass transition temperature and melting point of polymers? Also, give the relationship between glass transition temperature and melting point. (8)
   (b) What is branching and chain linking property of polymers? (8)

Exam Code: 220403 **Paper Code: 3217-R**

Programme: Master of Science (Chemistry)

Semester – III

Course Title: Photochemistry and Pericyclic Reactions

Course Code: MCHL – 3084

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

Note: Candidates are required to attempt five questions in all, selecting at least one question from each section. Fifth question may be attempted from any section. Each question carries 16 marks. The students are allowed to use non-programmable calculators.

SECTION-A

1. (a) Discuss the ring opening reactions of cyclobutene system when performed (i) thermally and (ii) photochemically to produce 1,3-butadiene. Also discuss this transformation in terms of conservation of orbital symmetry. (8)

   (b) On the basis of FMO approach explain why 4+2 cycloaddition reactions are thermally allowed and photochemically forbidden. (8)

2. (a) Using PMO approach how will you establish that cyclohexatriene is antiaromatic or aromatic? (8)

   (b) What are cycloaddition reactions? Explain the Suprafacial and Antarafacial addition reactions with suitable examples. (8)

SECTION-B

3. (a) Why Diels-Alder reaction between cyclopentadiene and acroleine, CH_2=CH-CHO preferentially give the endo product? Explain. (8)

(b) Write notes on the following: -
(i) 1,3-dipolar cycloaddition reactions (4)
(ii) Cheleotropic reactions (4)

4. Write notes on the following: -
(a) Claisen rearrangement (4)
(b) Aza-cope rearrangement (4)
(c) Ene reaction (4)
(d) Sigmatropic rearrangement (4)

SECTION-C

5. (a) Draw Jablonski diagram and explain the various transitions of excited molecules. (8)

(b) What is quantum yield? In some photochemical reactions, the quantum yield is often very low but the quantum yield can be very high. Explain. (8)

6. (a) Discuss briefly photo-dissociation and gas-phase photolysis. (8)

(b) Give a brief study of the rate constants and life times of reactive energy states. (8)

SECTION-D

7. (a) Write a note on the rearrangement of 1,4-dienes and 1,5-dienes. (8)

(b) Discuss intramolecular photochemical reactions of α, β-unsaturated carbonyl compounds. (8)

8. (a) Explain the following:
(i) Photodegradation of polymers (4)
(ii) Photo-fries reactions of anilides (4)

(b) How will you explain the 1,2-, 1,3-, and 1,4-Photoaddition reaction in Benzene molecule? (8)