MSC III SEM

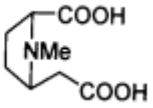
PAPER –I :- ORGANIC CHEMISTRY (Special I)

1) What are Norrish type-I reactions ? Give its mechanism.
2) Discuss the photochemistry of aromatic compounds with reference to its isomerization, addition and substitution reactions.
3) (a) Explain oxidation with : (i) Pyridinium Dichromate (PDC) and (ii) Sulfur.
4) Discuss reduction with : (i) Lindlar Catalyst (ii) Raney-nickel
5) Write brief account on : (i) Reduction with DIBAL-H (ii) Oxidation with Dess Martin Periodinane.
6) What are ylides ? Give methods of preparation of different sulfur ylides. Which sulfur ylides are better suited to form epoxide and why ? Explain.
7) How are phosphorous ylides synthesized and utilized in the synthesis of alkenes and tri-substituted alkenes ?
8) Comment on : (i) Dipole inversion and (ii) Paterson Synthesis
9) Give mechanism and stereochemistry of reduction with NaBH4 .
10) Give brief account on :— (i) Reduction with diimides (ii) Oxidation of Aromatic hydrocarbon

PAPER –II :- ORGANIC CHEMISTRY (Special II)

1) What conclusion can you derive about the structure of zingiberene from the following facts : (i) The molecular formula of zingiberene is C15H24. (ii) Catalytic hydrogenation (Pt) of zingiberene gives hexahydrozingiberene C15H30. (iii) Zingiberene form dihydrozingiberene, C15H26 on reduction with sodium and ethanol. (iv) It forms dihydrochloride with HCl. (v) Zingiberene absorbs at lmax 260 nm (e 2700).
2) An unknown terpenoid X, C10H16O, reacts with hydroxylamine to yield a compound of formula C10H17ON, and with Tollen's reagent to give a silver mirror and a compound of formula C10H16O2 . Upon vigorous oxidation X yields acetone, oxalic acid (COOH)2 and levulinic acid (CH3COCH2CH2COOH). The UV-spectrum of X shows absorptions at lmax = 238 nm, e 13500. What is the structure of an unknown terpenoid X
3) Distillation with zinc dust followed by oxidation with CrO3 of unknown alkaloid Z (C8H17N) results in the formation of pyridine-2-carboxylic acid. It forms monobenzoate derivative on reaction with benzoyl chloride and reacts with nitrous acid to form nitroso derivative. Hoffmann degradation of this alkaloid followed by reduction with HI yields 4-methylheptane. What is the structure of unknown alkaloid Z ?
4) What conclusion you can derive about the structure of androsterone from the following facts/observations : (i) The molecular formula of androsterone is C19H30O2 . (ii) Androsterone does not add to bromine. (iii) It forms monoester with acetic anhydride. (iv) Androsterone forms oxime on reaction with NH2OH. (v) On oxidation androsterone forms diketone.
5) A decapeptide undergoes partial hydrolysis to give peptides whose amino acid compositions are shown. Reaction of the intact decapeptide with Edman's reagent releases PTH-Gly. What is the sequence of the decapeptide ? (i) Ala, Trp (ii) Val, Pro, Asp (iii) Pro, Val (iv) Ala, Glu (v) Trp, Ala, Arg (vi) Arg, Gly (vii) Glu, Ala, Leu (viii) Met, Pro, Leu, Glu.
6) Propose a structure for an octapeptide that shows the composition Asp, 2Gly, Leu, Phe, 2Pro, Val on amino acid analysis. Edman analysis shows a glycine N-terminal group, and leucine is the C-terminal group. Acidic hydrolysis gives the following fragments : Val-Pro-Leu, Gly, Gly-Asp-Phe-Pro, Phe-Pro-Val
7) Explain secondary structure of proteins with suitable diagram.
8) Write the structure of following heterocyclic molecules present as sub-structural unit of plant pigments : (i) Flavone (ii) Flavanone (iii) Flavonol (iv) Flavanonol (v) Isoflavone.
9) What is a chemical evidence for the following structural features of quinine molecule ? (i) Quinine is a secondary alcohol (ii) Presence of vinyl group (iii) It contains methoxy group (iv) It contains quinoline moiety (v) Tertiary nature of nitrogen.
10) Write the structure of olefins that would eventually be formed when the following compound are subjected to a series of Hoffmann exhaustive methylation. Also sketch the reaction sequence.

(i) 

(ii) 

PAPER :- III :- ENVIRONMENTAL CHEMISTRY

1) What are the four climate zones of ecology ? Discuss their characteristics and role in ecology.
2) What is the role of Carbon-Hydrogen cycle in maintaining the ecological balance ? 6 (C) What are the sources and harmful effects of thermal pollution ?
3) Discuss the role of Sulphur cycle in nature. 6 (E) What is thermal pollution ? How can it be prevented ?
4) What are the adverse effects of noise pollution ? How can it be controlled ?
5) Discuss the different criteria for water quality. What is the role of alkalinity and hardness of water in deciding quality of water ?
6) What are the various harmful effects and consequences of water pollution on community use ?
7) Write a descriptive note on strategies for controlling water pollution.
8) Give the important characteristics of sandy soil and clayey soil. How does pH affect the soil ?
9) How can Saline and Alkaline Soil be reclaimed ? Discuss the method of conversion using Gypsum, in detail.
10) What are the sources of radioactive pollution ? Discuss their effect on Human.

PAPER :- IV :- SPECTROSCOPY–I

1) Derive character table for C3v point group on the basis of Great Orthogonality Theorem.
2) Identify the symmetry elements and point group of CH4 . If hydrogen atoms in this molecule are substituted with chlorine atoms one by one, determine point groups of all the resulting molecules.
3) Write short note with reference to Mossbauer spectroscopy (i) Isomer shift (ii) Quadrupole splitting.
4) Explain any two applications of mass spectrometry.
5) The mass spectrum of 1-hexanol shows very weak molecular peak at m/e = 102. Some other prominent peaks are at m/e = 100, 99, 84, 56 (base peak) and 31. What are the most probable species responsible for these peaks
6) What do you understand by Mossbauer effect ? Explain the role of Doppler effect in it.
7) Explain (i) Born-Oppenheimer approximation (ii) Overtone bands.
8) Explain the term 'normal modes of vibrations'. Derive expression for normal modes in linear and non-linear molecules.
9) Explain complementary nature of IR and Raman spectra of molecules with centre of symmetry
10) Calculate the force constant of HCl molecule if fundamental vibrational frequency is 8.667×1013s –1. (H = 1.008 amu, Cl = 35.5 amu)