DEPARTMENT OF CHEMISTRY

QUESTION BANK (Hons.)
+3 3rd Year Science
Semester - V

Organic Chemistry — Core - XI

Group-A

Each question carries 1 mark.

1. Define nucleic acid.
2. what is a nucleotide? Give one example.
3. what is a nucleoside? Give one example.
4. what is a DNA? Give one example.
5 What is a RNA? Give one example.
6. What is purine? Give its structure.
7. What is pyrimidine? Give its structure.
8. Give two examples of purine bases used in nucleic acid.
9. Give two examples of pyrimidine bases used in nucleic acid.
10. What is an enzyme? Give one example.
11. What is an inhibitor? Give one example.
12. Give two uses of enzymes.
13. Give two characteristics of enzymes
14. Give two factors of enzymes.
15. What is an aminoacid? Give one example.
16. What is an alpha-aminoacid? Give one example.
17. What is a peptide ? Give one example.
18. What is a protein? Give one example.
19. Name one fibrous and globular proteins.
20. What is a prosthetic group?
21. What is denaturation? Give one example denatured protein.
22. What kind of bonding is responsible for the tertiary structureof proteins?
23. What is renaturation? Give one example.

24. Define isoelectric point?
25. What is an oil? Give one example with structure.
26. What is a fat? Give one example.
27. What is different type of lipids? Give example of each.
28. What is a lipid? Give one example.
29. What are different types of compound lipids? Name them.
30. What is rancidity?
31. What are different types of rancidity?
32. What is acid value?
33. What is saponification value?
34. Define soap with one example.
35. What is iodine value?
36. Give two uses of oils and fats.
37. Define calorific value of food.
38. What is catabolism?
39. What is anabolism?
40. What is a natural drug? Give one example.
41. What is a synthetic drug? Give one example.
42. What is an antipyretic drug? Give one example.
43. What is an analgesic ? Give one example.
44. What is the difference between narcotics and non-narcotics?
45. Give the structure of Ibuprofen/ Aspirin.
46. What is an antimalerial drug? Give one example.
47. Name the antimalerial drug used for prevention of COVID 19 .
48. What is an antibiotics? Give one example.
49. What is an antacid? What is its use?
50. Give names of two natural drugs used as antibiotics.

Group-B

Each question carries 8 marks.

1. Define the term enzyme. Give an account of characteristic feature of enzymes.

2. Write notes on a) active sites and specificity b) Fischer's lock and key model.

3. Briefly describe Michaelis and Menten's theory and also the assumption upon which this theory is based.

4. Explain enzyme kinetics and also explain the factors which affect the rate of enzymatic reaction.

5. Give the detailed account competitive and non competitive inhibitions in enzymes.

6. Give an account of a) isoelectric point b) peptide linkage c) biological importance of protein d) Zwitter ion structure of amino acid.

7. Give three methods of preparation of alpha amino acid.

8. Write notes on a) Strecker synthesis b) Gabriel synthesis c) Azlacton synthesis

d) Darapsky synthesis

9. How can you determine the structure of a poly peptides/proteins.

10. What is solid phase synthesis? Explain.

11. How can you determine C- terminal and N-terminal ends of poly-peptides/proteins.

12. What are peptides? Discuss carboxy-benzoyloxy method for their synthesis.

13. What are lipids? How are they classifieds?

14. Write notes on a) Hydrogenation of oils b) Saponification.

15. Define and explain the terms oils and fats. How do you differentiate between them?

16. Explain Iodine value. What is meant by rancidity of oils?

17. Write notes on a) Saponification value b) Acid value c) Iodine number d) Reversion e) Rancidity.

18. Write notes on a) Oxidation of food stuff b) Catabolism c) Anabolism.

19. Write an explanatory notes on metabolic pathways of carbohydrates.

20. Give a detail description on catabolic pathways of the fats.

21. Explain metabolism in protein.

22. Write brief accounts of catabolism and anabolism.

23. How will you say that cells obtain energy by the oxidation of food stuff.

24. Describe the synthesis of a) chloroquine b) pamaquine c) chloramphenicol d) Ibuprofen.

25. Write notes on a) analgesics b) antipyretics c) antibiotics d) antimalerials.

26. Briefly explain the medicinal value of a) Curcumin b) Azadirachtin c) Vitamin C b) Antacid.

27. Briefly explain antimalerials, antibiotics and antipyretics with examples.

Physical Chemistry

Core – XII

Group-A

Each question carries 1 mark.

1. What is zero point energy?
2. What is formula for determination of no. of nodes in p-orbitals?
3. What is the Schrodinger wave equation for 'He' atom?
4. What is the bond order and magnetic behaviour of O_2 molecule?
5. What is Morse potential?
6. Define rule of mutual exclusion.
7. Define phosphorescence.
8. Define quantum yield with relation.
9. Define Franck-Condon principle.
10. Define Lambert-Beer's law.
11. If two operators, A and B commute then they have some set of _____.
12. The minimum vibrational energy is _____.
13. The Eigen values of a _____operator are real.

14. A particle moving in a three dimensional box cube has a total energy of $\frac{14h^2}{8ml^2}$. The energy level has fold g ml^2 degenerate.

15. Between CO and CO_2, which is microwave active?

16. Among fundamental,, overtone and combination bands, which is most intense?

17. Vibrational degrees of freedom of CO_2 is _____.

18. The selection rule for pure rotational Raman Spectra of a diatomic molecule is_____.

19. In photo chemistry, benzophenone and SO_2 are use as _____.

20. _____ and _____ are example of radiation less transitions.

21. What is normalized wave function?

22. What is orthogonal wave function?

23. Draw MO diagram of H_2 .

24. What is bond order of H_2^+.

25. What is selection rules of molecular spectroscopy /

26. Write then formula of force constant.

27. Define anharmonicity.

28. What is Morse potential?

29. What is a hot band?

30. Calculate degree of freedom of CO_2 molecule.

31. What is stokes line?

32. What is anti stokes line?

33. What is difference between singlet and triplet state?

34.What is fluorescence ?

35. Define phosphorescence.

36. Write two differences between Phosphorescence and fluorescence.

37. What is Beer Lamberts law.

38. What is chemiluminescence?

39. What is quantum yield of reaction of H_2 with Br_2?

40. What is quantum yield of decomposition of HI?

41. What is quenching?

42. What is electromagnetic radiation?

42. What is actinometry?

43. Give one example of reaction of low quantum yield.

44. Give one example of reaction of high quantum yield.

45. What is meant by photochemical reaction?

46. Give law of photochemistry.

47. Give one example of photosensitized reaction.

48. What is the wavelength of UV radiation?

49.. What is degree of freedom of water molecule ?

50. What is degree of freedom of NH_3 molecule?

Group-B

Each question carries 8 marks.

1. State and explain Schrodinger wave equation with its application to free particle.

2. Explain the qualitative treatment of simple harmonic Oscillator model of vibrational motion.

3. What are commutation rules? Explain the quantization of square of total angular momentum.

4. Define particle in one dimensional box. Find out the energy equation of wave function of
simple harmonic oscillator.

5. Explain the valence bond approach of diatonic molecule.

6. Give the molecular orbital diagrams electronic configurations, magnetic characters and bond orders of N_2 and HF molecules.

7. (a) What is rotational spectroscopy? To which this spectroscopy concerned?

(b) Determine bond length of linear triatomic molecule by rotational spectroscopy.

8. Write Notes on:-
(a) Overtones
(b) Degrees of freedom for polyatomic molecules.

9. Give the qualitative treatment of Rotational and vibrational Raman Spectra.

10. Explain Fluorescence and Phosphorescence on the basis of electronic transition.

11. (a) Derive the expression for Eigen functions of both the operators of a rigid rotator and show that they are same.

(b) Differentiate between Hermitian and Unitary operator giving expressions for each.

12. (a) Derive the expression for energy of an electron in a cube and show what happens when there is a distortion.

(b) Differentiate between normalised and orthogonal wave functions.

13. (a) Discuss the LCMO approach of H_2^+. Show the overlap of atomic orbitals of same and different symmetry.

(b) Give a comparison of MO and VB theory with respect to H_2. Show that both given nearly the same picture of covalent bonding.

14. (a) Give the Hitler-London approach of H_2. Calculate the integrals H_{11} and H_{12}.

(b) Give the correlation diagram of a homo nuclear diatomic molecule like H_2 and hetero nuclear molecule like LiH with justification.

15. (a) Derive the expression for rotational energy, frequencies and wave number of a rigid rotator.

(b) Define degree of freedom of a molecule and discuss the various degrees of freedom of diatomic and triatomic molecules.

16. (a) Define Raman spectra. Give the selection rules to explain strokes line Rayleigh line and Anti-strokes lines.

(b) Give the rotational vibrational Raman spectra of a diatomic molecule.

17. (a) Give Born-Openheimier approximation for electronic spectra and explain the different types of electronic transition.

(b) Explain Franck-Condon principle with suitable diagram of a diatomic molecule.

18. (a) Explain Lambert-Beers law of photo chemistry and derive expressions for extinction coefficient.

(b) Explain chemiluminescence, fluorescence and phosphorescence with example.

19. (a) Maintain the postulates of quantum mechanics.

(b) Normalize the wave function.

$\Psi(x) = A \sin \frac{2\pi x}{\pi}$, x varies between 0 to L.

20. (a) Show that the most probable distance of finding an electron in H-atom is q_0.

(b) Zero point energy is as per uncertainty principle.

21. Discuss the LCAO-MO treatment of H_2^+-ion. Obtain normalised binding and anti binding M.O.S.

22. Discuss valence bond treatment of H_2 molecule. Mention the limitations of valence bond treatments.

23. (a) Discuss Born-Oppenheimer approximation.

(b) What are the factors, that spectral intensity depends on, discuss.

(c) What is the selection rule for pure rotational transitions?

24. (a) Determine the separation between first two anti-stokes lines in Rotational Raman spectra.

(b) Describe the origin of P, Q and R lines in rotation-vibrational spectra.

25. (a) Discuss briefly:-

(i) Franck-Cordon Principle

(ii) Beer-Lambert's law. What is the selection rule for pure rotational transitions?

26. (a) Define quantum field.

(b) Discuss briefly :-

(i) Photosinthesizers

(ii) Phosphoresnence

(c) Why triplet state is more stable than singlet state? Explain.

Polymer Chemistry **DSE – I**

Group-A

Each question carries 1 mark.

1. Give four examples of polymer that are obtained from nature.
2. Define degree of polymerization.
3. Write the name of the techniques only used to measure the degree of crystallinity of polymer.
4. Write the relationship between T_g and T_m.
5. What are the chemical bonding present in nylon 6,6?
6. Write the Williams-Landel-Ferry equation for polymer melting.
7. Define polydispersity index (PDI). What is its value for uniform chain length?
8. Write the name of the factors only that affect the solubility of a polymer?
9. Write the structure and two uses of Teflon.
10. What are the monomers and structure of Novalac resin?
11. What is homo polymer ? Give an example.
12. What is copolymer ? Give an example.
13. What is addition polymer ? Give an example.
14. What is condensation polymer ? Give an example.
15. What is thermosetting polymer? Give an example.
16. What is thermoplastic polymer? Give an example.

17. What is an elastomer ? Give an example.

18 Write the IUPAC name PVC/ nylon -6,6/ neoprene/Teflon/PET.

19. What is monomers of nylon -6/ nylon -6,6/ Bakelite/ PAN.

20. What is functionality ? Give an example.

21. What is the repeating structural unit of polymer polythene/ polyisoprene/ PVC/ polyepoxide/ nylon -6,6/ PVA

22. What is monofunctional polymer? Give an example.

23. What is bifunctional polymer? Give an example.

24. What is trifunctional polymer? Give an example.

25. Find the functionality benzene / phenol.

26. What radical polymerization? Give an example.

27. What redox polymerization? Give an example.

28. What is linear termination?

29. What is gel point?

30. What is auto acceleration?

31. What is leaving polymerization?

32. What is first order transition in polymer?

33. What is second order transition in polymer?

34. What is DSC?

35. Give two factors affecting crystalinity of the polymer?

36. Write the different morphology of different polymer?

37. What is glass transition temperature ?

38. Define cohesive energy density.

39. What is solubility parameter?

40. What is viral coefficient?

41. What is vulcanization?

42. Give two uses of styrene rubber/ butyl rubber .

43. Give two properties of styrene rubber/ butyl rubber .

44. What are resins?

45. What is Bakelite?

46. What is PTFE ?

47. What is latex?

48. Give one difference between HDPE and LDPE.

49. What is silicone?

50. Give one method of preparation of polystyrene/ PVC/ Buna-S.

Group-B

Each question carries 8 marks.

1. Classify polymers based on source, heat response, use and structure with appropriate examples.
2. Define polymerization process. Differentiate between homo-polymer and co-polymer.
3. Explain the Chain Growth Polymerization (CGP) process. What are the initiators and inhibitors used for CGP process? How can you synthesize poly (ethylene) by this process?
4. What are the different types of crystal morphology? Draw and explain one type of such crystal morphology of a polymer.

5. Write the Mark-Houwink equation for determining the viscosity molecular weight. Explain the viscometry method in detail for the determination of molecular weight of polymer.
6. How chain topology, molecular weight, diluents and chemical structure influence Tg of the polymer, explain with example?

7. Explain entropy, enthalpy and free energy change of mixing of polymer solution.

8. Write the short note on criteria of polymer solubility and explain one method to determine the solubility parameter.

9. Draw the Structural formula, properties and commercial applications of the following polymers (i) Nylon 6, (ii) Poly (vinyl chloride (iii) Poly (ethylene) (iv) Poly (aniline) (v) Poly (siloxane) (vi) Poly (carbonate)
10. Give classification of polymers on basis of composition, origin, combination and heat treatment with examples.
11. What are the polymerization techniques? Discuss about emulsion polymerization process.

12. Write notes on a) bulk polymerization b) solution polymerization c) suspension polymerization d) emulsion polymerization

13. Briefly discuss about the interfacial polymerization by giving suitable example.

14. Derive the steady state kinetics of vinyl or free radical polymerization.

15. Discuss the kinetics of linear step growth polymerization.

16. What is anionic polymerization? Discuss its mechanism and kinetics.

17. What is cationic polymerization? Discuss its mechanism and kinetics.

18. Give an account of methods of determining the number average and weight average molecular weight.

19. Give an account of principles of technique involved in end group analysis.

20. Discuss osmometry method for the determination of molecular weight of high polymers.

Green Chemistry DSE – II

Group-A

Each question carries 1 mark.

1. Give an example ionic liquid.
2. Define the term Atom Economy.
3. Give an example of biocatalyst.
4. What are green solvents?
5. Give examples of protection and deportation of functional group in organic synthesis.
6. Which was gas responsible in Bhopal gas tragedy?
7. Give an example of CO_2 surfactant.
8. Write an example of the reaction using super critical CO_2.
9. Give an example of toxic inorganic pigment.

10. What is biomemetric approach to Green chemistry?
11. Give two principles of Green Chemistry.
12. Write the structure of adipic acid.
13. What is biodegradation?
14. What is biomimetic?
15. Give examples of renewable and non-renewable resources.
16. What is the need for Green Chemistry?
17. Which solvents are called “Green solvents” and why?
18. Give examples of microwave assisted reaction.
19. How Cannizzaro’s reaction is carried out by green method?
20. How catalytic reagents are superior to stoichiometric ones?
21. How are nitriles obtained from aldehydes by Green method?
22. How can you bring out esterfication by ultrasound assisted reaction?
23. What is green chemistry?
24. Define atom economy.
25. Define super critical CO_2.
26. Define super critical water.
27. Define super critical fluid.
28. What is a phase transfer catalyst? Give two advantages of it.
29. Give one important principle of green chemistry.
30. What is a biocatalyst give one example?
31. Give two strategies of ISD.
32. What is photo catalyst give one example.
33. Give one example of bio catalytic reducing agent.
34. Give two advantages of homo and heterogeneous catalyst.
35. Give two disadvantages of homo and heterogeneous catalyst.
36. What is an antifoulant ? Give one example.
37. Give microwave assisted Diels – Alder reaction.
38. Give microwave assisted Hoffmann elimination reaction.
39. Give the formula of % of atom economy.
40. What is the % of atom economy of the reaction

Cyclohexene + Br_2 $\longrightarrow$ 1,2- dibromohexane

41. What is Chernobyl disaster?
42. What is Miniamata disease?

43. What is 4 R's?

44. What is photochemical smog?

45. What is London smog ?

46. What is love canal incident?

47. What is Bhopal disaster?

48. What is Agent Orange tragedy?

49. What is CFC?

50. What is Global warming?

Group-B

Each question carries 8 marks.

1. (a) Discuss twelve principles of green chemistry.

2. (a) Calculate the percentage of atom economy of reaction between 2-methyl propane and HBr.

(b) Write a short note on effect of hazardous solvents in environment.

3.(a) What are the benefits of using microwave as energy source?

(b) Write the principles of sonochemistry in organic synthesis.

4. (a) What are biocatalysts? What are the advantages of use of biocatalyst over conventional catalysts?

5. (a) Describe green synthesis of adipic acid from D-glucose.

6. (a) Describe ultra sound assisted Simmon-Smith reaction.

(b) What are super critical fluids? Take CO_2 as example and explain in detail.

7. (a) What are the limitations of conventional methods of synthesis of catechol. Propose a green procedure for the synthesis of catechol.

8. Describe the following microwave assisted reactions in water.

(a) Hoffmann elimination

(b) Methyl benzoate to benzoic acid

9. (a) Write note on green chemistry in sustainable development.

(b) Describe green synthesis of biodegradable polylactic acid from corn.

10. What is Green Chemistry? Discuss the principles of Green Chemistry.

11. (a) Describe how you can minimize hazardous products by Green Chemistry.

(b) How atom economy is useful in Green Chemistry?

12. How can you synthesize the following by green method and how it is superior to the traditional method?

(a) Furfural (b) Acetaldehyde

13. Schematically show the synthesis of

(a) Catechol

(b) Disodium iminodiacetate by green method and how it is superior to the traditional method.

14. Explain how the following reactions can be carried out by microwave.

(a) Fries rearrangement

(b) Claisen rearrangement

(c) Diels – Alder reaction

15. How can the followings be carried out by ultrasonic waves:

(a) Strecker synthesis

(b) Reformatsky reaction

(c) Substitutional reactions.

16. (a) Draw the structure of diphenyl carbonate?

How it is used in the polymerization of amorphous polymers? Give examples.

(b) What is active methylene group? How can it be methylated by dimethyl carbonate? Give examples.

17. Write notes on any three :-

(a) Non-metallic oxidative reagent

(b) Free radical bromination

(c) Role of Tellurium is organic synthesis.

18. (a) What do you mean by multifunctional reagents. How it is useful in green synthesis? Give examples.

(b) What is combinatorial green chemistry? Illustrate giving an example.

19. (a) Discuss with examples how Green chemistry can be applied to sustainable development.

(b) Why solvent less reaction are preferred in green synthesis? Give examples to justify your answer.

20. Give a green synthesis of the following

a) Methyl Methacrylate b)Furfural c) disodium iminodiacitate d) catechol

21.Write notes on a) noncovalent derivetaisation b) multifunctional reagent c) sustainable development

Inorganic Chemistry

Core – XIII

Each question carries 1mark.

Group-A

1. Define common ion effect.
2. Define solubility product.
3. Define solubility.
4. Give the relationship between solubility and solubility product.
5. The solubility Ag_2CrO_4 at 85 ^oC is 8.0×10^{-5} M L^{-1} find its solubility product.
6. What is the group reagent of group I/ group II/ group IIIA/ group IIIB/ group IV cations?
7. What is the role of common ion effect in the separation of group II/ group IIIA/ group IIIB/ group IV cations.
8. How can you recover pure NaCl from sea water?
9. How can you recover pure soap by salting out process?
10. What is the function of NH_4OH in group V cations?

11. What is Wilkinson's catalyst?
12. What do you understand by Tolman catalytic loops?
13. What is Hydroformylation?
14. What is Wacker process?
15. What is asymmetric hydroformylation?
16. What is Fischer-Tropesch reaction?
17. What is syn gas?
18. What is Exxon process?
19. What is Shell process?
20. What is organometalic compound? Give one example.
21. What is meant by heptocity?
22. What is 18-electron rule give one example/ Give an example.
23. What is EAN rule?
24. What is Zeise salt ?
25. How many types of bonding are present in crystalline structure of $Co(CO)_8$.
26. What is Ziegler Natta catalyst?
27. What is ferrocene ? Give its structure.
28. What is Shlenk equilibrium?
29. Give the structure of methyl lithium/trialkyl aluminium.
30. Give laboratory preparation of ferrocene.
31. What is inert complex?
32. What is labile complex?
33. What is kinetic stability?
34. What is Thumb's rule?
35. What is meant by aquation in octahedral complex?
36. Give the decreasing order of trans effect of the ligands Cl^-, NH_3, NO_2^-.
37. What is trans effect?
38. Give two applications of trans effect.
39. Give two factors affecting rate of substitution in metal complexes.

40. Give two factors affecting formation of complexes.

41. What is π bonding?

42. Explain EAN rule in $Cr(CO)_6$.

43. Write the structure of decacarbonyl di manganese (o)/ tetra carbonyl cobaltate(I)/ hexacarbonyl(ethyl mecurio) tantalum.

45. What is the name of $(C_2H_5)_4Pb$/ $Fe_2(CO)_9$/ $K_3[Fe(CN)_5CO]$/ $[Fe(C_5H_5)_2]$

46. Give confirmatory test of Cl^-.

47. Give confirmatory test of PO_4^{3-}.

48. Give confirmatory test of Fe^{+3} /K^+.

49. Give all the cations of group III.

50. How can you separate S^{-2} from CO_3^{2-}.

Group-B

Each question carries 8 marks.

1. How are organometallic compounds classified on basis of their bond type? Explain with example.

2. Explain hapticity of organic ligands. Give at least four examples to explain it.

3. Explain 18 electron rule and effective atomic number rule with suitable example. Also calculate the EAN of Fe (π-C_5H_5) (σ- C_5H_5) $(CO)_2$ and (C_6H_6) Cr $(CO)_4$.

4. Give preparation, structure and evidence of synergic effect of Zeise salt. Also compare the synergic effect with that in carbonyls.

5. Describe various factors that influence the formation of complexes.

6. Explain kinetic and thermodynamic stabilities and explain their difference with example.

7. Give the mechanism of nucleophilic substitution in square planar complexes.

8. Describe ligand field effects and reaction rates in octahedral complexes.

9. Describe in details the substitution reaction of square planar metal complexes.

10. How will you explain the π – acceptor behaviour of CO with help of MO concept?

11. How will you explain the structure of trialkyl aluminium?

12. Explain the concept of multicenter bonding in methyl lithium and trialkyl aluminium.

13. Describe the role of triethyl aluminium in polymerisation of ether by Ziegler Natta catalyst.

14. Describe any two method of preparation of ferrocene. How does it give acylation reaction?

15. Give laboratory preparation of ferrocene. Give the comparison of aromaticity and reactivity with that of benzerne.

16. Give the principle involving separation of cation into groups according to the choice of group reagent.

17. How are solubility product and common ion effect involved in the separation of group II, group IIIA and group IV captions?

18. What is Wilkinson's catalyst? Give the mechanism of alkene hydrogenation with the help of this catalyst.

19. What is Wacker process? Give the mechanism for the reaction taking place in this process.

20. What is Fischer-Tropesch reaction? How is it used for the manufacture of synthetic gasoline?

21. What are interfering radicals? How can you identify Cl^- , Br^- and I^- in presence of each other.

Organic Chemistry

Core – XIV

Group-A

Each question carries 1 mark.

1. Explain chromophore with an example.
2. Define the term Absorbance?
3. What is the effect of hydrogen bonding on ultra violet absorption?
4. Why Methanol is a good solvent for U.V not for I.R.?
5. Define coupling constant?
6. What do you mean by base peak?
7. Define the term precessional frequency?
8. Explain mutarotation in glucose?
9. Explain Reducing and non-reducing sugar with example.
10. What is Mordant dye? Give one example.
11. What is Buna-S?
12. Write the name of monomers for Nylon 6.6.
13. What is the wave no. of a wave having wave length 2000 A^0?
14. What is an auxochrome? Give one example.
15. What is Bathochromic shift?
16. What are the no. of molecular vibrations for H_2O and CO_2 molecules?
17. What is fingerprint region?
18. What do you mean by NMR spectroscopy?
19. What is molecular ion peak?
20. What is an epimer? Give one example.
21. What is polysaccharide? Give one example.
22. What is degree of polymerisation?

23. What is Ziegler-Natta catalyst?
24. Give two examples of conducting polymers.
25. Explain chromophore with an example.
26. Define the term Absorbance?
27. What is the effect of hydrogen bonding on ultra violet absorption?
28. Why Methanol is a good solvent for U.V not for I.R.?
29. Define coupling constant?
30. What do you mean by base peak?
31. Define the term precessional frequency?
32. Explain muta rotation in glucose?
33. Explain Reducing and non-reducing sugar with example.
34. What is Mordant dye? Give one example.
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45. What is polysaccharide? Give one example.
46. What is degree of polymerisation?
47. What is Ziegler-Natta catalyst?
48. Give two examples of conducting polymers.
49. What is the use of Ziegler-Natta catalyst?
50. Give one example of mono, oligo and poly saccharide.

Group-B

Each question carries 8 marks.

1. Describe the various types of transitions involved in U.V. spectroscopy with one example in each case?

2. Write a note on the modes of vibration in diatomic and polyatomic molecules?

3. What is meant by the term chemical shift? Explain the factors affecting chemical shift with examples.

4. Write the basic principle of Mass Spectrometry? Describe the importance of metastable peaks.

5. Discuss the configuration of D(+) Glucose?

   Discuss the pyranose structure of D-Glucose? Describe Killiani-Fischer synthesis.

6. Give the synthesis and applications of following dyes.

   (i) Methyl orange

   (ii) Crystal violet

   (iii) Phenolphthalein

7. Give the structural elucidation and synthesis of Alization.

8. Explain step-growth polymerization reaction with example and kinetics?

9. Give the synthesis and uses of -

   (i) Phenol-formaldehyde resin

   (ii) Poly Urethanes

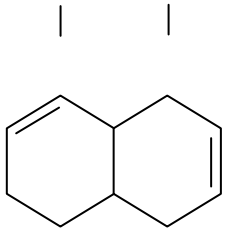
   (iii) Poly Vinyl Chloride

10. (a) Write the basic principles of UV spectroscopy with potential energy diagram.

    (b) What are chromophores? What are the conditions of a group to be act as chromophore?

11. (a) Write the Woodward empirical rules for calculation of λ_{max} values of conjugated dienes.

    (b) Calculate the λ_{max} value of the following compound.



12. Write the basic principle of NMR spectroscopy.

13. Give the instrumentation in detail with schematic diagram of mass spectroscopy.

14. Give the detail description of determination of ring size of glucose.

15. Write notes on (any two) :-

(a) Mutarotation
(b) Coversion of Glucose to Fructose
(c) Killiani-Fischer synthesis.

16. Elucidate the structure of Indigotin with synthesis.

17. Write notes on (any two) :-

(a) Congo Red
(b) Malachite green
(c) Fluorescein

18. What are free radical and amionic polymerisation? Explain with mechanism.

19. Write notes on (any two):-

(a) Classification of polymer.
(b) Natural and synthetic polymers with example.
(c) Biodegradable polymers.

20. (a) Describe Woodward-Fiesher rule for calculating absorption maximum for a simple conjugated diene.

(b) Calculate the frequency and energy associated with 1 mole of photon with wavelength 480nm.

(c) Define the term auxochrome and chromophores.

21. (a) Discuss n $\rightarrow$ π* and π $\rightarrow$ π* electronic transitions involved in UV spectroscopy. Which class of compound exhibit these types of transitions.

(b) Distinguish between red and blue shifts in UV spectroscopy.

(c) What is the effect of hydrogen bonding on UV absorption?

22. (a) What are fundamental vibrations? Explain various types of fundamental vibrations in water molecule.

(b) How can you distinguish between primary and secondary amines by I-R spectra? Explain with example.

(c) Using IR technique, how will you show that a compound under investigation is aromatic.

23. (a) Briefly describe the instrumentation and functioning of IR spectrometer.

(b) How can you distinguish between phenol and cyclohexanol using IR spectroscopy?

24. (a) Discuss the basic principle of NMR spectroscopy.

(b) What do you mean by diamagnetic and paramagnetic effects in NMR spectroscopy?

Explain with a suitable example.

25. (a) What is NMR spectroscopy? Discuss briefly what information can be obtained from NMR spectrum?

(b) Describe briefly shielding and deshielding effect involved in NMR spectroscopy.

26. (a) Determine the structure of organic compound whose mass spectrum shows m/e values as 114, 85, 72 (MR ion), 57, 41, 29.

(b) Discuss the important features of mass spectra of amines.

(c) Draw and explain the mass spectra of 2, 2- dimethyl butane.

27. (a) Write Notes on metastable ions.

(b) Discuss the process involved in identification of an organic compound by mass spectra.

28. (a) What is chromatography? Describe how it can be used to separate the components from a mixture.

(b) Write notes on Gas-liquid chromatography.

29. (a) Write a note on HPLC.

(b) What is paper chromatography?

Define the parameters R_f, R_M and R_x in paper chromatography.

30. (a) What is meant by electromagnetic radiations?

Discuss important characteristics of electromagnetic radiation.

(b) Arrange the following radiations in the order of their increasing wave number.

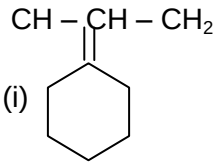
UV, X-rays, visible light, microwaves, cosmic ray.

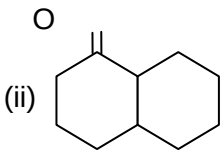
(i) CMC (ii) Micelles

(c) The wavelength associated with an U.V. radiation is 280nm. Determine the energy

associated with it in K.Cal.

31. (a) Calculate the values of absorption maxima for the following compounds.

(i) 

(ii) 

(b) Write Notes on :

(i) Bathochromic shift. (ii) Hypochromic shift.

32. (a) Discuss the basic principles of Infra-red spectroscopy.

(b) Discuss the effect of intermolecular and intramolecular hydrogen bonding on the absorption frequency of a compound with example.

33. (a) Distinguish between the following pairs of compounds with the help of infra-red technique.

(i) Propanol and Propane (ii) Ethanol and Ethyl amine.

(b) Discuss the inductive and mesomeric effect influencing the Carbonyl absorption frequency with example.

34. (a) State and explain the term Chemical Shift and describe the factors affecting it.

(b) Write notes on spin-spin coupling.

35. (a) Discuss notes on spin-spin spectrum of

(i) 1, 3-dichloropropane (ii) Ethyl alcohol

(b) Write Notes on Coupling Constant.

(c) Explain why NMR spectrum of benzene is observed at a lower field strength than

acetylene.

36. (a) Discuss the basic principles of mass spectrometry.

(b) Write Notes on mass spectra of alkanes and alkenes

37. (a) Write notes on Mc-Lafferty Rearrangement.

(b) Give some important features of the mass spectrum of primary, secondary and tertiary alcohol.

38. (a) Write Notes on thin layer chromatography.

(b) Discuss ascending paper chromatography and write the various solvent systems used in paper chromatography.

39. (a) Write the principles of Chromatography.

(b) How will you proceed to separate a mixture of amino acids.

40. Describe the various types of transitions involved in U.V. spectroscopy with one example in each case?

41. Write a note on the modes of vibration in diatomic and polyatomic molecules?

42. What is meant by the term chemical shift? Explain the factors affecting chemical shift with examples.

43. Write the basic principle of Mass Spectrometry? Describe the importance of metastable peaks.

44. Discuss the configuration of D(+) Glucose?

Discuss the pyranose structure of D-Glucose? Describe Killiani-Fischer synthesis.

45. Give the synthesis and applications of following dyes.

(i) Methyl orange

(ii) Crystal violet

(iii) Phenolphthalein

46. Give the structural elucidation and synthesis of Alizarin.

47. Explain step-growth polymerization reaction with example and kinetics?

48. Give the synthesis and uses of -

(i) Phenol-formaldehyde resin

(ii) Poly Urethanes

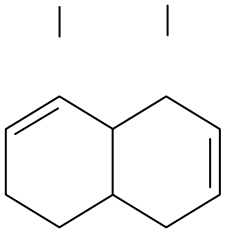
(iii) Poly Vinyl Chloride

49. (a) Write the basic principles of UV spectroscopy with potential energy diagram.

(b) What are chromophores? What are the conditions of a group to be act as chromophore?

50. (a) Write the Woodward empirical rules for calculation of λ_{max} values of conjugated dienes.

(b) Calculate the λ_{max} value of the following compound.



51. Write the basic principle of NMR spectroscopy.

52. Give the instrumentation in detail with schematic diagram of mass spectroscopy.

53. Give the detail description of determination of ring size of glucose.

54. Write notes on (any two) :-

(c) Mutarotation
(d) Coversion of Glucose to Fructose
(c) Killiani-Fischer synthesis.

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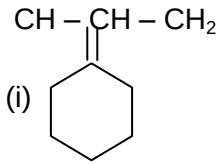
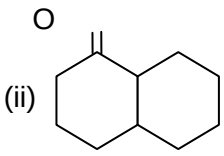
(i) 

(ii) 

(b) Write Notes on:

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(b) Give some important features of the mass spectrum of primary, secondary and tertiary alcohol.

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(b) Discuss ascending paper chromatography and write the various solvent systems used in paper chromatography.

78. (a) Write the principles of Chromatography.

(b) How will you proceed to separate a mixture of amino acids.

Industrial Chemistry

DSE – III

Group-A

Each question carries 1 mark.

1. Give two uses of acetylene.
2. Write the formula and application of borox.
3. What is Smog? What are the constituents?
4. Point out the major sources of air pollution?
5. What are the major sources of ground water pollution?
6. What are industrial effluents?
7. What is reverse osmosis?
8. How ion exchange is used for purification of water?
9. What is tidal energy?
10. Give the significance of geothermal energy.
11. What are LPG and LNG.
12. What happens when potassium chlorate is heated?
13. What are the uses of oxygen?
14. Write the uses of helium.
15. What is molecular shiver?
16. What is synthetic gas?
17. Write two uses of Chlorine.
18. How potash alum is prepared?
19. Describe different types of cast iron.
20. What is smelting?
21. What is roasting?
22. What are calcinations?
23. What is intrinsic semiconductor?

24. What is extrinsic semiconductor?
25. Define ecosystem.
26. What are the components of ecosystem?
27. What is smog?
28. Write the major regions of atmosphere.
29. What is ozone hole?
30. What is hydrological cycle?
31. Describe pond ecosystem.
32. What is thermal pollution?
33. What is COD?
34. What is BOD?
35. What is dechlorination?
36. How sterilisation of water takes place by UV rays?
37. Write two methods of sludge disposal.
38. What do you mean by land treatment?
39. What is synfuel?
40. What is Shale oil?
41. What is natural gas?
42. What is kerogen?
43. Give an example of fission reaction.
44. Give an example of fusion reaction.
45. What is chain reaction?
46.What is saline polar pond?
47. What is biocatalyst?
48. What is non aqueous biocatalyst?
49. What is uncontrolled chain reaction?
50. What is biodiversity?

Group-B

Each question carries 8 marks.

1. Give a brief account of production, uses, storage and hazards in handling of the following gases:-

(a) Nitrogen (b) Chlorine

2. Briefly describe the manufacture, application and hazards of the following chemicals:-

(a) Hydrochloric acid (b) Caustic soda

3. (a) What are the major types of air pollutants its sources and how can it be minimized?

(b) Describe the role played by ozone in maintaining the environmental balance and what are the causes of its depletion.

4. Write Short Notes on:-

(a) Green house effect

(b) Carbon cycle

(c) Major region of atmosphere

5. What are the major sources of water pollution and how can it be minimised.

6. Write Short Notes on:-

(a) Hydrological cycle

(b) Effluent treatment plants

(c) Water resources

7. Write Notes on:-

(a) Reverse Osmosis

(b) Electro dialysis

(c) Ion exchange

8. Discuss the water quality parameters for different types of water and what steps can

be taken to maintain it?

9. Write Notes on:-

(a) Solar energy

(b) Geothermal energy

(c) Hydel energy

10. (a) What is nuclear pollution? Suggest different methods by which it can be minimised.

(b) What are biocatalysts? How it is relevant to chemical industry?

11. Give a brief account of production, uses, storage and hazards in handling of the following gases:-

(a) Carbon monoxide (b) sulphur dioxide

12. Briefly describe the manufacture, application and hazards of the following chemicals:-

(a) bleaching powder (b) sodium thisulphate

13. How K_2MnO_4 is industrially prepared? What are uses and hazards of it .

14. How cast iron is prepared in the blast furnace?

15. What is semiconductor? Give its classification. How n-type and p-type semiconductor are prepared.

16. What is smog? What is photochemical smog and London smog? Write the difference between the two?

17. Write Notes on:- a) Global warming b) Ozone layer depletion c) CFC

18. Discuss the source and nature of water pollution.

19. Write Notes on: - a) sludge disposal b) Industrial waste management.

20. What is nuclear fusion process? Also write how this reaction is used for making atom bomb and nuclear reactor.

21. Describe Bosch process for preparation of hydrogen. What are the hazards of handling H_2-gas?