

**B.Sc. CHEMISTRY
SIXTH SEMESTER
ORGANIC CHEMISTRY-V
BSC – 602 [SPECIAL REPEAT]
[USE OMR FOR OBJECTIVE PART]**

**SET
A**

Duration: 3 hrs.

Full Marks: 70

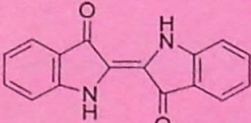
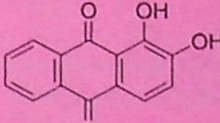
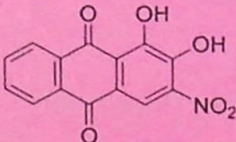
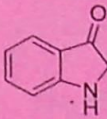
(Objective)

Time: 30 min.

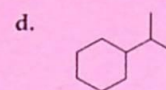
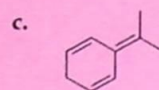
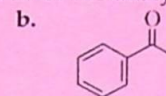
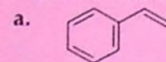
Marks: 20

Choose the correct answer from the following:

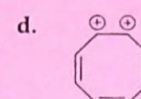
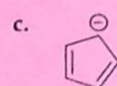
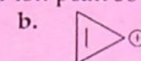
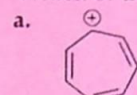
1X20=20

- Rosaniline is a direct dye for silk and wool. It is prepared by oxidising
 - Benzaldehyde and dimethyl aniline
 - Carbonyl chloride and dimethyl aniline.
 - Benzene diazonium chloride and dimethyl aniline.
 - Aniline and o- and p-toluedine
- Which of the following is structure of indigotin dye?
 - 
 - 
 - 
 - 
- Butter yellow is an
 - Nitroso dye
 - Azo dye
 - Triphenyl methane dye
 - Phthalein dye
- An IR spectrum reading is taken before and after treating a s-alcohol with an oxidising agent. What IR spectrum readings would be seen for the reactant and the predicted product.
 - s-alcohol 3400 cm^{-1} ; Product: 3000 cm^{-1}
 - s-alcohol 1720 cm^{-1} ; Product: 3400 cm^{-1}
 - s-alcohol 1720 cm^{-1} ; Product: 2200 cm^{-1}
 - s-alcohol 3400 cm^{-1} ; Product: 1720 cm^{-1}
- The number of vibrational modes in methyl amine (CH_3NH_2) molecule will be
 - 24
 - 19
 - 16
 - 15
- In EI-MS the energy of bombarding electron-beam is
 - 5-10 eV
 - 10-15 eV
 - 10-20 eV
 - 50-70 eV

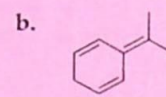
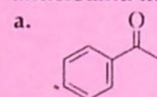
7. Which of the molecule will give M+29 peak in CI-MS analysis?



8. Which of the following will have molecular ion peak 50% of its molecular weight?



9. Ammonia can be used as the most suitable ionizing gas for CI-MS analysis to understand molecular weight of



10. The double bond equivalence (DBE) for the molecule with formula C_6H_6ClNO will be

- a. 1
c. 3

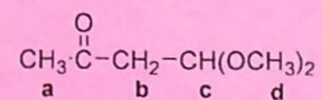
- b. 2
d. 4

11. IR spectrum of an organic compound shows a blunt broad peak at 3400 cm^{-1} and also a peak at 1710 cm^{-1} . The compound is likely to be a

- a. Ketone
c. Carboxylic acid

- b. Ester
d. Anhydride

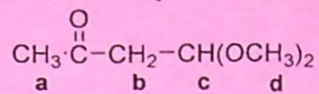
12. Which of the protons a - d in the following molecule will give a doublet signal in its ^1H NMR spectrum.



- a. protons 'a'
c. protons 'a' and 'b'

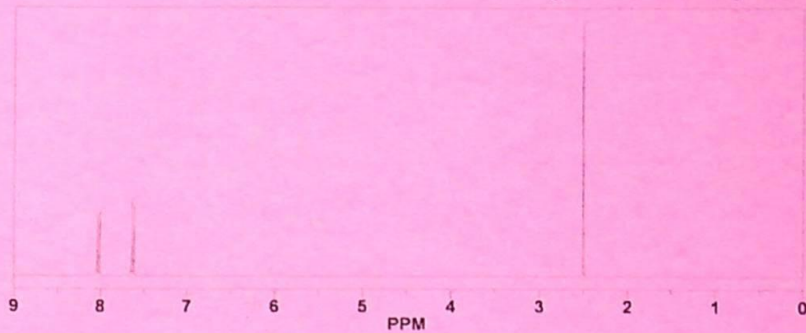
- b. protons 'b'
d. protons 'a' and 'd'

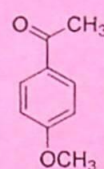
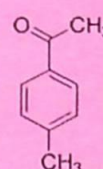
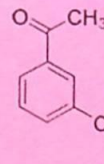
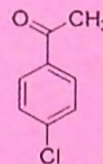
13. Which of the protons a - d in the following molecule will have highest δ-value.



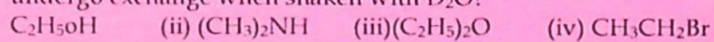
- a. protons 'a'
 b. protons 'b'
 c. protons 'c'
 d. protons 'd'

14. Which of the following molecules will fit in to the given ¹H NMR spectrum?



- a. 
- b. 
- c. 
- d. 

15. Which of the following compound/s containing one or more protons that could undergo exchange when shaken with D₂O?



- a. i & ii
 b. ii & iii
 c. i & iii
 d. ii & iv

16. Ultraviolet spectroscopy is seen in the wave length range of

- a. 200-400 nm
 b. 400-600 nm
 c. 600-800 nm
 d. Above 800 nm

17. The vacuum region in the UV-spectroscopy is
- a. Below 850 nm
 - b. Below 650 nm
 - c. Below 350 nm
 - d. Below 150 nm
18. Applying Woodward Fieser rules, the basic value of 253 nm is given to:
- a. Hetero annular conjugated diene
 - b. Homo annular conjugated diene
 - c. α, β -unsaturated aldehyde
 - d. α, β -unsaturated ester
19. For mono disperse sample of polymers, PI values are usually:
- a. < 0.53
 - b. < 0.82
 - c. < 0.05
 - d. < 0.75
20. Which of the following is an example of polymer having weakest intermolecular force of attraction
- a. Natural rubber
 - b. Cellulose
 - c. PVC
 - d. Nylon

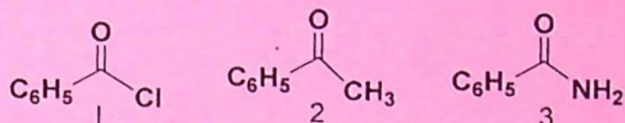
(Descriptive)

Time : 2 hrs. 30 mins.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. a. Chose the correct set of carbonyl group frequency in the IR spectrum of the compounds, 1, 2 and 3, in cm^{-1} . Justify the variation of carbonyl group frequency in these compounds. 5

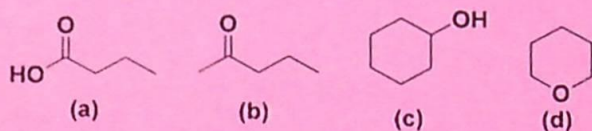


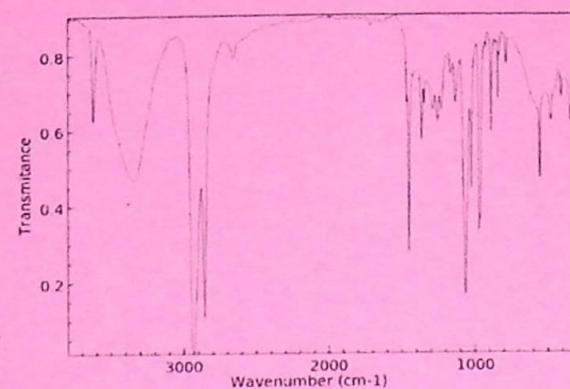
(a) 1 - 1720, 2 - 1800, 3 - 1680

(b) 1 - 1680, 2 - 1800, 3 - 1720

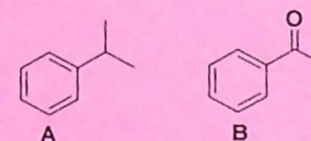
(c) 1 - 1800, 2 - 1720, 3 - 1680

- b. If a molecule contains one Br atom and shows its molecular ion peak in EI-MS is half of its base peak, find the % ratio of M and (M+2) peak. 3
- c. Write the principle of electronic spectroscopy. 2
2. a. An unknown compound gives the following IR spectrum. Which of the following is likely to be the structure of the molecule? Justify your answer. 3



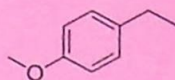


- b. Describe IR spectrum of CO₂ molecule. Theoretically how many IR peaks are expected and practically how many peaks are observed? Give reasons. 3
- c. How you will differentiate the following molecules using IR spectroscopy? 2

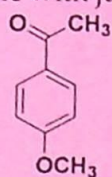


- d. IR spectra of 2-propanol gave an absorption band at 3300cm⁻¹. On dilution with CCl₄ an additional band appears at 3600 cm⁻¹. Explain. 2
3. a. Define molecular ion peak, base peak, and meta stable ion peak in mass spectrum. What is nitrogen rule in mass spectrometric analysis? 3+2=5
- b. Compound C₅H₁₀O had an IR- band at 1715 cm⁻¹, and shows two signals, a triplet and a quartet in its NMR spectrum. Evaluate the structure of the compound. 3
- c. An aromatic compound C₁₂H₁₈ shows a singlet at δ 3.2. Give the structure of the compound. 2

4. a. Show the fragmentation of n-heptane and depict the EI-MS spectrum. Identify the ion which will show the base peak in EI-MS spectrum of 4+2=6



- b. Find the ratio of the M, M+2 & M+4 peaks obtained in the mass spectrum of dibromobenzene and depict the probable EI-MS of the compound. 4
5. a. Draw the pattern of NMR spectrum for the following molecule with justification. 3



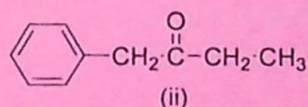
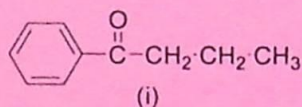
- b. How many proton signals would you expect in the NMR spectra of the following compounds? 2

- (i) Cyclohexane (ii) Tetramethyl silane
(iii) Ethyl methyl ketone (iv) Ethyl bromide

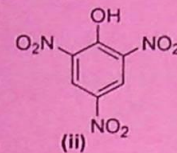
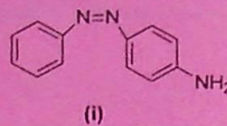
- c. Why tetramethyl silane (TMS) taken as a standard for recording chemical shifts? 2

- d. An organic compound gave the following peaks in its PMR spectrum: 3

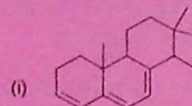
δ 7.22 (m, 5H), δ 3.59 (s, 2H), δ 2.77 (q, 2H) and δ 0.97 (t, 3H). Which of the following structures is in accordance with above data? Give reason.



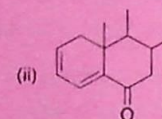
6. a. Give a short classification of dyes on the basis of chemical constitution. 4
- b. What are phthalein dyes? Give the synthesis of phenolphthalein. Explain why it is colourless in acidic medium, pink in presence of base and again becomes colourless at high concentration of base? 4
- c. Label the auxochrome and chromophore groups in the following structures: 2



7. a. Define the term 'chromophore' with examples. 2+3+5 = 10
- b. What are bathochromic and hypsochromic shifts? Discuss the causes of such shifts.
- c. Using Woodward-Fieser rules calculate the λ_{max} for the following compounds



and



8. a. Explain di-block and tri-block copolymers. 2+2+3+3=10
- b. What is polydispersity index (PDI)? Give its significance.
- c. Illustrate addition and condensation polymers with examples.
- d. What is vulcanization of rubber? Mention the advantages of vulcanization of natural rubber.

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