K20P 1080

Reg. No. : ....

Name : ....

III Semester M.Sc. Degree (CBSS – Reg./Suppl./Imp.) Examination, October 2020
(2014 Admission Onwards)
CHEMISTRY
CHE 3C.09 – Organic Chemistry – III

Time : 3 Hours

Max. Marks : 60

SECTION – A

Answer **all** questions in **one** word or **one** sentence. **Each** question carries **one** mark.

1. How is absorbance related to transmittance ?

2. _____ effect is due to an increase in the intensity of an absorption signal.

3. Vibrational coupling is exhibited by _____ molecules.

4. The chemical shift value for an aldehydic proton is around _____ ppm.

5. $CDCl_3$ shows _____ lines in the ^{13}C NMR spectrum.

6. Intensity ratio of the M and M+2 peak of methyl bromide is _____.

7. Thiophene is more reactive towards nucleophiles than electrophiles. True or false ?

8. Synthesis of indole involves a _____ rearrangement as a major step. **(8×1=8)**

SECTION – B

Answer **any eight** questions. Answer may be **two** or **three** sentences. **Each** question carries **two** marks.

9. Why does increase in solvent polarity cause a blue shift in carbonyl absorption ?

10. What is meant by fingerprint region ?

11. How does hydrogen bonding effect IR stretching frequency of O – H group ?

12. Which absorbs at a higher frequency in IR, acetylene or alkene and why ?

13. What is the importance of D_2O exchange studies in ^1H NMR ?

14. A triplet resonates at 1753 Hz, 1755 Hz and 1757 Hz in a 500 MHz NMR spectrometer. Represent in terms of chemical shift and calculate the coupling constant.

15. How is cis-stilbene differentiated from trans-stilbene using IR spectroscopy ?

16. How is CH_3 and CH_2 signals differentiated using DEPT-135 ?

17. What does non-integer values refer to in a mass spectra ?

18. Illustrate McLafferty rearrangement.

19. Illustrate the Hantzsch pyridine synthesis.

20. Depict the structures of benzo[b]furan and furo [2, 3, –b] thiophene.　　　(8×2=16)

SECTION – C

Short paragraph questions. Answer **any four** questions. **Each** question carries **three** marks.

21. Calculate the € value of a solution containing 2 mmol/dm^3 of a solute when absorbance in a 1 cm cell is 2. What is the value of the absorbance of a solution of triple the concentration ?

22. Give an application of NOE and explain.

23. Give the principle behind FAB and MALDI techniques.

24. Illustrate a method for coumarin synthesis.

25. Illustrate a 1,3-dipolar cycloaddition reaction for the synthesis of a heterocycle.

26. Depict the ^1H - ^1H COSY of isopropyl acetate.　　　(4×3=12)

SECTION – D

Essay type questions. Answer **four** questions. **Each** question carries **six** marks.

27. A) Predict the maximum wavelength of absorption of the following molecules.

a)　　　　　b)
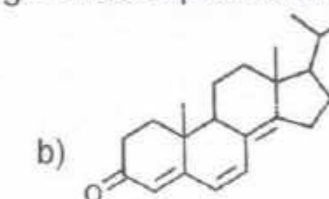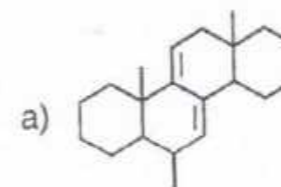
OR

B) How does electronic effects change IR absorption ? Explain providing examples.

28. A) The proton NMR spectrum of $C_4H_7NO_2$ exhibits the following signals δ 12 (s, 1H), 4.3 (1H, t, J = 8Hz), 2.1 (2H, m), 1.1 (t, 3H, J = 7.5 Hz). IR spectrum shows a broad peak at 3000 cm^{-1} and a strong band near 1700 cm^{-1}. Discuss the structure of the molecule and assign the signals.

OR

B) Molecular formula of a compound is $C_3H_6O_2$. IR spectrum shows signals at 2900 and 1727 cm^{-1}. Proton NMR signals are found as triplet, quartet and singlet at δ 1.2, 4.2 and 8 respectively. Elucidate the structure of the compound.

29. A) Differentiate between EIMS and CIMS.

OR

B) Identify the aromatic ether having the following peaks in the MS : 136 (29), 93 (6), 94 (100), 77 (8), 66 (7), 51 (6), 43 (5), 41 (5), 39 (6).

30. A) Illustrate one method each for the synthesis of quinoline and isoquinoline.

OR

B) How can indole and thiophene be synthesized ? Illustrate the mechanisms.

(4×6=24)