(i) Printed Pages : 4] Roll No. .....

(ii) Questions : 9] **Sub. Code :** 0 4 5 2

Exam. Code : 0 0 0 5

B.A./B.Sc. (General) 5th Semester Examination

1127

CHEMISTRY

(Organic Chemistry–A)

(Same for B.Sc. Microbiology and Food Technology)

Paper : XVIII

Time : 3 Hours] **[Max. Marks : 22**

Note :– Attempt *five* questions in all, choosing *one* question from each Unit and Question No. **9** is compulsory.

Unit–I

1. (i) A compound with molecular formula C_3H_6O has the structures

CH_3COCH_3, CH_3CH_2CHO and

$CH_2 = CHCH_2OH$

With the help of ^{1}HNMR how will you deduce the structure ?

(ii) How will you account for the observation that attachment of an electronegative atom to a carbon carrying a proton causes a downfield shift in ^{1}HNMR spectrum ? 2,2

2. (i) How will you distinguish between the following pairs of compounds on the basis of ^{1}HNMR spectroscopy ?

(a) $(CH_3)_3CCOOH$ and $(CH_3)_3COCOCH_3$

(b) 1-bromopropane and 2-bromopropane

(ii) Deduce the structure of an organic compound with formula C_7H_6O on the basis of ^{1}HNMR data given :

δ : 2.25 (s, 3H), 7.41–7.49 (m, 3H) and 7.8–7.9 (m, 2H) 2,2

Unit–II

3. (i) How will you distinguish between the following pairs of compounds on the basis of IR spectroscopy ?

(a) CH_3CH_2COOH and CH_3COOCH_3

(b) $CH_3C \equiv CH$ and $C_6H_5CONH_2$

(ii) A compound with molecular formula $C_8H_8O_2$ shows IR absorption bands at; 3030, 2820, 2730, 1700, 1180 and 820 cm^{-1}. Identify the compound. 2,2

4. (i) Account for the following facts giving suitable examples :

(a) Conjugation decreases the frequency of C = O stretching and C = C stretching.

(b) Introduction of an EWG shifts the C = O absorption band to higher wave numbers.

(ii) An organic compound gave the following spectroscopic data. Deduce the structure :

UV : 220 (ε 1800) nm

IR : 1745, 1608, 1497, 1456 cm^{-1}

^1H NMR in δ : 1.25 (s, J = 7Hz, 3H), 2.0 (t, 3H), 4.15 (q, J = 7Hz, 2H) 2,2

Unit–III

5. (i) Give the mechanistic details for the conversion of glucose to fructose via its osazone.

(ii) Discuss the detail for lengthening of the carbon chain via Kiliani-Fischer synthesis. 2,2

6. (i) Give details for epimerization of D-glucose into D-mannose.

(ii) What are the limitations of the open chain structure of D-(+)-glucose ? How have these been removed by the cyclic structure ? 2,2

Unit–IV

7. (i) How do you justify the electrophilic substitution at position 2 in pyrrole and position 3 in pyridine ?

(ii) Account for the following :

(a) Isoquinoline is more basic than quinoline.

(b) Electrophilic substitution of quinoline is carried out using less rigorous conditions than those required for pyridine. 2,2

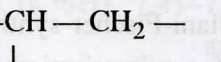
8. (i) Discuss two examples where electrophilic substitution reactions of quinoline takes place at position 3.

(ii) Discuss the mechanistic detail of the Fischer Indole synthesis. 2,2

Compulsory Question

9. (i) Explain the terms shielding and deshielding, giving suitable examples.

(ii) Discuss the spin-spin coupling with the help of molecular fragment :



(iii) Calculate the wave number of the stretching vibration of a C-H bond, given k = 5x 10^5 dynes/cm.

(iv) How many fundamental vibrational frequencies would you expect to observe in the IR spectrum of CO_2 molecule and why ?

(v) Distinguish chemically between 2-deoxy-D-glucose and 3-deoxy-D-glucose.

(vi) Give the reaction of 3-chloropyridine with sodamide in liquid NH_3. 6×1=6