

(i) Printed Pages :4]

Roll No.

(ii) Questions :9]

Sub. Code :

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

1127

CHEMISTRY

(Organic Chemistry-A)

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

Paper : XVIII

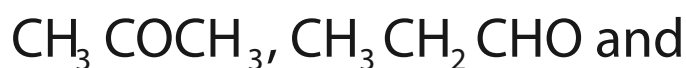
Time : 3 Hours]

[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



With the help of 1H NMR 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 1H NMR spectrum ?

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

(a) $(\text{CH}_3)_3\text{CCOOH}$ and $(\text{CH}_3)_3\text{COCOCH}_3$

(b) 1-bromopropane and 2-bromopropane

(ii) Deduce the structure of an organic compound with formula $\text{C}_7\text{H}_6\text{O}$ on the basis of ^1H NMR data given :

δ : 2.25 (s, 3H), 7.41-7.49 (m, 3H)

and 7.8-7.9 (m, 2H)

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Unit-II

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

(a) $\text{CH}_3\text{CH}_2\text{COOH}$ and $\text{CH}_3\text{COOCH}_3$

(b) $\text{CH}_3\text{C}=\text{CH}$ and $\text{C}_6\text{H}_5\text{CONH}_2$

(ii) A compound with molecular formula $\text{C}_8\text{H}_8\text{O}_2$ shows IR absorption bands at; 3030, 2820, 2730, 1700, 1180 and 820 cm^{-1} . Identify the compound.

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

(a) Conjugation decreases the frequency of $\text{C}=\text{O}$ stretching and $\text{C}=\text{C}$ 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, $J = 7\text{Hz}$, 3H), 2.0 (t, 3H), 4.15 (q, $J = 7\text{Hz}$, 2H)

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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.
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 ?

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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.

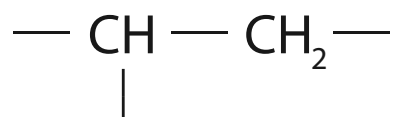
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8. (i) Discuss two examples where electrophilic substitution reactions of quinoline takes place at position 3.
- (ii) Discuss the mechanistic detail of the Fischer Indole synthesis.

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Compulsory Questions

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 CH bond, given $k = 5 \times 10^5$ 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 .

6x1=6