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B.Sc. RNLKWC(A)/CC4T/22

2022

CHEMISTRY

[Honours]

B.Sc. Second Semester End Examination - 2022

PAPER - CC4T

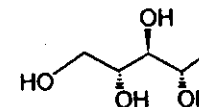
Full Marks : 40

Time : 2 hours

*The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in their own
words as far as practicable.
Illustrate the answers wherever necessary.*

Group - A

1. Answer any five questions : - 2×5=10
- (a) Draw the orbital picture of the following indicating hybridization in each after CH_2N_2 , $\text{CH}_2\text{CHCONH}_2$
- (b) What is periagelic reation? Give example.
- (c) Draw the Fischer projection of the following compound and give its description as D/L.



(Turn Over)

(2)

- (d) Antibonding orbitals are expressed by the symbols σ^* and π^* but not by n^* . -Explain.
- (e) Optically active 2-iodooctane racemises on reacting with NaI in acetone. -Explain.
- (f) What is epimer? Give example.
- (g) Calculate the DBE of $C_{12}O_9$ and draw its structure.
- (h) Is S_4 symmetry element present in CH_4 ? If yes explain it.

Group - B

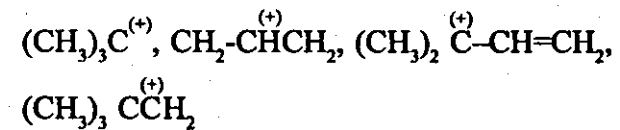
Answer any four from the following : 4×5=20

2. (a) Carbon-carbon length in tetrafluoroethylene is less than that in ethylene. Explain.
- (b) Which has higher dipole moment and why?
- (c) Give an example p-Fluorophenol and p-chlorophenol example of sacrificial hyperconjugation. 2+2+1=5
3. (a) Draw the conformational form of the following compound and indicate the major contributor : $Me_2N^+CHOCH_3$
- (b) Arrange the following carbocations in order of increasing stability and explain.

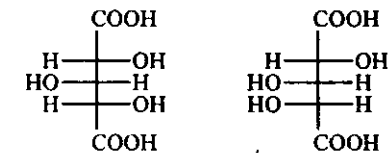
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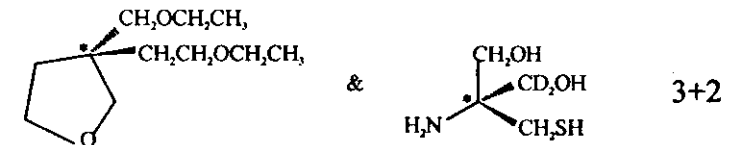


4. (a) Label the C-3 centres of the following molecules as stereogenic/non-stereogenic and chirotopic/achirotopic.



Justify your answer.

- (b) Find the absolute configuration (R/S) of the following "*" marked centres.

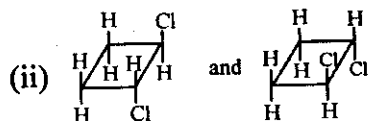
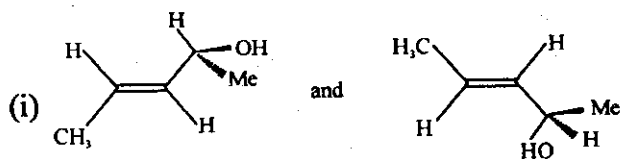


5. (a) Label the following pair of the molecule as homomer, enantiomer or diastereoisomer :

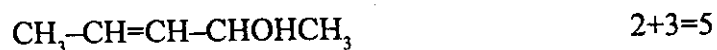
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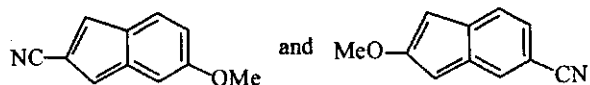
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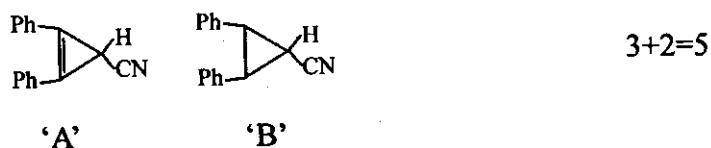
- (b) Draw all the possible stereoisomers of the following molecule with R/S or E/Z nomenclature.



6. (a) Compare the dipole moments of the following compound with reason.



- (b) In hydrogen exchange reaction, the nitrite 'A' loses its proton at a much slower rate (100 times slower) than the nitrile B. Explain.



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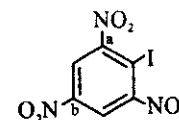
(5)

7. (a) Compare the melting and boiling point of n-pentane and neopentane with reason.
- (b) The boiling point of methanol and n-hexane are closer enough. But if same amount of two solvents are kept on hot water bath it is found that n-hexane evaporated reading but not methanol. Explain. 3+2=5

Group - C

Answer any one from the following : 1×10=10

8. (a) Draw the FMO of 1,3-butadiene and indicate its HOMO & LUMO in excited state.
- (b) Which C-N bond 'a' or 'b' has a shorter length in the following compound and why.



- (c) The compound $\text{PhCOCH}(\text{CH}_3)\text{CH}_2\text{CH}_3$ loses its optical purity/activity on treatment with base whereas the isomeric compound $\text{CH}_3\text{COCH}_2\text{CH}(\text{CH}_3)\text{Ph}$ retains

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(6)

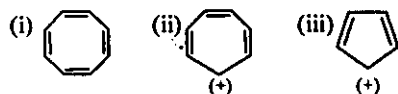
its optical purity/activity on the same treatment. –
Explain.

(d) What is Captodative radical? Give example.

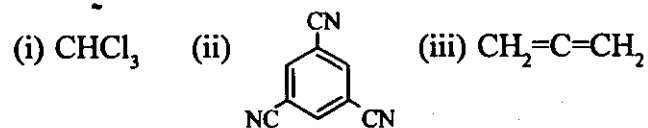
$$3+2+3+2=10$$

9. (a) Give the schematic diagram for the resolution of racemic alcohol.

(b) Predict the following compound as aromatic, anti aromatic or non-aromatic with reason.



(c) State the point group of the following molecules showing the symmetry elements. (any two)



(d) Draw the orbital picture of nitromethane.

$$3+3+2+2=10$$