

2019

B.Sc.

1st Semester Examination
CHEMISTRY (Honours)

Paper - C 1-T

Full Marks : 40

Time : 2 Hours

*The figures in the margin indicate full marks.
Candidates are required to give their answers
in their own words as far as practicable.*

Group - A

1. Answer any *five* questions : 5×2=10
- (a) Define non-classical carbocation with an example.
 - (b) Show that the reaction of trans 2-butane with methylene obtained from diazomethane takes place in a stereospecific manner.
 - (c) Calculate the double bond equivalent (D.B.E.) of the following : $C_{14}H_8O_2$ and $C_{10}H_{14}N_2$.

[Turn Over]

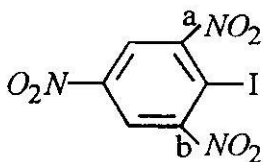
- (d) What do you mean by homoaromaticity. Give an example.
- (e) What do you mean by stereogenic centre ?
- (f) Draw E and Z isomers of Butanone oxime and azobenzene.
- (g) Determine symmetry point group of staggered ethane and 1, 3-dimethylallene
- (h) What do you mean by "optical purity" and "enantiomeric excess" ?

Group - B

Answer any *four* questions : 5×4=20

2. (a) The bond dissociation energy of $Ph-CH_2-H$ bond is considerably smaller than that of CH_3-H bond — Explain. 2
- (b) Calculate formal charge of CH_3 , $\dot{C}H_3$ and $\ddot{C}H_3$. 3
3. (a) Hyperconjugation is not observed in C—C bond in α -position with respect to carbocation — Why? 2

- (b) Calculate the double bond equivalent of $C_7H_6O_2$, C_3H_7N and $C_{10}H_7Cl$. 3
4. (a) Draw all stereo isomers of Pent-3-ene-2-ol. Which of these are enantiomers? 2+1
- (b) What do you mean by asymmetric and dissymmetric molecules? Give examples. 2
5. (a) The group moment of NH_2 and NO_2 are 1.35D and 3.95D respectively, but the measured dipole moment of p-nitroaniline is 6.20D — Explain. 2½
- (b) Which C—N bond a or b has a higher bond length and why?



2½

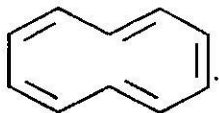
6. (a) Why singlet difluoro carbene is found to be more stable than its triplet state? 2
- (b) Draw the M.O. diagram mentioning HOMO, LUMO, SOMO of $\text{CH}_2=\text{CH}_2$ + and $\text{CH}_2=\text{CH}^\cdot$.

1½×2=3

[Turn Over]

7. (a) Draw resonance structure of N_3^- and O_3 . 2

(b) Define aromaticity. Comment on aromaticity of



2

(c) What do you mean by "epimers" ? 1

Group - C

Answer any *one* question : $1 \times 10 = 10$

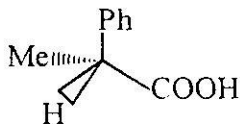
8. (a) What are radical inhibitors and how do they work ? 1+1

(b) The $\angle HCH$ bond angle in methane is $109^\circ 28'$ but $\angle FCF$ bond angle in difluoromethane is much smaller — Explain. 2

(c) Explain the terms (i) symmetry element and (ii) symmetry operation. 1+1

(d) What is the significance of specific rotation and molar rotation ? $1\frac{1}{2} + 1\frac{1}{2}$

(e) Assign R or s configuration to the following -



1

9. (a) Discuss the procedure of resolution of optically active alcohol. 2
- (b) Draw the threo and erythro isomers of 3-bromo-2 butanol. 2
- (c) Draw the orbital picture of CH_3CONH_2 and $\text{CH}_2 = \text{CH} - \text{COCH}_3$. 1+1
- (d) What is a pseudoasymmetric centre ? Show whether it is reflection invariant or not. 1+1
- (e) The boiling point of 2,3 pentanediol (188°C) is much lower than its isomeric 1, 5 pentanediol (238°C) — Explain. 2
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