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**SB—01—2022**

**FACULTY OF SCIENCE**

**B.Sc. (Third Year) (Sixth Semester) EXAMINATION**

**MAY/JUNE, 2022**

**(CBCS Pattern)**

**CHEMISTRY**

**Paper—XIV**

**(Organic and Inorganic Chemistry)**

**(Thursday, 2-6-2022)**

**Time : 10.00 a.m. to 12.30 p.m.**

*Time— 2½ Hours*

*Maximum Marks—40*

*N.B. :— (i) All questions are compulsory.*

*(ii) Figures to the right indicate full marks.*

1. Answer any *three* of the following : 3×5=15

(a) What are inner orbital complexes ? Explain with suitable example.

(b) What is crystal field splitting ? Explain crystal field splitting of *d*-orbitals in octahedral complexes.

(c) Give the postulates of crystal field theory.

(d) Draw Orgel energy level diagram for  $d^1$  and  $d^9$  state.

(e) Calculate ground state term symbol of  $d^3$  configuration.

2. Answer any *three* of the following : 3×5=15

(a) How will you interpret IR spectra of the following :

(i) Ethene

(ii) Benzene

(iii) Phenol.

(b) Explain non-equivalent proton with example and predict the number of NMR signal of :

(i) Acetone

(ii) Ethyl benzene

(iii) Diethyl ether.

P.T.O.

- (c) Explain Favorskii rearrangement with mechanism.
- (d) Define homopolymer ? Give the synthesis of Neoprene.
- (e) The organic compound having molecular formula  $C_3H_5N$  shows following spectral data :

UV—Transparent above 210 nm.

IR—2975  $cm^{-1}$

2210  $cm^{-1}$

PMR ( $\delta$  ppm)

$\delta$  1.1, t, 3H

$\delta$  3.5, q, 2H

deduce structure and name of organic compound.

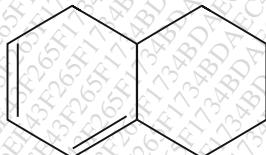
3. Answer any *two* of the following : 2×5=10

- (a) Explain shielding and deshielding effect with suitable example.
- (b) Define bathochromic and hypsochromic shift. Calculate  $\lambda_{max}$  of :

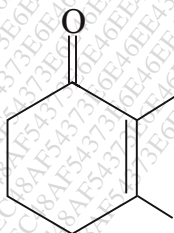
(i)



(ii)



(iii)



- (c) Explain cationic polymerisation reaction with mechanism.

- (d) Deduce the structure of compound based on the following PMR spectral data :

Molecular formula— $C_2H_7N$

PMR ( $\delta$  ppm) :

$\delta$  1.2, *t*, 3H

$\delta$  2.7, *q*, 2H

$\delta$  4.5, *s*, 2H