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(FOR THE CANDIDATES ADMITTED

19 UCY 611

DURING THE ACADEMIC YEAR 2019 ONLY)

REG.NO. :

N.G.M.COLLEGE (AUTONOMOUS): POLLACHI

END-OF-SEMESTER EXAMINATIONS: JULY 2022

B.Sc.-CHEMISTRY

MAXIMUM MARKS: 75

VI SEMESTER

TIME : 3 HOURS

PART – III

PHYSICAL METHODS AND CHEMICAL STRUCTURE

SECTION - A

(10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS.

(K1)

1. The increase in rotational energy shows absorption spectrum in _____.
(a) Visible region (b) UV region (c) Microwave region (d) IR region
2. Electronic band spectra are observed in _____.
(a) ultraviolet and visible regions (b) microwave region
(c) infrared region (d) none of the above
3. The difference between the resonance frequency of a given proton and that of methyl protons of TMS is called _____.
(a) stokes lines (b) anti stokes lines (c) Chemical shift (d) spin couplin
4. In FCC lattice, the number of nearest neighbors around each atom is _____.
(a) 8 (b) 12 (c) 4 (d) 6
5. Orientation polarization _____ with temperature.
(a) increase (b) decrease
(c) may increase or decrease (d) is independent

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES

(K2)

6. *cis*1,2-dichloroethene IR active where as *trans*1,2-dichloroethene is IR inactive. Comment.
7. Which molecular electronic transition type requires the most energy?
8. Why is TMS used as a standard reference in NMR spectroscopy?
9. Miller indices of a crystal plane which cuts through the crystal axes at $\frac{1}{6}a$, $\frac{1}{3}b$, $\frac{1}{3}c$ is ____.
10. If the dipole moment of dichlorobenzene is zero, what is the orientation of the two chlorine atoms?

SECTION - B

(5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. (K3)

11. a. Discuss the properties of electromagnetic radiations.

(OR)

- b. Enlist the factors affecting carbonyl stretching frequency.

(CONTD...2)

12. a. What is Raman effect? Explain the selection rules for Raman spectroscopy'.
(OR)
b. Explain the following (i) bathochromic effect (ii) hypsochromic effect.
13. a. Explain shielding and deshielding effect of molecule in NMR spectra.
(OR)
b. Draw and explain the NMR spectra of (i) Ethanol (ii) Toluene.
14. a. Elaborate the crystal structure of sodium chloride with a neat sketch.
(OR)
b. Describe the formation and consequences of Schottky and Frenkel defects.
15. a. Differentiate between ferromagnetism and paramagnetism.
(OR)
b. Define and analyze magnetic permeability.

SECTION - C**(4 X 10 = 40 MARKS)****ANSWER ANY FOUR OUT OF SIX QUESTIONS. (K4/K5)****(16th QUESTION IS COMPULSORY AND ANSWER ANY THREE QUESTIONS FROM Qn. No. 17 TO 21)**

16. a. Explain the theory of IR spectra.
b. Discuss about the harmonic anharmonic oscillator of a diatomic molecule.
17. a. Explain the selection rules for IR spectroscopy.
b. Calculate the force constant of HCl molecule which gives absorption band at 2890 cm⁻¹.
18. Provide a detailed explanation on the calculation for absorption maxima in dienes. K5
19. Enumerate the hyper fine splitting in ESR methyl radical and Mn²⁺ ion with neat sketch and comment on intensity of hyperfine splitting ratio.
20. Outline Debye-Scherrer XRD method to study the structure of crystalline substances.
21. Elaborate the use of Guoy balance in determining magnetic susceptibility of a paramagnetic substance.
