Chem sem papers

Chemistry (SRM Institute of Science and Technology)

28. a.	Discuss on the principle, instrumentation of X-ray photo electron spectroscopy.	10	3	3,6	1,4
	(OR)				
b.	Demonstrate the periodic trends for any two properties with suitable examples.	10	3	3,6	1,4
29. a.	Derive Gibbs-Helmholtz equation and apply it to explain any two uses.	10	3	4,6	1,4
	(OR)				
b.	Compare structural isomerism with stereo isomerism by taking suitable examples.	10	4	4,6	1,6
30. a.i.	Explain the E_2 mechanism with suitable example.	5	4	5,6	4
ii.	Illustrate with an example the Dieckmann condensation reaction.	5	3	5,6	4
	(OR)				
b.	Explain in detail the different types of isomerisms exhibited by transition metal complexes.	10	4	5,6	4

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Reg. No.														

B.Tech. DEGREE EXAMINATION, JULY 2022
Second Semester

18CYB101J - CHEMISTRY
(For the candidates admitted from the academic year 2018-2019 to 2019-2020)

Note:
(i) **Part - A** should be answered in OMR sheet within first 40 minutes and OMR sheet should be handed over to hall invigilator at the end of 40th minute.
(ii) **Part - B** should be answered in answer booklet.

Time: 2½ Hours Max. Marks: 75

PART – A (25 × 1 = 25 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
1.	Which of the following is known as the Schrodinger equation? (A) $E = mc^2$ (B) $\lambda = h / p$ (C) $\hat{H}\psi = E\psi$ (D) $\frac{-\hbar^2}{2m}\nabla^2$	1	1	1,6	1
2.	Two electrons occupying the same orbital are distinguished by _____ quantum number. (A) Azimuthal (B) Spin (C) Magnetic (D) Orbital	1	1	1,6	1
3.	Heisenberg uncertainty principle mathematically describe that the product of the position and momentum of the particle is _____. (A) equal to h/p (B) equal to E-V (C) $\geq h / 4\pi$ (D) $\geq$ E-V	1	1	1,6	1
4.	Which of the following molecule is NOT homonuclear? (A) H_2 (B) N_2 (C) O_2 (D) NO	1	2	1,6	4
5.	The filling up of Molecular orbital takes place according to _____. (A) Huckel's rule (B) Hund's rule (C) Fajan's rule (D) CIP rule	1	1	1,6	1
6.	The different types of energies associated within a molecule are _____ energies. (A) Electronic, vibrational and rotational (B) Dissociation and potential (C) Potential and kinetic (D) Only kinetic energy	1	2	2,6	1
7.	_____ is the region for studying nuclear magnetic resonance spectroscopy. (A) Microwave (B) Radio frequency (C) Infrared (D) UV	1	1	2,6	1

8. Which of the following compounds is frequently used as an internal reference in protein NMR spectroscopy? 1 1 2,6 1
(A) TMS (B) TNS
(C) DMF (D) DMSO

9. One of the following complex is having "zero" oxidation state for the central metal ion. 1 2 2,6 4
(A) $K_4\left[Fe(CN)_6\right]$ (B) $K_3\left[Fe(CN)_6\right]$
(C) $\left[Ni(CO)_4\right]$ (D) $\left[Pt(NH_3)_4\right]Cl_2$

10. The energy required to pair up the electrons is called _____. 1 2 2,6 1
(A) Dissociation (B) Pairing
(C) Crystal field stabilization energy (D) Potential

11. Minimum inter-planar spacing required for Bragg's diffraction is _____. 1 2 3,6 1
(A) $\lambda/4$ (B) 4π
(C) $\lambda/2$ (D) 2λ

12. The pressure correction factor for modified VanderWaals equation of state is 1 2 3,6 1
(A) a/b (B) n^2a/V^2
(C) a/v (D) $V-nb$

13. The Z_{eff} for 4s electron in potassium atom (Z=19) is _____. 1 2 3,6 1,2
(A) 16.8 (B) 10
(C) 6.8 (D) 2.20

14. The co-ordination number and oxidation state for the cobalt atom in the complex $\left[Co(NH_3)_5Cl\right]Cl_2$ is _____ and _____. 1 2 3,6 1,2
(A) 4; +2 (B) 4; +3
(C) 6; +3 (D) 6; +1

15. The Bragg's equation for diffraction of X-rays is _____. 1 2 3,6 1
(A) $n\lambda = 2d\cos\theta$ (B) $n\lambda = 2d\sin\theta$
(C) $n\lambda^2 = 2d\sin\theta$ (D) $n\lambda = 2d^2\sin\theta$

16. Chiral molecules which are non-superimposable mirror images of each other are called _____. 1 1 4,6 1
(A) Diastereomers (B) Meso compounds
(C) Racemic mixtune (D) Enantiomers

17. The plane which divides the molecule into 2 equal parts so that each half is the mirror image of the other half is called _____. 1 1 4,6 1
(A) Centre of symmetry (B) Plane of symmetry
(C) Axis of symmetry (D) Improper axis of symmetry

18. If our eyes travel in counter clockwise, direction from the functional group of highest priority to lowest priority, then the configuration is _____. 1 2 4,6 1
(A) R (B) S
(C) E (D) Z

19. Which of the following compound would exhibit geometrical isomerism? 1 2 4,6 1,3
(A) 2 – Butene (B) n-propyl iodide
(C) Cyclopropane (D) Butanal

20. Identify the hard acid from the following: 1 2 4,6 1,3
(A) $AlCl_3$ (B) N_2H_4
(C) H_2O (D) OH^-

21. In gauche conformations, the methyl groups are 1 2 5,6 2,3
(A) 60° apart (B) 90° apart
(C) 180° apart (D) 360° apart

22. $\left[Co(NH_3)_5NO_2\right]Cl_2$ and $\left[Co(NH_3)_5ONO\right]Cl_2$ 1 2 5,6 1
(A) Geometrical isomers (B) Optical isomers
(C) Linkage isomers (D) Co-ordination isomers

23. Find the number of stereo isomers for 1 2 5,6 2

CH_3-CH(OH)-CH=CH-CH_3

(A) 1 (B) 2
(C) 3 (D) 4

24. Which of the following act as an initiator in free radical mechanism? 1 1 5,6 2
(A) H_2SO_4 (B) Benzoyl peroxide
(C) $KMnO_4$ (D) CrO_3

25. An acceptor of pair of electrons is called _____. 1 1 5,6 2
(A) Nucleophile (B) Carbocation
(C) Anion (D) Electrophile

PART – B (5 × 10 = 50 Marks) Marks BL CO PO
Answer **ALL** Questions

26. a. Derive time independent Schrodinger wave equation. 10 2 1,6 1

(OR)

b. Draw and explain the π-molecular orbital picture of 1,3-butadiene. 10 4 1,6 4

27. a. With a neat sketch discuss on the crystal field splitting of d-orbitals for Tetrahedral complexes. 10 3 2,6 1,4

(OR)

b. Consider AB molecule to absorb in Microwave region and behaving like a rigid rotor. Explicate the rotational spectra for this molecule and predict at which $\bar{\nu}\,cm^{-1}$, the signal is observed in the spectrum for a jump from J = 0 to J = 1. 10 4 2,6 3,4