Reg. No.	R	A	2	2	1	1	0	3	7	0	1	0	0	0	2

B.Tech / M.Tech (Integrated) DEGREE EXAMINATION, MAY 2023
First and Second Semester

21CYB101J - CHEMISTRY

(For the candidates admitted from the academic year 2022-2023 onwards)

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** and **Part - C** should be answered in answer booklet.

Time: 3 Hours | Max. Marks: 75

	Marks	BL	CO	PO

PART – A (20 × 1 = 20Marks)
Answer **ALL** Questions

1. What is the Geometrical shape of $K_4\left[Ni(CN)_4\right]$? — 1 | 1 | 1 | 1
   (A) Octahedral (B) Square planar
   (C) Tetrahedral (D) Trigonal Pyramidal

2. The crystal field theory considers the metal-ligand bond to be a _____ bond. — 1 | 1 | 1 | 1
   (A) Covalent (B) Ionic
   (C) Polar (D) Hydrogen

3. The CFSE for a high spin d^4 Octahedral complex is — 1 | 2 | 1 | 2
   (A) $-0.6\Delta oct$ (B) $-1.8\,\Delta oct$
   (C) $-1.6\Delta oct + P$ (D) $+1.2\,\Delta oct$

4. In a period with increase in atomic number, the metallic character of an element: — 1 | 2 | 1 | 1
   (A) Decreases across period increase in group (B) Increases across period and decrease in group
   (C) Increases across period and increase in group (D) Decreases across period and decrease in group

5. HASB principle was given by — 1 | 1 | 2 | 1
   (A) Lewis (B) Arrhenius
   (C) Bransted (D) Pearson

6. Helmholtz free energy A is expressed — 1 | 2 | 2 | 1
   (A) $A = U + TS$ (B) $A = H + TS$
   (C) $A = U - TS$ (D) $A = H - TS$

7. The anode of the galvanic cell has — 1 | 1 | 2 | 1
   (A) Positive polarity (B) Negative polarity
   (C) No polarity (D) Neutral

8. In corrosion, as a result of decay, the metals are NOT converted into
   (A) Oxides (B) Hydroxides
   (C) Peroxides (D) Carbonates

1 1 2 1

9. Chiral molecules which are non – super imposable mirror images of each other are called.
   (A) Enantiomers (B) Diastereomers
   (C) Meso compounds (D) Racemic Mixture

1 2 3 1

10. The potential energy of n-butane is minimum for
    (A) Skew conformation (B) Staggered conformation
    (C) Eclipsed conformation (D) Ganche

1 3 3 1

11. Which of the following is an initiator molecule in the free radical polymerisation?
    (A) Benzoyl Peroxide (B) Sulphuric acid
    (C) Potassium permanganate (D) Chromium oxide

1 3 3 1

12. A compound with the same molecular formula exists in two forms one is alcohol and the other is ether, what type of isomerism does it show?
    (A) Metamerism (B) Positional isomerism
    (C) Functional isomerism (D) Chain Isomersim

1 2 3 1

13. The strength of the polymer increases with _____ in molecular weight
    (A) Decreases (B) Increases
    (C) No change (D) Slightly decrease

1 2 4 1

14. Which of the following is NOT a natural polymer?
    (A) Rayon (B) Starch
    (C) Cellulose (D) RNA

1 1 4 1

15. Intermolecular forces of thermoplastic polymers are
    (A) More than elastomers (B) Between elastomers and fibers
    (C) Same as elastomers (D) More than fibers

1 2 4 1

16. Glass transition temperature (Tg) for Nylon – 6:6 is 50°C, which is higher than polyethylene due to
    (A) Vander Waals forces (B) Covalent bonding
    (C) Inter-molecular hydrogen bonding (D) Intra-molecular hydrogen bonding

1 3 4 1

17. Minimum interplanar spacing required for Bragg's diffraction is
    (A) $\lambda/4$ (B) $\lambda/2$
    (C) 4λ (D) 2λ

1 2 5 1

18. The source for XPS is
    (A) Mercury – arc (B) Nernst glower
    (C) Global source (D) Alka

1 2 5 1

19.	What happens in the case when the intermolecular distance increases due to tensile force? (A) there is no force between the molecules (B) there seems to be a repulsive force between the molecules (C) there seems to be an attractive force between the molecules (D) there is zero resultant force between the molecules	1	2	5	1
20.	Usually stronger constituent of a composite in (A) Matrix (B) Reinforcement (C) Both are of equal strength (D) Can't define	1	1	5	1

PART – B (5 × 8 = 40 Marks)
Answer **ALL** Questions

		Marks	BL	CO	PO
21. a.i.	Explain briefly about high spin and low spin complexes with examples.	5	3	1	1
ii.	Give the differences between hard and soft acids.	3	2	1	1
	(OR)				
b.	Write short notes on structural isomerism in coordination compounds. Give examples.	8	2	1	1
22. a.	With appropriate examples, elucidate how Nernst equation can be applied in a redox reaction and in an acid-base reaction.	8	3	2	1
	(OR)				
b.	With proper equations compare dry and wet corrosion.	8	3	2	1
23. a.	Explain Cahn-Ingold prelog priority rules to determine R/S configuration on a chiral center taking an example.	8	4	3	2
	(OR)				
b.	Sketch the potential energy diagram and explain in detail the conformational analysis of n-butane.	8	2	3	2
24. a.i.	Give the differences between thermoplastic and thermosets.	4	1	4	1
ii.	How polyurethane is prepared? Give its properties and uses.	4	1	4	1
	(OR)				
b.	Write a short note on conducting polymer. Explain n and p doping in conducting polymer.	8	2	4	1
25. a.	Explain Bragg's law with a neat diagram.	8	2	5	1
	(OR)				
b.i.	Define the terms 1) Elastic body 2) Plastic body 3) Elasticity	3	1	5	1

		Marks	BL	CO	PO
ii.	Write the various engineering applications of composites.	5	1	5	1

PART – C (1 × 15 = 15 Marks)
Answer **ANY ONE** Question

		Marks	BL	CO	PO
26.	Give a neat sketch of Pourbaix diagram and explain all the significant features.	15	3	2	1
27.i.	Explain the stereochemistry of SN1 mechanism.	5	3	3	2
ii.	Discuss about the principle and instrumentation of XPS.	10	3	5	1

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