Reg. No.															

B.Tech/ M.Tech (Integrated) DEGREE EXAMINATION, JULY 2023

First 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

PART – A (20 × 1 = 20Marks)

Answer **ALL** Questions

	Marks	BL	CO	PO
1. In $K_4[Fe(CN)_6]$ the number of unpaired electrons in iron are (A) 0 (B) 2 (C) 3 (D) 5	1	2	1	1
2. The tetrahedral complexes have coordination number (A) 3 (B) 6 (C) 4 (D) 8	1	2	1	1
3. The magnetic moment of $[Co(NH_3)_6]Cl_3$ is (A) 1.73 (B) 2.83 (C) 6.6 (D) 0	1	3	1	1
4. The energy required to remove an electron from the highest occupied atomic orbital is known as _____. (A) Ionization energy (B) Kinetic energy (C) Binding energy (D) Vibrational energy	1	1	1	1
5. All the naturally occurring processes proceed spontaneously in a direction that leads to (A) decrease of entropy (B) an increase in enthalpy (C) an increase of free energy (D) decrease of free energy	1	1	2	2
6. Metals do NOT exist in nature in the form of ____. (A) Nitrates (B) Sulphates (C) Carbonates (D) Oxides	1	1	2	3
7. Diastereomers are (A) Geometrical isomers (B) Mirror images (C) Non-Mirror images (D) Unstable molecules	1	2	2	2
8. The potential energy of n-butane is maximum for _____. (A) Skew conformations (B) Staggered conformations (C) Eclipsed conformation (D) Gauche conformations	1	2	2	2

9. In SN1 the first step involves the formation of _____ . 1 1 3 4

(A) Free radical (B) Carbanion
(C) Final product (D) Carbocation

10. Markovnikov's law is applied in addition of _____ . 1 1 3 2

(A) Propylene with Cl_2 (B) Propylene with HBr
(C) Ethylene with Br_2 (D) Ethylene with HCl

11. The product of Dieckmann condensation reaction is 1 2 3 2

(A) Cyclic alcohol (B) Keto esters
(C) Cyclic ketone (D) Alkane

12. The reactivity order of alkyl halides in SN^2 mechanism is 1 3 3 2

(A) CH_3-X > 1°> 2°> 3° (B) CH_3-X > 2°> 1°> 3°
(C) CH_3-X > 3°> 1°> 2° (D) CH_3-X > 3°> 2°> 1°

13. Which of the following is a thermosetting polymer? 1 2 4 1

(A) polystyrene (B) polyolefins
(C) nylons (D) phenolic resins

14. Which of the following polymer exhibit a lower value of molar cohesion? 1 1 4 1

(A) wool (B) silk
(C) vulcanized rubber (D) polystyrene

15. Which of the following is a co-polymer? 1 2 4 4

(A) Polythene (B) Bakelite
(C) PVC (D) Polyacrylonitrile

16. Which of the following is NOT an elastomer? 1 1 4 1

(A) Buna-S (B) Buna-N
(C) PVC (D) Neoprene

17. In fiber reinforced composites longitudinal strength is mainly influenced by 1 4 5 1

(A) Fiber strength (B) Fiber orientation
(C) Fiber volume fraction (D) Fiber length

18. Fibers having thin crystals is called 1 1 5 1

(A) Wires (B) Fibers
(C) Whiskers (D) Matrix

19. What does the area under the stress-strain curve represent? 1 4 5 3

(A) Toughness (B) Total deformation
(C) Modulus of elasticity (D) Average force applied

20. Kevlar is a _____ type of material. 1 1 5 1

(A) Glass (B) Thermoplastic
(C) Whisker (D) Polymer

PART – B (5 × 8 = 40 Marks)

Answer **ALL** Questions

		Marks	BL	CO	PO
21. a.	Discuss the crystal field splitting in tetrahedral complexes.	8	2	1	1
	(OR)				
b.	Discuss the crystal field splitting in octahedral complexes.	8	2	1	1
22. a.	Explain the structural isomerism exhibited by organic compounds with suitable examples.	8	1	2	2
	(OR)				
b.	Derive the Nernst equation and mention its applications.	8	3	2	3
23. a.	Discuss in detail about SN1 mechanism with a suitable example.	8	4	3	2
	(OR)				
b.	What is the reaction of the following with cyclopropane? a. Halogens b. HI c. Sulphuric acid d. Hydrogen	8	2	3	2
24. a.	Discuss the synthesis, properties and applications of the following a) PTFE and b) Polystyrene.	8	1	4	1
	(OR)				
b.	What are the differences between Thermoplastic and Thermosets?	8	1	4	4
25. a.	Describe the principle, instrumentation and applications of XPS.	8	1	5	1
	(OR)				
b.	Describe the ceramic matrix composite and metal matrix composite with suitable examples.	8	2	5	3

PART – C (1 × 15 = 15 Marks)

Answer **ANY ONE** Question

		Marks	BL	CO	PO
26.	Identify from the following as high spin or low spin complexes and calculate the magnetic moment of the complexes. i. $[CoF_6]^{3-}$ ii. $[NiCl_4]^{2-}$ iii. $[Fe\ (CN)_6]^{3-}$ iv. $[Co(H_2O)_6]^{3+}$ v. $[FeCl_4]^{-}$	15	2	1	4
27.i.	Explain in detail particle reinforced composites, fiber reinforced composites and metal matrix composites. (9 Marks)	9	1	5	1
ii.	Explain Bragg's law with a neat diagram. (6 Marks)	6	1	5	1

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