(7 pages) Reg. No. :.....

Code No. : 20621 E **Sub. Code : EECH 21/ EECH 41/FECH 21**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2025.

Second/Fourth Semester

Chemistry

Elective — CHEMISTRY FOR PHYSICAL SCIENCES – II

(For those who joined in July 2023 onwards)

Time : Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. According to Werner's theory, how many types of valencies can a metal exhibit in coordination compounds?

   (a) One (b) Two

   (c) Three (d) Four

2. The biological role of hemoglobin primarily involves:

   (a) Oxygen transport

   (b) Carbon dioxide transport

   (c) Nitrogen transport

   (d) Hydrogen transport

3. The open-chain structure of glucose and fructose is characterized by the presence of

   (a) One aldehyde group

   (b) Two ketone groups

   (c) Two aldehyde groups

   (d) One ketone group

4. Which nucleic acid carries genetic information in cells?

   (a) RNA (b) DNA

   (c) mRNA (d) tRNA

5. Which of the following electrodes is commonly used as a reference electrode in electrochemical measurements?

(a) Platinum electrode

(b) Calomel electrode

(c) Copper electrode

(d) Graphite electrode

6. Which of the following is a buffer solution?

(a) Distilled water

(b) 0.1 M HCl

(c) A solution of acetic acid and sodium acetate

(d) 0.1M NaOH

7. What is the order of a reaction if its rate is directly proportional to the concentration of a single reactant?

(a) Zero order (b) First order

(c) Second order (d) Third order

8. The energy required to initiate a chemical reaction is known as :

(a) Activation energy

(b) Enthalpy

(c) Entropy

(d) Gibbs free energy

9. Stark-Einstein's law of photochemical equivalence states that :

(a) Each photon absorbed by a molecule result in the emission of multiple electrons

(b) Each molecule absorbs multiple photons to undergo a photochemical reaction

(c) Each photon absorbed by a molecule result in the emission of one electron

(d) Each photon absorbed by a molecule result in the emission of one photon

10. Phosphorescence is characterized by:

(a) Immediate emission of light upon absorption of radiation

(b) Delayed emission of light after stopping the radiation

(c) Emission of light only at specific wavelengths

(d) Emission of light with high intensity

PART B — (5 × 5 = 25 marks)

Answer ALL questions, by choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Describe Werner's theory of coordination compounds.

Or

(b) Explain the EDTA method for the determination of water hardness.

12. (a) How will you convert glucose into fructose?

Or

(b) Write a note on RNA.

13. (a) Discuss the principle and applications of a calomel electrode in electrochemistry.

Or

(b) Write a note on fuel cells.

14. (a) Write a note on half-life period.

Or

(b) Discuss homogeneous catalysis.

15. (a) Explain Stark-Einstein's law of photochemical equivalence.

Or

(b) Explain the concept of photosynthesis.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, by choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Discuss the application of Pauling's theory to $[Ni(CO)_4]$, $[Ni(CN)_4]^{2-}$, and $[Co(CN)_6]^{3-}$

Or

(b) Explain the biological role of hemoglobin and chlorophyll.

17. (a) Discuss the preparation and properties of glucose.

Or

(b) What are amino acids? How are they classified? Discuss the preparation of glycine.

18. (a) Discuss the principle and applications of conductometric titrations.

Or

(b) Write a note on electroplating.

19. (a) Explain the methods of determining the order of a reaction.

Or

(b) Define the energy of activation for a chemical reaction. Explain how the Arrhenius equation relates temperature to the rate constant of a reaction.

20. (a) Explain the photochemical reaction of hydrogen with chlorine.

Or

(b) Discuss the mechanism of phosphorescence and provide examples.

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