(6 pages) **Reg. No. :** .....

Code No. : 20616 E **Sub. Code : EMCH 21/ FCCH 21**

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

Second Semester

Chemistry – Core

GENERAL CHEMISTRY – 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. The pH of a solution is directly proportional to the concentration of

   (a) Hydroxide ions (OH^-)

   (b) Hydrogen ions (H^+)

   (c) Salt ions

   (d) Neutral molecules

2. Which equation describes the relationship between the pH of a solution, the pKa of its acid, and the ratio of its conjugate base to acid?

   (a) Nernst equation

   (b) Arrhenius equation

   (c) Henderson-Hasselbalch equation

   (d) Le Chatelier's principle

3. The anomalous behavior of beryllium is primarily attributed to its

   (a) Low density (b) High reactivity

   (c) Small atomic size (d) Low melting point

4. What is the primary industrial use of carbon disulphide?

   (a) Food preservation

   (b) Fertilizer production

   (c) Solvent in chemical reactions

   (d) Semiconductor manufacturing

5. Ozone is a/an

   (a) Reducing agent (b) Oxidizing agent

   (c) Inert gas (d) Acid anhydride

6. Which element of Group 15 exhibits allotropy?

(a) Nitrogen (b) Phosphorus

(c) Arsenic (d) Antimony

7. Dehydration of alcohols is a common method for preparing alkenes. Which of the following reagents is typically used for this purpose?

(a) Concentrated sulfuric acid

(b) Sodium hydroxide

(c) Hydrochloric acid

(d) Potassium permanganate

8. Which process separates petroleum into different fractions based on boiling points?

(a) Cracking

(b) Reforming

(c) Fractional Distillation

(d) Alkylation

9. Which method is commonly used for the synthesis of naphthalene?

(a) Haworth synthesis

(b) Friedel-Crafts alkylation

(c) Elbs reaction

(d) Diels-Alder reaction

10. What is the electrophile in the nitration of benzene?

(a) NO_2^+ (b) NO_2^-

(c) NO_3^+ (d) NO_3^-

PART B — ($5 \times 5 = 25$ marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 250 words.

11. (a) Write a note on degree of dissociation.

Or

(b) How does the Henderson-Hasselbalch equation relate to buffer solutions?

12. (a) Discuss the anomalous behavior of Be.

Or

(b) Discuss the structure of borazine.

13. (a) Write a note on pseudo halogens.

Or

(b) Discuss the unique nature of noble gases and explain the cause for it.

14. (a) Write a note on Diels-Alder reactions.

Or

(b) Write a note on fractional distillation of petroleum.

15. (a) Define aromaticity. Explain the structure of benzene.

Or

(b) Discuss the synthesis of anthracene.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).
Each answer should not exceed 600 words.

16. (a) Discuss the factors affecting the relative strengths of acids and bases. How does the dissociation constant (Ka or Kb) relate to the strength of an acid or base?

Or

(b) How does the hydrolysis of salts affect solution pH? Explain the factors influencing the degree of hydrolysis.

17. (a) Discuss the position of hydrogen in the periodic table.

Or

(b) Discuss the extraction of aluminium from its ores.

18. (a) Explain the chemistry of the oxy acids of phosphorous.

Or

(b) Discuss the general characteristics of halogens.

19. (a) Discuss the stability of 1,2 and 1,4-dienes.

Or

(b) (i) Write a note on the acidic nature of acetylene.

(ii) Explain epoxidation reactions.

20. (a) Explain the halogenation and acylation reactions of benzene with mechanism.

Or

(b) Discuss the Haworth's method of synthesis of naphthalene and give its chemical reactions.

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