

(6 pages)

Reg. No. :

Code No. : 20326 E Sub. Code : CMCH 63

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

Sixth Semester

Chemistry — Core

PHYSICAL CHEMISTRY — III

(For those who joined in July 2021 and 2022 only)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

- The site of reduction in an electrochemical cell is _____.
(a) the anode (b) the cathode
(c) the electrode (d) salt Bridge
- One Faraday = _____ coulombs.
(a) 96485 (b) 94685
(c) 69485 (d) 89465

- Which of the following changes the value of K?
(a) Adding reactant
(b) Adding product
(c) Adding a catalyst
(d) Changing temperature
- Chemical absorption _____ with increasing temperature.
(a) increases (b) decreases
(c) remains the same (d) stopped
- For a reaction $A \rightarrow \text{Products}$. A graph of [A] versus time is found to be a straight line. What is the order of reaction?
(a) Zero order (b) First order
(c) Second order (d) Third order
- Reaction rate can change with _____.
(a) temperature
(b) the addition of a catalyst
(c) reactant concentration
(d) all of these

7. Ammonia belongs to _____ point group.
(a) C_{2v} (b) C_{3v}
(c) C_{4v} (d) C_{2h}
8. The symbol used to represent improper axis of symmetry is _____.
(a) E (b) C_n
(c) S_n (d) P_n
9. TMS has _____ Equivalent protons.
(a) 3 (b) 6
(c) 10 (d) 12
10. The isotropic g value is _____.
(a) = 2 (b) < 2
(c) > 2 (d) = 0

PART B — (5 × 5 = 25 marks)

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

11. (a) How will you measure equilibrium constant from EMF measurement?
Or
(b) What are reversible and irreversible cells? Explain.

Page 3 Code No. : 20326 E

12. (a) Derive the relationship between K_p and K_c .
Or
(b) Explain the characteristics of physical and chemical absorption.
13. (a) Explain the characteristics of first order reaction.

Or

- (b) Define order and molecularity of reaction with example.
14. (a) What is plane of symmetry? Explain different types of planes with example.

Or

- (b) Construct the group multiplication table for C_{2v} point group.
15. (a) Explain the ESR spectrum of benzene radical.

Or

- (b) Write the applications of NQR spectroscopy.

Page 4 Code No. : 20326 E
[P.T.O.]

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) Explain the following :

- (i) Concentration cells
- (ii) Calomel electrode.

Or

- (b) (i) Summarize the determination of pH using glass electrode.
- (ii) Write the principle of potentiometric titrations.

17. (a) Write Hammett Equation. Explain the terms in it. Give its applications.

Or

- (b) Discuss the following applications of absorption :
 - (i) Determination of surface area
 - (ii) Absorption indicators

Page 5 Code No. : 20326 E

18. (a) Discuss any two methods for the determination of order of a reaction.

Or

(b) Summarize the role of collision theory in explaining the rate of the chemical reaction. Give its limitation.

19. (a) Discuss the classification of molecules into point groups.

Or

(b) Predict the point group for the following molecules and give the different symmetry elements present. Ammonia Boron trifluoride.

20. (a) Discuss the principles and applications of ^{13}C NMR spectroscopy.

Or

(b) Explain the following :

- (i) Chemical shift (4)
- (ii) Electric field gradient. (4)

Page 6 Code No. : 20326 E