

(6 pages)

Reg. No. : .....

Code No. : 30482 E Sub. Code : CMCH 63

B.Sc. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2024.

Sixth Semester

Chemistry — Core

PHYSICAL CHEMISTRY – III

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

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The site of oxidation in an electrochemical cell is \_\_\_\_\_  
(a) the anode (b) the cathode  
(c) the electrode (d) salt bridge
2. Which of the following can be used to determine pH \_\_\_\_\_  
(a) Galvanic cell (b) Daniel cell  
(c) Fuel cells (d) Hydrogen electrode

3. Which of the following will change equilibrium constant for a reaction mixture?  
(a) Changing temperature  
(b) Adding an inert gas  
(c) Adding an inert solvent  
(d) All of these
4. Physical adsorption \_\_\_\_\_ with increasing temperature.  
(a) increases (b) decreases  
(c) remains the same (d) completed
5. A \_\_\_\_\_ reaction is one whose rate is independent of concentration.  
(a) zero order (b) first order  
(c) second order (d) third order
6. The unit for first order rate constant is \_\_\_\_\_  
(a) s (b) s<sup>-1</sup>  
(c) m (d) m<sup>-1</sup>
7. Water belongs to \_\_\_\_\_ point group.  
(a) C<sub>2v</sub> (b) C<sub>3v</sub>  
(c) C<sub>4v</sub> (d) C<sub>2h</sub>

8. The symbol used to represent axis of symmetry is \_\_\_\_\_

- (a) E (b)  $C_n$   
(c)  $S_n$  (d)  $P_n$

9. Which of the following nucleus is NMR active?

- (a)  $^{12}C$  (b)  $^{13}C$   
(c)  $^{14}C$  (d) all the above

10. ESR spectrum of hydrogen radical has \_\_\_\_\_ lines.

- (a) 1 (b) 2  
(c) 3 (d) 4

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

11. (a) Write the principle and applications of amperometric titrations.

Or

(b) What is electrochemical cell? Give its significance.

Page 3 Code No. : 30482 E

12. (a) Explain the law of mass action.

Or

(b) Discuss the absorption of gases by solids.

13. (a) What is zero order reaction? Give an example.

Or

(b) Discuss the effect of temperature on reaction rate.

14. (a) Give the matrix representation of E, C2 and i. Calculate their character value.

Or

(b) What are groups? Give their basic properties.

15. (a) What are the factors affecting the chemical shift value of proton NMR?

Or

(b) What is g value? Explain.

Page 4 Code No. : 30482 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) Derive Nernst equation.  
Or  
(b) Write the principle and working of fuel cells.
17. (a) Discuss the behaviour of Freundlich and Langmuir adsorption isotherms in low and high pressures.  
Or  
(b) Utilize Le Chatelier principle to explain the formation of ammonia from nitrogen and hydrogen.
18. (a) Derive the rate equation for first order reaction.  
Or  
(b) What are fast reactions? Explain their kinetics.
19. (a) Explain the following :  
(i) Symmetry elements. (4)  
(ii) Abelian groups. (4)  
Or

- (b) Predict the point group for the following molecules and give the different symmetry elements present.  
(i) Water. (4)  
(ii) Boron tri fluoride. (4)
20. (a) Draw and explain the ESR spectrum of methyl and benzene anion radical.  
Or  
(b) Write the principle and applications of NQR spectroscopy.