

(6 pages)

Reg. No. :

**Code No. : 20008 E Sub. Code : JMCH 52/
SMCH 52**

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021.

Fifth Semester

Chemistry — Main

PHYSICAL CHEMISTRY — III

(For those who joined in July 2016-2019)

Time : Three hours

Maximum : 75 marks

PART A — ($10 \times 1 = 10$ marks)

Answer ALL questions.

Choose the correct answer.

1. Which of the following statements is true?

- (a) Entropy is a path function
- (b) Entropy is a state function
- (c) Entropy is a unitless function
- (d) Entropy is an Intensive property

2. Chemical potential is an example for _____ property.
- (a) Intensive property
 - (b) Extensive property
 - (c) Colligative property
 - (d) Electrical property
3. Which of the following electrodes is reversible with respect to anion?
- (a) Hydrogen electrode
 - (b) Glass electrode
 - (c) Calomel electrode
 - (d) All the above
4. Over voltage depends on _____.
- (a) current density
 - (b) nature of electrode
 - (c) temperature
 - (d) all the above
5. Molecular multilayers are formed in _____.
- (a) Chemical adsorption
 - (b) Physical adsorption
 - (c) Absorption
 - (d) All the above

6. Which of the following effect the rate of enzyme catalyzed reactions?
- (a) Temperature
 - (b) pH
 - (c) Concentration of enzyme
 - (d) All the above
7. Acetylene belongs to _____ point group.
- (a) $C_{\infty}V$
 - (b) C_{2V}
 - (c) $D_{\infty h}$
 - (d) C_{2h}
8. Which of the following molecules possesses a centre of symmetry?
- (a) $PtCl_4$
 - (b) NH_3
 - (c) Chlorobenzene
 - (d) Pyridine
9. Spectroscopy is the study of _____.
- (a) Interaction of electromagnetic radiation with outer sources of light
 - (b) Interaction of electromagnetic radiation with matter
 - (c) Interaction of electromagnetic radiation with inner sources of light
 - (d) Interaction of electromagnetic radiation with scattered light

10. The range of IR radiations are _____.

- (a) 400 cm^{-1} to 300 cm^{-1}
- (b) 3000 cm^{-1} to 300 cm^{-1}
- (c) 4000 cm^{-1} to 667 cm^{-1}
- (d) 4000 cm^{-1} to 800 cm^{-1}

PART B — ($5 \times 5 = 25$ marks)

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

Each answer should not exceed 250 words.

11. (a) State the third law of thermodynamics.
Mention one application of it.

Or

- (b) Derive an expression of Van't Hoff Isochore.

12. (a) Explain any two applications of electrochemical series.

Or

- (b) Illustrate any two applications of concentration cells.

13. (a) Write BET equation and explain its application.

Or

- (b) What are the characteristics of enzyme catalysis?

14. (a) Explain the symmetry operations.

Or

- (b) Explain about the Abelian groups.

15. (a) Explain Moment of Inertia.

Or

- (b) Give the selection rules for IR spectra.

PART C — ($5 \times 8 = 40$ marks)

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

Each answer should not exceed 600 words.

16. (a) Derive Gibb's Duhem equation.

Or

- (b) Derive the Clapeyron Clausius equation.

17. (a) Discuss about decomposition voltage.

Or

(b) Give an account of calomel electrode.

18. (a) Derive Michaelis-Menton equation.

Or

(b) Differentiate between physisorption and chemisorption.

19. (a) Explain in detail H₂O point groups.

Or

(b) Explain the following :

(i) Identify element

(ii) Rotational axis of symmetry

(iii) Improper axis of symmetry

20. (a) Explain the factors affecting vibrational frequencies.

Or

(b) Discuss about the effect of Isotopic substitution.