

Reg. No. :

Code No. : 20011 E Sub. Code : SMCH 63

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2022.

Sixth Semester

Chemistry — Core

PHYSICAL CHEMISTRY — IV

(For those who joined in July 2017 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which of the following will not give NMR spectra?

- (a) ^1_1H (b) $^{12}_6\text{C}$
(c) $^{14}_7\text{N}$ (d) $^{19}_9\text{F}$

2. ————— is more intense peak in mass spectra.

- (a) Molecular peak (b) Base peak
(c) Isotopic peak (d) Hydrogen peak

7. The Gibbs phase rule is —————

- (a) $F = C - P + 2$ (b) $F = C + P + 2$
(c) $F = C - P - 2$ (d) $F = C + P - 2$

8. A saturated solution of sodium chloride is a

- (a) one phase system
(b) two phase system
(c) three phase system
(d) four phase system

9. $10^{-9}\text{m} = \text{—————}$

- (a) 1 cm (b) 1 nm
(c) 100 nm (d) 100 cm

10. ————— is called fullerene.

- (a) C-60 (b) C-20
(c) C-100 (d) C-12

PART B — (5 × 5 = 25 marks)

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

11. (a) What are stokes and antistokes lines? Explain.

Or

(b) Write an Explain Mc-Lefferty rearrangement.

Page 3 Code No. : 20011 E

3. Reaction rates can change with —————

- (a) Temperature
(b) Catalyst
(c) Reaction concentration
(d) All the above

4. The quantity k in a rate law equation

- (a) is dependent of concentration
(b) is independent of concentration
(c) is called the arrhenius constant
(d) is independent of temperature

5. Which of the following is false?

- (a) neutral solution $[\text{H}^+] = [\text{OH}^-]$
(b) acidic solution $[\text{H}^+] > [\text{OH}^-]$
(c) basic solution $[\text{H}^+] < [\text{OH}^-]$
(d) pH scale > 7 for acidic medium

6. ————— is a salt of weak acid strong base.

- (a) NaCl (b) KCl
(c) CH_3COONa (d) $\text{CH}_3\text{COONH}_4$

Page 2 Code No. : 20011 E

12. (a) Give the factors affecting rate constant.

Or

(b) Compare collision theory with ARRT.

13. (a) What is pH? Explain pH scale.

Or

(b) Define the following :

(i) Common ioneffect. (3)

(ii) Buffer solution. (2)

14. (a) Explain the phase diagram of water.

Or

(b) Write a note on : solvent extraction.

15. (a) What are quantum dots? Give their properties.

Or

(b) Explain chemical vapour deposition for the synthesis of nanoparticles.

Page 4 Code No. : 20011 E

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PART C — (5 × 8 = 40 marks)

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

16. (a) (i) Explain δ and τ scale. (3)
(ii) Write the application of NMR spectra. (5)

Or

- (b) (i) Discuss the factors affecting molecular fragmentation. (4)
(ii) Write the differences between IR and Raman spectroscopy. (4)
17. (a) Discuss the characteristics of first and second order reaction with example.

Or

- (b) How will you determine order of a reaction?
18. (a) What is K_{sp} ? Give its application.

Or

- (b) Write a note on :
(i) Lewis concept. (4)
(ii) Ostwald's dilution law. (4)

19. (a) Describe the phase diagram of KI - water system.

Or

- (b) Write a note on :
(i) Phase rule. (4)
(ii) Distribution law. (4)

20. (a) Discuss the application of nanoscience and nanotechnology.

Or

- (b) Explain the following :
(i) Metal oxide nanoparticles. (4)
(ii) Ceramic nanoparticles. (4)