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Reg. No. :

**Code No. : 30287 E Sub. Code : JMCH 63/
SMCH 63**

B.Sc. (CBCS) DEGREE EXAMINATION, APRIL 2020.

Sixth Semester

Chemistry — Core

PHYSICAL CHEMISTRY – IV

(For those who joined in July 2016 onwards)

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 molecule will give Raman spectra
(a) N_2 (b) O_2
(c) Cl_2 (d) All the above
2. How many different types of protons are present in $CH_3 - O - CH_3$?
(a) 1 (b) 2
(c) 3 (d) 4

3. The specific rate constant of a first order reaction depends on the
- (a) concentration of the reactant
 - (b) time
 - (c) temperature
 - (d) concentration of the product
4. Unit of first order rate constant is ____.
- (a) $\text{mole lit}^{-1} \text{ s}^{-1}$
 - (b) s^{-1}
 - (c) lit sec^{-1}
 - (d) lit mole^{-1}
5. Which of the following is a salt of strong acid strong base?
- (a) KCN
 - (b) NaNO_3
 - (c) NH_4Cl
 - (d) NaCl
6. _____ is a Lewis base.
- (a) AlCl_3
 - (b) BF_3
 - (c) BH_3
 - (d) NH_3
7. Sulphur system has _____ phases.
- (a) one
 - (b) two
 - (c) three
 - (d) four

8. The number of phases in a mixture of N_2 , O_2 and H_2 will be
- (a) 0 (b) 1
(c) 2 (d) 3
9. $1\text{ nm} = \text{_____}$.
- (a) 10^{-9} m (b) 10^{-10} m
(c) 10^{-10} cm (d) 10^{-11} m
10. Which of the following is a 1D nano structure?
- (a) quantum well (b) quantum wire
(c) quantum dot (d) all the above

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 the differences between IR and Raman Spectroscopy.
- Or
- (b) What are the factors affecting chemical shift?

12. (a) Discuss the Lindemann theory of unimolecular reaction.

Or

- (b) Write any one method to determine the order of a reaction.

13. (a) How will calculate pH of a buffer solution?

Or

- (b) Write a note on : acid-base titration.

14. (a) Draw and explain the phase diagram of sulphur.

Or

- (b) Derive the equation of phase rule.

15. (a) What are fullerenes? Give their properties.

Or

- (b) Write the electrical property of nanoparticles.

PART C — ($5 \times 8 = 40$ marks)

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

Each answer should not exceed 600 words.

16. (a) (i) State mutual exclusion principle. (4)
(ii) Discuss the theory of NMR spectra. (4)

Or

- (b) Define :
(i) Molecular peak (2)
(ii) Base peak (2)
(iii) Isotopic peak (2)
(iv) Metastable peak. (2)
17. (a) What is zero-order reaction? Give its characteristics. Give an example for zero order reaction.

Or

- (b) Explain collision theory of reaction rates and its limitations.
18. (a) What is buffer solution? Explain its classification with example.

Or

- (b) Describe the hydrolysis of different salts.

19. (a) Explain the phase diagram of Mg-Zn system.

Or

(b) State distribution law? Give its applications.

20. (a) What are Nano particles? Give its magnetic properties. Write any two uses.

Or

(b) Explain the following :

(i) Carbon nanofibre. (4)

(ii) Nanocomposites. (4)
