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Reg. No. : .....

ode No. : 30288 E **Sub. Code : SMCH 63**

(CBCS) DEGREE EXAMINATION, APRIL 2022

Sixth Semester

Chemistry — Core

PHYSICAL CHEMISTRY — IV

(For those who joined in July 2017 onwards)

: Three hours Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

Which of the following will give NMR spectra?

(a) $^{4}_{2}He$ (b) $^{16}_{6}C$

(c) $^{16}_{8}O$ (d) $^{14}_{7}N$

How many number of ESR lines observed for $CH_3^{\bullet}$?

(a) 1 (b) 2

(c) 3 (d) 4

3. $t^{1/2}$ for a zero order reaction is proportional to

(a) a (b) 1/a

(c) $1/a^2$ (d) a^2

4. Unit of first order rate constant is

(a) $mol\,lit^{-1}s^{-1}$ (b) s^{-1}

(c) $lit\,sec^{-1}$ (d) $litmol^{-1}$

5. pH + pOH = ————

(a) 7 (b) 0

(c) 14 (d) 100

6. Which of the following is Lewis acid?

(a) BF_3 (b) NH_3

(c) Cl^{-1} (d) OH^{-1}

7. For one component system the phase rule is ————

(a) F = 3 – P (b) F = 2 – P

(c) F = 1 – P (d) F = 3 + P

The reduced phase rule is

(a) F = C – P + 2 (b) F = C – P – 2

(c) F = C – P + 1 (d) F = C – P – 1

Which of the following is a allotrope of carbon?

(a) C_6H_6 (b) CH_3Cl

(c) fullerene (d) fluorocarbons

———— is a 3D nanostructure.

(a) Nano wire (b) Nanocrystal

(c) Fullerene (d) All the above

PART B — (5 × 5 = 25 marks)

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

Each answer should not exceed 250 words.

(a) State and explain mutual exclusion principle.

Or

(b) Write the basic principle of mass spectra.

12. (a) Define and differentiate : Order and molecularity.

Or

(b) Derive the rate constant for first order reaction.

13. (a) What is common ion effect? Give it's applications.

Or

(b) What is buffer solution? Give it's types.

14. (a) Derive the expression of distribution law.

Or

(b) Explain the formation of congruent melting point.

15. (a) Write a note on : Nanocomposites.

Or

(b) Write the sol-gel method for the synthesis of nanoparticles.

PART C — (5 × 8 = 40 marks)

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

Each answer should not exceed 600 words.

16. (a) (i) What is chemical shift? (3)

(ii) Explain the factors affecting chemical shift. (5)

Or

(b) Discuss the ESR spectrum of methyl and benzene radicals.

17. (a) Write and explain ARRT.

Or

(b) (i) Explain the effect of temperature on rate constant. (5)

(ii) Define : Rate law. (3)

18. (a) Derive Ostwald's dilution law. Give its experimental verification.

Or

(b) How will you calculate degree of hydrolysis?

19. (a) Define phase rule. Write the thermodynamic derivation of phase rule.

Or

(b) Explain the phase diagram of $FeCl_3$ - water system.

20. (a) Write the synthetic principles of nanoparticles with example.

Or

(b) Explain the following :

(i) Carbon nanotubes

(ii) Metal nanoparticles.

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