

STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2015–16 & thereafter)

SUBJECT CODE: 15CH/MC/PC34

B.Sc. DEGREE EXAMINATION, NOVEMBER 2017
BRANCH IV- CHEMISTRY
THIRD SEMESTER

COURSE : MAJOR CORE
PAPER : PHYSICAL CHEMISTRY-I
TIME : 3 HOURS

MAX.MARKS : 100

SECTION – A

(30x1=30)

Answer all the questions.

I. Choose the Correct Answer:

1. In Schrodinger wave equation, the symbol Ψ represents
 - a) Wavelength of the spherical wave
 - b) amplitude of the spherical wave
 - c) Frequency of the spherical wave
 - d) none of these.
2. Frequency below which no electrons are emitted from metal surface is
 - a) minimum frequency
 - b) angular frequency
 - c) maximum frequency
 - d) threshold frequency
3. Wave nature of electrons is shown by
 - a) Photoelectric effect
 - b) Compton effect
 - c) Diffraction experiment
 - d) Stark effect
4. A crystalline solid does not have one of the following properties. It is
 - a) anisotropy
 - b) Sharp melting points
 - c) isotropy
 - d) definite and regular geometry
5. The number of crystal systems is
 - a) 7
 - b) 8
 - c) 6
 - d) 4
6. In a solid lattice, a cation has left a lattice site and is present in the interstitial position, the lattice defect is
 - a) Schottky defect
 - b) Frenkel defect
 - c) Vacancy defect
 - d) Interstitial
7. For tetrahedral coordination number, the radius ratio is
 - a) 0.732- 1.0
 - b) 0.225-0.41
 - c) 0.414- 0.732
 - d) 0.155-0.225
8. In gas masks the poisonous gases are removed by the process of
 - a) absorption
 - b) adsorption
 - c) catalysis
 - d) diffusion
9. Most efficient catalysts are
 - a) Transition metals
 - b) alkali metals
 - c) Alkaline earth metals
 - d) Noble gases
10. An example of acid-base catalysis is
 - a) Inversion of cane sugar
 - b) Keto-enol tautomerism
 - c) decomposition of nitramide
 - d) all of these

II. Fill in the blanks:

11. De Broglie wavelength is expressed as _____.
12. The crystalline structure of ZnS is _____.
13. The percentage efficiency of packing in case of simple cubic lattice is _____.
14. Physical adsorption is appreciable at _____.
15. Multi molecular layers are formed in _____.
16. The catalyst used in the manufacture of ammonia in Haber's process is _____.
17. The minimum energy needed for a reaction to occur is _____.
18. _____ are called biocatalyst.
19. _____ defect causes decrease in density of a crystal.
20. Finely divided form of the catalyst is more efficient due to its _____.

III. State whether true or false:

21. A Black body is a perfect absorber as well as perfect radiator of energy.
22. Miller indices of the plane that intersect the crystallographic axes at a distance of a , $2b$, ∞c is $[210]$
23. The coordination number of an octahedral crystal is eight.
24. Chemisorption is reversible.
25. A catalyst does not alter the equilibrium constant of the reaction

IV. Answer in a line or two:

26. What is an Eigen value?
27. Give the parameters for a tetragonal crystal system.
28. Define center of symmetry.
29. Define Physisorption.
30. What is an adsorption isobar?

SECTION – B**(5x6=30)****Answer any FIVE questions:**

31. Discuss photoelectric effect.
32. What is meant by Space Lattice and Unit cell?
33. Describe the structure of sodium chloride.
34. Sketch and calculate the number of atoms present in simple, FCC and BCC structures.
35. Discuss Freundlich adsorption isotherm of a gas on a solid.
36. Write down the important characteristics of a catalyst
37. What is Heterogeneous Catalysis? Give examples of heterogeneous catalysis.

SECTION-C**Answer any TWO questions:****(2x20=40)**

38. a) Explain the properties of the following a) linear operator b) Laplacian operator
c) Hermitian Operators (3+3+4)
- b) Draw the seven crystal systems and indicate the parameters. (6)
- c) What are the types of symmetry elements present in crystals? (4)
39. a) Describe the Bragg's and powder diffraction method of crystal analysis. (8)
- b) Distinguish between Hexagonal close packing and cubic close packing. (4)
- c) Describe the Rutile and Fluorite structure of crystals. (8)
40. a) What are liquid crystals? Explain its types
- b) What are enzyme catalyzed reactions? Derive Michaelis Menten equation for enzyme catalyzed reaction. (10+10)

