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1B2A22105 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.Sc Degree Examination, April 2022

BCH2B02 - Theoretical and Inorganic Chemistry II

(2019 Admission onwards)

Time: 2 hours Max. Marks: 60

Section A (Short answers)
(Answer questions up to 20 marks. Each question carries 2 marks)

1. State and explain photoelectric effect.
2. Calculate the de Broglie wave length of electron moving with a velocity of 1.20×10^5 m s^{-1}
3. Explain any two limitations of Bohr's theory.
4. State and explain Pauli's exclusion principle.
5. What is meant by radial probability distribution? Draw the radial probability distribution of 1s atomic orbital.
6. State the variation theorem.
7. What is Born Oppenheimer approximation?
8. Calculate the bond order of Be_2 molecule.
9. What is meant by 'sigma' molecular orbitals?
10. Account for the reactivity of PCl_5.
11. Define hybridisation of atomic orbitals.
12. What is the geometry of IF_7 molecule? Mention the hybridisation involved.

[Ceiling of marks: 20]

Section B (Paragraph)

(Answer questions up to 30 marks. Each question carries 5 marks)

13. Explain the postulates of quantum mechanics.
14. Explain the term degeneracy from the expression of energy of particle in three dimensional box.
15. Explain the formation of hydrogen spectra.
16. Discuss Einstein's explanation of photoelectric effect using quantum theory.
17. Point out the differences between bonding and antibonding molecular orbitals.
18. Explain the formation of sp^2 hybridization using LCAO approximation.
19. Explain the hybridisation and geometry of SF_6 molecule.

[Ceiling of marks: 30]

Section C (Essay)

(Answer any one. Each question carries 10 marks)

20. Derive the expression for energy of a particle in one dimensional box.
21. a) Construct molecular orbital diagram of CO molecule.

    b) Calculate the bond order and explain the stability and magnetic behaviour of the molecule.

[1 x 10 = 10 Marks)

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B2A22106 (Pages : 2) Reg. No:.....

Name: .....

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Second Semester B.ScDegree Examination, April 2022

BCH2C02 - Physical Chemistry

(2019 Admission onwards)

Time: 2 hours Max. Marks: 60

Section A (Short answers)
(Answer questions up to 20 marks. Each question carries 2 marks)

1. What is meant by standard electrode potential?
2. Explain why water wets glass while mercury does not.
3. Sketch the (222) planes of a bcc lattice.
4. How does pressure affect the solubility of a gas in a given liquid?
5. State third law of thermodynamics.
6. An aqueous solution of ferric chloride is acidic in nature. Justify.
7. State the law of rationality of indices.
8. What is entropy? Explain its significance.
9. What is the internal energy change when a system absorbs 3000 J of heat and performs 2000 J of work?
10. The specific conductance of a decinormal solution of an electrolyte is $0.0025 ohm^{-1}cm^{-1}$. Calculate the equivalent conductance of the solution .
11. What is state function ? Give two examples.
12. Define ionic product of water. What is its value at 298 K?

[Ceiling of marks: 20]

Section B (Paragraph)
(Answer questions up to 30 marks. Each question carries 5 marks)

13. What is meant by molar conductance of an electrolyte solution? How does it vary with dilution for : a) a strong electrolyte b) for a weak electrolyte. Justify your answer.
14. Discuss the stochiometric defects found in crystals.
15. Derive the Van't Hoff osmotic pressure equation.
16. Explain the entropy criterion for reversible and irreversible processes.
17. Discuss how real gases deviate from Boyle's law.

18. Sketch and explain the conductometric titration curves for

a) a strong acid – weak base titration and

b) weak acid- strong base titration.

19. State and explain Kohlrausch's Law. Discuss its applications.

[Ceiling of marks: 30]

Section C (Essay)
(Answer any one. Each question carries 10 marks)

21. a)Derive Bragg's equation. Discuss its applications.

b) The first order Bragg's reflection from (100) plane of a cubic crystal with $d_{100} = 4.8\,\overset{0}{A}$ occurs at a glancing angle of 20^0. Calculate the wavelength of X- rays used.

22. a)Discuss H_2 - O_2 Fuel cell.

b) Explain the variation of viscosity and surface tension of a liquid with temperature.

[1 X 10 = 10]