Or

10. (a) Draw the isotherms of CO_2 according to Van der Waals equation and account on that in comparison to Andrews experiment. 3

(b) Deduce the equation $n\lambda = 2d\sin\theta$ (terms have their usual meaning). 3

(c) Briefly account on the structure of diamond. 2

(d) What is lattice energy? 2

****

UG Odd Semester Examination, 2022

EDUCATION B.Sc. B.Ed

(1st Semester)

Course No.: BSCH-102

(General Chemistry)

Full Marks: 50

Pass Marks: 20

Time: 2 hours

The figures in the right margin indicate full marks for the question.
Answer the following five (5) questions

1. (a) "In hydrogen like systems as we go to higher and still higher orbits the energy gap between two immediate orbits continues to decrease."-— Justify in detail. 4

(b) Estimate the potential energy of an electron in a hydrogen atom in terms of r and e (terms have their usual meaning). 4

(c) Write a brief account on diagonal relationship or inert-pair effect. 2

Or

2. (a) The ions O^{2-}, F^-, Na^+, Mg^{2+}, and Al^{3+} are isoelectronic. How do their ionic radii vary? Write in detail. 3

(b) Calculate using Slater's rule, the effective nuclear charge on (i) a 3d electron and (ii) a 4s. 3

(c) Write a detailed note on Pauling scale of electronegativity. 4

3. (a) Describe whether two spherical objects : one has a diameter of 10nm and the other has a diameter of 1000nm, are considered as nano particles by using the size-based definition of nanomaterial. 3

(b) Write down the advantages and disadvantages of the top-down and bottom-up methods of fabrication of materials. 4

(c) Write down the principal differences in the preparation of sample for SEM and TEM. 3

Or

4. (a) Describe the basic steps of formation of nano particles from solutions. 4

(b) Write a short note on the applications of nanomaterials. 5

(c) Define quantum dots (QD). 1

5. (a) Write short note on any two among the following: 2x2½=5

(i) Baeyer Strain theory

(ii) Cracking

(iii) Tautomerism

(b) Write down the reaction steps for the preparation of cyclopropone (in any method). 3

(c) Write down the mechanism of hydrohalogenation of alkene. 2

Or

6. (a) Give a detailed mechanism for the Friedel-Crafts alkylation. 4

(b) Which one is more acidic :

1, 3, 5 cycloheptatriene Or 1,3,5- heptatriene. Justify! 3

(c) Arrange the following with brief justification, according to their increasing Lewis acid character :

BF_3, BCl_3, BBr_3, BI_3 3

7. (a) The following statement is correct or incorrect. The phase rule F= C–P+2, is valid even if some of the components may not be present in all the phases. 1

(b) Define (any two) : 2x2=4

(i) Component, (ii) Phase, (iii) Degree of freedom

(c) Write down the number of components, number of phases, and evaluate the degrees of freedom for a 'dilute solution of sulphuric acid' in water'. 3

(d) What is triple point? 2

Or

8. (a) Write a detailed account on the phase diagram of water with necessary figures. 6

(b) Derive the equation F=C–P+2 (terms have their usual meaning) 4

9. (a) Derive the Van der Waals equation of state. 6

(b) The Van der Waals constant 'b' for helium is 2.433×10^{-5} m^3/mol, calculate the diameter of a helium atom. 4