

2022

M.Sc.

1st End Semester Examination

CHEMISTRY

PAPER-CEM-103

Full Marks: 40

Time: 2 Hours

(Inorganic Chemistry -I)

Group-A

Answer **any four** questions.

2.5x4=10

- (a) What do you mean by endo and exo peptide?
(b) What is Wilson's disease?
(c) What do you mean by energy rich bond in phosphoanhydride segments?
(d) Write the H.M. notation for D_{2h} , and S_4 . Draw their stereographic projections.
(e) What will be the symmetry point group of d_{xy} orbital? Explain your answer
(f) What are transistors? Draw the symbol for p-n-p and n-p-n transistors.
(g) Discuss the origin of twinning.

Group-B

Answer any four questions.

4x5=20

- (a) Discuss the active site structure of the enzyme carboxy peptidase A.
(b) Explain the mechanism of peptide bond hydrolysis of carboxy peptidase A. 2+3
- (a) What is the role of central metal ion in the function of carboxy peptidase enzyme A.
(d) Write down the overall chemical reaction involved in ferritin mineralization. 2+ 3
- What do you mean by a class? Are the following symmetry operations belonging to same class or not? Explain your answer in brief:
(a) $\sigma_v(xz)$ and $\sigma_v(yz)$ in (i) C_{2v} and in (ii) C_{4v} ;
(b) C_3^1 and C_3^2 in (i) C_3 and (ii) C_{3v} [1+2x2=5]
- Derive an expression for the matrix representation of $C_n(z)$ operation involving rotation around z axis by an angle of θ . Hence find the matrix for $C_3^1(z)$ and $C_3^2(z)$ operations. [3+2=5]
- (a) Classify the crystal systems in terms of symmetry element.
b) Find the primitive unit cell in 2-dimensional non square lattice structure. 2+3

7. Draw the crystal planes for the cubic system:

- a) (111)
- b) (110)
- c) (010)
- d) (0,1/2,1/2)
- e) (220)

1x5=5

Group-C

Answer **any one** question 1x10

8. (a) Discuss the recycling of iron in red blood cells.
(b) Propose the mechanism of action of the enzyme carbonic anhydrase.
(c) Explain the preferential binding of myoglobin to O₂ in comparison to CO.
(d) Write down the enzymatic mechanism of urease. 3+2+2+3=10
9. (a) Write the matrix representations of C_{2h} and D₃ point groups (in 3D). Assign these two representations as reducible or irreducible representation with explanation.
(b) Discuss Edge dislocation with diagram.
(c) Write the difference between Schottky and Frenkel defect. 5+3+2=10