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NEPWT—51—2024

FACULTY OF SCIENCE

M.Sc. (NEP) (First Year) (First Semester) EXAMINATION

NOVEMBER/DECEMBER, 2024

CHEMISTRY

Paper SCHEC-401

(Inorganic Chemistry—I)

(Thursday, 12-12-2024)

Time : 10.00 a.m. to 1.00 p.m.

Time—3 Hours

Maximum Marks—80

N.B. :— (1) Question No. 1 is compulsory and solve any *three* from remaining five.

(2) Calculator and log table is allowed.

1. (a) Give the characteristics of reactions occurring through inner sphere mechanism. 5
- (b) How will you prepare cis and trans $[\text{Pt}(\text{C}_2\text{H}_4)(\text{NH}_3)\text{Cl}_2]$ complex compounds ? 5
- (c) Explain semiconducting nanoparticles a novel optical property of nano-materials. 5
- (d) Explain, *d-d* transition spectra in metal complexes. 5
2. (a) Explain with suitable examples the role of conjugated base in SN^1CB mechanism. 10

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- (b) List bottom-up approaches for the synthesis of nanoscale structures and explain synthesis of metallic nanoparticles in detail. 10
3. (a) Write about the synthesis and uses of carbon nano tubes. 10
- (b) One of the excited state of Ti has electronic configuration $[\text{Ar}] 4s^2 3d^1 4p^1$. Calculate the number of microstates. 10
4. (a) What is trans effect ? Explain π -bonding theory of trans effect. 10
- (b) Draw and explain Orgel diagram for d^4 and d^6 configurations in octahedral complexes. 10
5. (a) Give an account about scanning probe microscopy. 10
- (b) Determine the spectroscopic ground state term symbol for d^3 and d^6 configuration. 10
6. (a) Explain electron transfer between $[\text{Fe}(\text{CN})_6]^{3-}$ and $[\text{Fe}(\text{CN})_6]^{4-}$ is much faster than between $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{Co}(\text{NH}_3)_6]^{2+}$. 5
- (b) Write a note on cis effect. 5
- (c) Give an account of bionanocomposite. 5
- (d) Explain cooperative magnetism in brief. 5