SCHOOL OF CHEMICAL AND LIFE SCIENCES
M.SC. CHEMISTRY/B.SC. INTEGRATED PROGRAM IN CHEMISTRY
SEMESTRE-IV EXAMINATION-2020
PAPER TITLE: INORGANIC CHEMISTRY-II
PAPER CODE: BCH-CC08TH

Maximum Mark: 75 **Duration of time: 3 hrs**

Note: Please write the roll number at the top the answer sheets. It should be noted that 20 min extra time will be provided for uploading the answer sheet in the pdf format.

Q1 A. Multiple choice type question. Each question one marks. **15 marks**

A.1 The total number of stereoisomers MA_3B_3:
A. 3 **C.** 2
B. 6 **D.** 1

A.2 Total number of unpaired electron in $[Mn(CN)_6]^{4-}$:
A. 1 **C.** 2
B. 3 **D.** 0

A.3 Most common oxidation state of lanthanoids:
A. +1, +2 **C.** +3, +4
B. +2, +3 **D.** All of these

A.4 The electronic spectrum of $[Ti(H_2O)_6]^{3+}$ in aqueous solution:
A. 20,300 cm^{-1} **C.** 440cm-1
B. 20,300 kJ/mole **D.** 440 kJ/mole

A.5 Dioxygen molecule is bind to heme group:
A. In a bent way **C.** In a sideway symmetrical way
B. In a linear way **D.** None of these

B. Attempt all fill in the blank. Each question one marks.

i. CFSE of $[Fe(H_2O)_6]^{3+}$ complex is.....
ii. Spin only magnetic moment of Cu^{2+} ion is .....
iii. In the cytoplasm, the K^+ concentration may be as high as.....M whereas outside it is usually less than .....M.
iv. Zr and Hf show the same size due to .....
v. In the electronic spectra of lanthanoid metal ions, absorptions due to f–f transitions are ....., but bands due to 4f–5d transitions are .....

C. Short answer type. Each question one marks.

i. What is John-Teller distortion?
ii. What is molecular geometry of VF_5 in the gas and solid phase?
iii. What is the reason of $KMnO_4$ give intense colour?
iv. What is the electronic configuration of Ce element?
v. What is the composition of metal content in a human body (70 kg)?

Q2. Answer any three out of five. **15 marks**

i. What is the chelating ligand and effect of stability of the complex?
ii. Calculate (spin-only) for $[Mn(CN)_6]^{2+}$.
iii. Arrange in the stability order of metal ion- Mn^{+} Mn^{2+}, Mn^{3+}, Mn^{4+}.
iv. Explain, Eu^{3+} has an f^6 electronic configuration and yet the calculated value of μeff is 0.
v. Explain Dose–response curve for an essential element.

Q3. Answer any three out of five. **15 marks**

i. What is the Polynuclear complex? Give example.
ii. Describe Crystal field theory (CFT) with suitable example.
iii. Calculate the ground term symbol of Mn(II) ion.
iv. Calculate the magnetic moment of Pr^{3+} ion (f^2 configuration).
v. Explain the Na^{+}/K^{+} ion pump.

Q4. Answer any two out of four. **15 marks**

i. Draw the splitting diagram of the d^6 orbitals in a heigh and low spin octahedral crystal field.
ii. Calculate the M-M bond in $Re_2Cl_8^{2-}$.
iii. Explain the basic character of $La(OH)_2$ to $Lu(OH)_2$.
iv. Discuss the shape electronic configuration of Fe metal in oxy and deoxy hemoglobin.

Q5. Answer any one out of two. **15 marks**

i. Explain the differences between lanthanoids and actinoids series?
ii. Explain the catalytic cyclic of Carbonic anhydrase and their biological importance.