SUBJECT: CHEMISTRY (PAPER-I)

TIME ALLOWED: THREE HOURS   **MAXIMUM MARKS: 100**

NOTE:
   i. All the parts (if any) of each Question must be attempted at one place instead of at different places.
   ii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
   iii. No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
   iv. Extra attempt of any question or any part of the question will not be considered.

NOTE: **Attempt Any Five Questions. All Questions Carry Equal Marks. Attempt in English or Urdu.**

Q No. 1: a). Define entropy. Describe entropy changes and conclusions for reversible and irreversible process.   **(2+4+4=10 Marks)**

b). Explain the significance of Gibbs free energy as useful work.   **(10 Marks)**

Q No. 2: a). What is hybridization of orbitals? Give comparison of Sigma and Pi bonds. Explain Sp^3 hybridization.   **(2+4+4=10 Marks)**

b). Write down the main points of Molecular Orbital Theory (MOT) and explain the structure of HF molecule.   **(5+5=10 Marks)**

Q No. 3: a). What is molar conductance? How are the conductance / resistance measured?   **(2+8=10 Marks)**

b). Define electrode potential. Explain standard hydrogen electrode.   **(2+8=10 Marks)**

Q No. 4: a). What is Pauli Exclusion Principle? How does it helps and effect in distribution of electrons in an atom?   **(3+7=10 Marks)**

b). Derive Schrodinger wave equation for calculating the *Laplacian operator*.   **(10 Marks)**

Q No. 5: a). What are the main postulates of Werner's theory and explain structure of $CoCl_3.6NH_3$.   **(7+3=10 Marks)**

b). What are chelates and give classification? Give examples of the formation of chelates.   **(2+2+6=10 Marks)**

Q No. 6: a). What is radioactive decay? Describe the decay of Beta (β^+, β^-) particles.   **(2+8=10 Marks)**

b). Differentiate nuclear fission and nuclear fusion process.   **(10 Marks)**

Q No. 7: a). What is the composition of cement? Describe the Wet process for the manufacture of Cement.   **(10 Marks)**

b). Define fertilizers and explain the classification of fertilizers.   **(2+8=10 Marks)**

Q No. 8: a). What are pollutants? How air pollution can be controlled?   **(10 Marks)**

b). Write a note of any one: **(10 Marks)**

   (i) Green house effect

   (ii) Water pollution

(PPSC logo)

PUNJAB PUBLIC SERVICE COMMISSION
COMBINED COMPETITIVE EXAMINATION
FOR RECRUITMENT TO THE POSTS OF
PROVINCIAL MANAGEMENT SERVICE, ETC -2021
CASE NO. 3C2022
SUBJECT: CHEMISTRY (PAPER-II)

TIME ALLOWED: THREE HOURS **MAXIMUM MARKS: 100**

NOTE:
i. All the parts (if any) of each Question must be attempted at one place instead of at different places.
ii. Write Q. No. in the Answer Book in accordance with Q. No. in the Q. Paper.
iii. No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
iv. Extra attempt of any question or any part of the question will not be considered.

NOTE: **Attempt any FIVE Questions in all. Attempt in Urdu or English.**

Q.No.1 A. What is the necessary conditions for the absorption of IR radiation by the compounds? Which of the following molecules do not absorb in the IR region and why? **(15 Marks)**

   (i) H_2 (ii) HCl   (iii) ICl   (iv) N_2 (v) H_2O

   B. Discuss the applications of Ultraviolet/Visible spectroscopy. **(5 Marks)**

Q.No.2 A. Discuss the effect of Hydrogen bonding on the boiling points and water solubility of organic compounds. **(8 Marks)**

   B. What is essential difference between: **(12 Marks)**

   (i) Inductive effect and Mesomeric effect

   (ii) Resonance and Tautomerism

   (iii) Conjugation and Hyperconjugation

Q.No.3 A. Describe the general mechanism by which benzene undergoes substitution reaction. **(5 Marks)**

   B. Show the product formed (if any), by action of each of the following on benzene. **(15 Marks)**

   (i) Conc. HCl   (ii) Bromine Water   (iii) Con. NaOH

   (iv) Bromine water   (v) Fuming H_2SO_4

Q.No.4 A. Write the structure of the following compounds. **(10 Marks)**

   (i) 2-methylecyclobutanol   (ii) t-amylalcohol   (iii) o-nitrophenol
   (iv) 2-iso-propyl-6-methylphenol   (v) neo pentyl alcohol

   B. Define and explain the following reactions: **(10 Marks)**

   (i) Haloform reactions   (ii) Canizzaro reactions

Q.No.5 A. What is optical isomerism? Discuss necessary conditions for it. How it can be determined? **(10 Marks)**

   B. Write the resonance structure of: **(10 Marks)**

   (i) Benzene   (ii) Anthracene   (iii) Naphthalene   (iv) Phenanthrene

Q.No.6 A. Discuss the digestion, absorption and transport of proteins. **(12 Marks)**

   B. Discuss structure and biological significance of nucleic acids. **(8 Marks)**

Q.No.7 A. What is Chromatography? How Column chromatography is used as an analytical technique? **(10 Marks)**

   B. What is polymerization? Discuss and compare condensation polymerization with addition polymerization. **(10 Marks)**