FE Sem-I (C Scheme) Nov. 2025 (1/2)

Time: 2 hours Date 24/11/2025 Maximum marks: 60

QP. Code. 98296

NB:

1) Question No.1 is Compulsory

2) Attempt any **Three questions** from the remaining **Five questions**

3) Figures to the right indicate full marks

Q.1 Attempt any **five** of the following: **(15)**

a) Compare temporary and permanent hardness (any 3 points).

b) Why H_2O is liquid and H_2S is a gas. Justify.

c) Comment on glass transition temperature (Tg).

d) Give difference between bonding and antibonding orbitals.

e) Identify how many phase/s are present in each of the following systems;

1) Mixture of N_2, H_2 and O_2
2) Mixture of rhombic and monoclinic Sulphur
3) Ethanol and water

f) Explain drawbacks of Kekule's Benzene structure.

g) Calculate COD of 25 ml of waste water sample in ppm which was refluxed with 10 ml of $K_2Cr_2O_7$ and after refluxing the excess unreacted dichromate required 6.5 ml of 0.1N FAS solution. A blank of 25 ml of distilled water on refluxing with 10 ml of $K_2Cr_2O_7$ solution required 27 ml of 0.1N FAS solution.

Q.2) a) Apply Gibb's phase rule to one-component (Water) system. **(6)**

b) Explain reverse osmosis with the help of principle, process, and diagram. Also give its advantages. **(5)**

c) Discuss the roles of plasticizer and lubricant in compounding of plastics. **(4)**

Q.3) a) Draw the Molecular Orbital diagram of CO molecule. Give its electronic configuration. Calculate its bond order and identify its magnetic behaviour. **(6)**

b) What is hydrogen bonding? Explain its types with examples. **(5)**

c) Calculate number average molecular weight of polymer which has 5 molecules of molecular weight of 10000, 3 molecules of molecular weight 30000 and 2 molecules of molecular weight 60000. **(4)**

FE Sem-I (C Scheme) Dec. 2025 (2/2)

Q.4) a) Explain Gibbs phase rule with its mathematical expression. Give its limitations and advantages. (6)

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b) Comment on structure and bonding of pyrrole. (5)

c) Explain p-doped and n-doped conducting polymers with appropriate examples. (4)

Q.5) a) Define fabrication of plastics. Explain injection moulding process with neatly labelled diagram. Give its any two advantages. (6)

b) Distinguish between orbit and orbital (any three points). Explain the shapes of p-orbitals with their diagrams. (5)

c) Give equations explaining EDTA titration. (4)
Standard hard water sample contained 1 mg of pure $CaCO_3$ per ml. 50 ml of Standard hard water sample consumed 20 ml of EDTA solution. 50 ml of hard water sample required 30 ml of EDTA solution. Calculate total hardness of water in ppm.

Q.6) a) Explain the ion-exchange method for softening of water giving the following details: Principle, diagram, process, and Reactions. (6)

b) i) Define: Phase and Component. (2)

ii) An alloy of tin and lead contains 73% tin. Find the mass of eutectic in 1kg of solid alloy, if the eutectic contains 64% of tin. (3)

c) i) Draw Molecular Orbital diagram of O_2 molecule. (2)

ii) Give synthesis of Kevlar. (2)
