PRN:-

Shirpur Education Society's

R. C. PATEL INSTITUTE OF TECHNOLOGY, SHIRPUR

An Autonomous Institute

(Affiliated to Dr. Babasaheb Ambedkar Technological University, Lonere)

आर. सी. पटेल इन्स्टिट्यूट ऑफ टेक्नॉलॉजी, शिरपूर

(स्वायत्त महाविद्यालय)

Programme: B.TECH (AIML)/B.TECH (DATA SCI.)/B.TECH (IT)

Year: I/Semester I (Exam Year: 2024-2025)

Subject: Chemistry **Time:** 10:00 am - 12:00 pm (02:00 Hrs.)

Date: 25 Jan 2025 **Max Marks:** 60

END SEMESTER EXAMINATION ODD SEM-I(2024-2025)

Instructions: 1. This question paper contains 2 pages

2. Answer to each new question to be started on a fresh page.
3. Figure in right hand side indicates full marks
4. All questions are compulsory except for the internal options.
5. Assume necessary data wherever required.
6. Atomic weights: H = 1, C =12, N = 14, O = 16, Na = 23, Mg = 24, Al = 27, Si = 28, S = 32, Cl = 35.5, K = 39, Ca = 40, Fe = 56, Ba = 137, F = 19, Br = 80

1. (Attempt Any 3 Questions) **15**

A. Draw the schematic diagram of the flame photometer and give the function of each part. **5**

B. Explain the process of fluorescence. Give its path in Jablonski diagram. Is it allowed or forbidden transition? **5**

C. Calculate the energy associated with (a) one photon; (b) one einstein (or energy in one mole of photon) of radiation of wavelength 3000 A°. Express the energy of one Einstein in Kcal per mole. **5**
(h = 6.62 x 10^{-27}erg-sec; c = 3 x 10^{10}cm/s. N = 6.023 x 10^{23},1 Calorıe = 4.18 x10^{7} erg).

D. Write conventional and green synthesis of Adipic acid. Write which green principle is involved. **5**

E.Discuss the following green principles a) Avoid chemical derivatives b) The use of auxiliary substances **5**

2. **15**

A. What are fullerenes? Give any four properties. **5**

B. . **5**

i. Define compounding of plastics? Explain the role of Plasticizers and Dyes and Pigments in it. **5**

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ii. What are the two pre-requisites to behave as conducting polymer? Explain any two types of conducting polymers. **5**

C. . **5**

i. 2.5 g of air dried coal sample was kept in an electric oven for 1 hour at 110°C. The weight reduced to 2.32 g. Further it was kept in a muffle furnace in a crucible with vented lid at 950 ± 25°C for exactly 7 minutes. The weight of coal reduced to 2.1 g. It was then burnt in a furnace at 750°C for half an hour. The residue weighed 0.1 g. Report the proximate analysis results. **5**

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ii. Explain preparation of power alcohol with reactions. **5**

3. **15**

A. Calculate the weight of air needed for complete combustion of 5 kg of coal containing C=70%, H=10%, O=10%, N=5% and remaining ash. **5**

B. . **5**

i. Draw two component Lead Silver alloy system. Calculate the degree of freedom on curves, area, and eutectic point. **5**

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ii. Define eutectic system. An alloy of Cd and Bi contain 20% of Cd. Find the mass of eutectic in 2 kg of alloy, if the eutectic system contains 50% Cd. **5**

C. With a neat and labelled diagram, calculate degree of freedom of curves and area of the water system. **5**

4. **15**

A. What is Green solvent? Explain why CO_2 is used as a supercritical fluid. **5**

B. 1. **5**

i. Calculate the temporary, permanent and total hardness for a water sample in ppm containing following salts: $Ca(HCO_3)_2$ = 4.05 ppm, $MgSO_4$ = 27 ppm, $MgCO_3$ = 21 ppm, $Na_2(SO4)_2$ = 10. **5**

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ii. 50 mL of standard hard water containing 1 mg of pure $CaCO_3$ per mL consumed 22 mL of EDTA solution. 75 mL of water sample consumed 33 mL of EDTA solution using EBT indicator. 75 mL of water sample after boiling required 13.2 mL of EDTA solution using same indicator. Calculate temporary, permanent and total hardness of water sample. **5**

C. Draw the neat labelled diagram of the Ion exchange process. Give advantages of the Ion exchange process (Any two). **5**