

(Set-A<sub>1</sub>)

**B. Tech- 1**  
**CHEMISTRY**

*Full Marks : 70*

*Time : 3 hours*

**Answer any six questions including Q.No.1  
which is compulsory.**

*The figures in the right-hand margin indicate marks*

*Symbols carry usual meaning*

✓ 1. **Answer all questions :**

**2 × 10**

- (a) Name the corresponding regions of following wavelength. (540 nm, 200 nm)**
- (b) Calculate the stopping potential when a metal of work function 1.9 eV is irradiated by a light of 450 nm.**
- (c) What is black body?**
- (d) If a conjugated pi-system is attached with a carbonyl group, then in which region the electronic spectrum appears.**
- (e) Name the state variables which are used to define the state of a system.**

**( Turn Over )**

(f) Name the phases which coexist in the triple point of S- system.

(g) Cementite exists in which structural form. What is the percentage of carbon in it?

(h) Give an example of a reaction in which order is one but molecularity is two.

(i) What is single electrode potential?

(j) What are smart materials?

✓ 2. (a) What are eigenvalues and eigenfunctions? Discuss the terms present in eigenvalue equation. 5

(b) What is infrared spectroscopy? Explain why  $O_2$  and  $H_2$  molecules don't show IR spectroscopy. 5

✓ 3. (a) Comment on the statement 'Entropy of the Universe is always increasing'. 5

(b) Define chemical potential. Show that chemical potential of an ideal gas is independent on pressure. 5

4. (a) Explain the terms : component and degree of freedom with example. 5



(b) Derive the phase rule equation. 5

✓ 5. (a) How the pH of a solution is determined using hydrogen electrode ? Write two limitation of the use of H- electrode. 5

(b) Calculate the emf of a concentration cell at 25°C consisting of two Zinc electrodes immersed in solutions of  $\text{Zn}^{2+}$  ions of 0.1 M and 0.01 M concentration. 5

✓ 6. (a) Derive the kinetic equation of first order reaction. What is half life period ? 5

(b) The decomposition of  $\text{N}_2\text{O}_5(\text{g})$  is a first order reaction and rate constant of the reaction is  $1.35 \times 10^{-4} \text{ s}^{-1}$ . If the initial concentration of  $\text{N}_2\text{O}_5(\text{g})$  is 0.03 mol/L, calculate its concentrations after 30 minutes. 5

✓ 7. (a) What is corrosion ? Discuss galvanic corrosion. 5

(b) Discuss three applications of nanomaterials. 5

✓ 8. Write short notes any two :

(a) Eutectic point 5

(b) Chain reaction 5

(c) Cooling curve 5