Total Pages—4

(Set-P)

B.Tech-2nd
Chemistry

Full Marks : 70

Time : 3 hours

Answer 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*) Why do the microscopic particles obey quantum mechanics ?

(*b*) What type of information we obtain from the solution of Schrödinger wave equation ?

(*c*) How many type of energy are present in molecules ?

(*d*) Which law of thermodynamics says about entropy ?

(*e*) Calculate the phase, component and degree of freedom of following equilibrium :

$$NH_4Cl_{(s)} \xleftrightarrow{\Delta \text{ closevessel}} NH_{3(g)} + HCl_{(g)}$$

(*f*) What is chemical potential ?

(*g*) Draw the phase diagram of water system.

(*h*) It is impossible to measure absolute value of single electrode potential, why ?

(*i*) What type of chain reaction causes explosion ?

(*j*) What is nano science ?

2. (*a*) Write the difference between classical mechanics and quantum mechanics. 5

(*b*) What is the significance of Schrödinger wave equation ? 5

3. (*a*) What is microwave ? Write the theory of microwave spectroscopy. 5

(b) The space between lines of rotational spectra of HBr is 16·94 cm^{-1}. Calculate the bond length of the molecule (H = 1, Br = 80). 5

4. (a) Write the significance of chemical potential. 5

(b) Using the definition of enthalpy, show that

$$\left(\frac{\partial T}{\partial P}\right)_S = \left(\frac{\partial V}{\partial S}\right)_P$$ 5

5. (a) Draw the phase diagram of Fe-C system. 5

(b) Explain the Pb-Ag phase diagram. 5

6. (a) Explain how the pH of solution can be determined using glass electrode. 5

(b) What is dry cell ? 5

7. (a) What is parallel reaction ? Derive the kinetic equation of parallel reaction. 5

(b) What is corrosion ? 5

(Turn Over)

8. Write short notes on (any *two*) : 5 + 5

(*i*) Galvanic corrosion

(*ii*) Consecutive reaction

(*iii*) Organometallic compound.

$\Delta P \cdot \Delta x \geq \frac{h}{4\pi}$