

(Set-1)

M.Sc -2nd(IC)

Nuclear Chemistry and Surface Chemistry

Full Marks : 70

Time : 3 hours

Q. No. 1 is compulsory and answer any
five questions out of **Q.No. 2 to 8**

The figures in the right-hand margin indicate marks

1. Answer the following questions : 2 × 10

(a) Calculate number of components, number of phases and degree of freedom of the system

$\text{NaCl(s)} - \text{KCl(s)} - \text{H}_2\text{O(l)} - \text{H}_2\text{O(g)}$ system

(b) What is the maximum number of phases that can coexist in equilibrium in a two component system ?

(c) $\text{NaCl} - \text{KCl} - \text{H}_2\text{O}$ is a three component system while $\text{NaCl} - \text{KBr} - \text{H}_2\text{O}$ is a four component mixture —Explain.

(Turn Over)

(2)

- (d) What is the effect of temperature on enzyme catalysed reaction ?
- (e) What are the characteristics of enzyme catalysis ?
- (f) What is intrinsic viscosity ? How is it related to molecular mass of polymer ?
- (g) Give one example of each cationic micelle, anionic micelle, non-ionic micelle.
- (h) What is reversed micelle ?
- (i) The disintegration constant of ^{238}U is $1.54 \times 10^{-10} \text{ years}^{-1}$. Calculate the half life period of ^{238}U .
- (j) Binding energy of ^4He is 28.57 MeV. What should be the binding energy per nucleon of this element ?
2. (a) Discuss kinetics of enzyme catalysed reaction. 5
- (b) Derive $F \rightleftharpoons C - P + 2$. 5

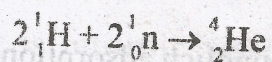
(3)

3. (a) Derive BET equation. How it helps in calculating the surface area of the adsorbent ? 5
- (b) Describe capillary rise method for determining surface tension of a liquid. 5
4. (a) Discuss Freundlich adsorption isotherm of a gas on a solid. 5
- (b) Deduce Langmuir adsorption isotherms equation. 5
5. (a) How light scattering method is used to calculate the molecular mass of macro-molecule ? 5
- (b) Equal numbers of molecules with $M_1 = 10,000$ and $M_2 = 1,00,000$ are mixed. Calculate \bar{M}_N and \bar{M}_M . 5
6. (a) Discuss the Kinetics of addition polymerisation. 5
- (b) Define and express number average and weight average molecular mass. 5

(4)

7. (a) Discuss three methods of separation of isotopes. 5

- (b) Calculate energy released in following reaction



The nuclear masses ${}^1_1\text{H} = 1.0081$,
 ${}^1_0\text{n} = 1.0086$, ${}^4_2\text{He} = 4.0039$. 5

8. (a) What are fast breeder reactors ? Discuss its use with example. 5

- (b) What is neutron activation analysis ? What is its application ? 5