

Bachelor of Science (B.Sc.) Semester—VI (C.B.S.) Examination

ICH-601 : INDUSTRIAL CHEMISTRY

Paper—1

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) All *five* questions are compulsory and carry equal marks.

(2) Give neat and well labelled diagrams wherever necessary.

1. (A) Explain the principle of solvent extraction. What are the factors affecting solvent extraction ? Explain in detail. 5

(B) What is distillation ? Explain the following terms :

(i) Simple distillation

(ii) Fractional distillation

(iii) Vacuum distillation. 5

OR

(C) Explain the following :

(i) Purification

(ii) Separation. 2½

(D) Write a note on HPLC. 2½

(E) What is ion-exchange chromatography ? Discuss its technique. 2½

(F) How will you isolate liquid from a mixture of two or more liquids by different distillation technique ? 2½

2. (A) What is electronic spectroscopy ? Explain the various types of electronic transitions involved in it with suitable examples. 5

(B) Give the principle and working of NMR spectroscopy. 5

OR

(C) Discuss the principle of IR spectroscopy. 2½

(D) Explain the hyperfine splitting in ESR spectroscopy. 2½

(E) A compound has M.F and double bond equivalent is one. The UV spectrum has $\lambda_{\max} = 298 \text{ nm}$ and $\epsilon_{\max} = 19$. IR spectrum shows a very strong band at 1715 cm^{-1} and also shows absorption bands at 2900 and 2700 cm^{-1} . Assign the structural formula to the compound. 2½

(F) Explain the spin-spin splitting with suitable example. 2½

3. (A) Explain the principle and working of polarography with suitable examples. 5

(B) What is differential thermal analysis ? Describe the construction and working of DTA. 5

OR

(C) Explain the working of voltametric cell. 2½

(D) Draw well-labelled diagram of double beam colorimeter. 2½

(E) Draw and explain TGA curve of 0.25 g of Ca(OH)_2 , showing the loss in weight at different temperatures :

(i) 0.18 g at $373\text{--}423 \text{ K}$ (loss of hygroscopic water)(ii) 0.038 g at $1173\text{--}1223 \text{ K}$ (dissociation)(iii) 0.38 g at $773\text{--}833 \text{ K}$ (dehydration). 2½

(F) Write a note on DSC analysis. 2½

4. (A) Describe the construction and working of Atomic Absorption Spectroscopy (AAS). Give the applications of AAS on the basis of chemical interference. 5
- (B) What is the principle of spectrophotometry ? Give the quantitative applications of spectrophotometry. 5

OR

- (C) Draw well-labelled diagram of single beam spectrophotometer. 2½
- (D) Write the industrial applications of flame photometer. 2½
- (E) Calculate the wavelength of the resonance line of the sodium atom if the excited energy of the resonance level is 2.10 eV (Given $hc = 12330$). 2½
- (F) Give the qualitative and quantitative application of ASS. 2½
5. Attempt any **ten** of the following :
- How many signals appeared in $^1\text{H-NMR}$ spectrum of ethyl methyl ketone ?
 - What is the frequency of absorption of $-\text{OH}$ group ?
 - How many bands would be expected in the IR spectrum of water ?
 - Write the name of anion exchange resin.
 - What is crystallization ?
 - What is GLC ?
 - Write the name of instrument used in TGA.
 - What is the name of burner used in flame photometer at low temperature ?
 - What is measured by DSC ?
 - Write the IKOVIC equation.
 - What is absorbance ?
 - What is the function of spectrophotometer ? 1×10=10