AQ – 2740

First Semester M. Tech. (Membrane and Separation Tech.) Examination

CHEMICAL ENGINEERING ANALYSIS

Paper - 1 MST 3

P. Pages : 3

Time : Three Hours] [Max. Marks : 80

Note : (1) All questions carry marks as indicated.
(2) Answer any **Six** questions.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Diagrams and Chemical equations should be given wherever necessary.
(5) Illustrate your answer wherever necessary with the help of near sketches.
(6) Use of pen Blue/Black ink/refill only for writing the answer book.

1. (a) Why is Beer's law a useful tool in chemical analysis ? 8

(b) Is it possible to use the Beer's law for samples in IR–spectral range. 3

(c) Bring out clearly the meaning of

(a) Absorbance.

(b) Molal extinction coefficient. 3

2. (a) Why are IR–spectra always recorded? 4

(b) Give a brief account of detectors in IR–spectroscopy? 4

(c) In what region do rotational spectra of molecules show up ? 5

3. (a) Can paper chromatography be a tool in chemical analysis ? Explain. 5

(b) Outline the technique of paper chrom-atography. 5

(c) What is the utility of the R_f value ? 4

4. (a) Why is activated carbon not suited as an adsorbent in chromatography ? 4

(b) Why is it necessary to feed the eluting agent uniformly into the column? 4

(c) What are fraction collectors ? 5

5. (a) Describe the construction of the Hollow Cathode Lamp in AAS. 5

(b) Give a rough sketch of a typical AAS instrument labelling all the parts? 5

(c) What do you understand by ICPS ? 3

6. (a) What essential difference exists between a flame photometer and an atomic absorption spectrometer ? 5

(b) List the various gases employed in AAS? 5

(c) Of the above gases, which is most suited for heavier metals ? 3

7. (a) What is the principle underlying Gas chromatography ? 5

(b) Draw a neat sketch of a typical gas Chrom-atography. 5

(c) Describe briefly detectors in Gas chrom-atography. 3

8. (a) Why is hydrogen gas preferred in Gas chromatography ? 5

(b) What supports are generally employed in Gas chromatography ? 5

(c) What do you understand by temperature programming in Gas chromatography? 3

9. (a) Which nuclei undergo precessional motion when placed in a magnetic field? 5

(b) Explain the principle of working of a typical NMR equipment. 5

(c) What do you understand by chemical shift in NMR spectroscopy ? 3

10. (a) Why is high vacuum a prerequisite for MS spectral determinations ? 5

(b) Describe the construction of a 60^0 near mass spectrometer. 5

(c) Discuss the fragmentation of hydrocarbons in Mass spectral determinations. 3