

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VI (NEW) - EXAMINATION – SUMMER 2018**

**Subject Code: 2163610**

**Date: 01/05/2018**

**Subject Name: Analytical techniques**

**Time: 10:30 AM to 01:00 PM**

**Total Marks: 70**

**Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1**
- (a) Write principle of chromatography. **03**
  - (b) Define Terms: standard deviation, standard error. **04**
  - (c) Explain following Terms: Beer's law, Tetra Methyl Silane, constant error,  $R_f$ , solvents for NMR, guard column, range of UV. **07**

- Q.2**
- (a) Write notes on: Retention Time, Retention Factor **03**
  - (b) Explain terms QA & QC. **04**
  - (c) Draw instrumentation diagram of Mass spectroscopy and state its principle. How will you differentiate between  $\text{CH}_3\text{CONH}_2$  and  $\text{CH}_3\text{CH}_2\text{NH}_2$  using MS spectroscopy? **07**

**OR**

- (c) What is Gravimetric analysis? Explain the same for Copper with calculations involved. **07**

- Q.3**
- (a) Write down the Classification of chromatography. **03**
  - (b) Write a short note on: Hook's law, and degree of freedom. **04**
  - (c) Write a detailed note on benefits of Good laboratory practices & classification of errors. **07**

**OR**

- Q.3**
- (a) Do you feel Total Quality Management is necessary for industries, give reasons for your answer? **03**
  - (b) Write the characteristic requisits for a solvent to act as mobile phase. **04**
  - (c) Write short notes on: Post-precipitation, conditions for precipitation & precipitation from homogeneous solution. **07**

- Q.4**
- (a) Suggest chromatography by which you may separate a mixture of volatile liquids. Draw its instrumentation diagram only. **03**
  - (b) Write a note on sample preparation for IR, UV, NMR and Mass Spectroscopy? **04**
  - (c) Write note on: TGA and validation of analytical methods. **07**

**OR**

- Q.4**
- (a) What will happen if you add HCl to aniline (spectroscopically)? **03**
  - (b) Write short notes on: Nitrogen Rule, fragmentation pattern **04**
  - (c) Explain various ways of expression of concentration and their roles in Analytical Techniques. **07**

- Q.5**
- (a) Define errors and state their importance in analytical techniques. **03**
  - (b) A sample of hard water is to be tested in the chemistry laboratory, which type of titration do you think will be useful for its analysis? Write the details of the method with chemical reactions. **04**
  - (c) Draw labeled diagram of instrumentation of UV-VIS spectroscopy. State its principle and applications. **07**

**OR**

- Q.5** (a) Elaborate terms: Bathochromic & Hyperchromic shifts **03**
- (b) Define titrations. Explain complexometric titrations with the help of reactions and calculations involved. **04**
- (c) Propose tentative structure of organic compound, on the basis of following data: (Also explain spectroscopic data given below) **07**
- i) UV= 270 nm
  - ii) IR=2941-2857  $\text{cm}^{-1}$  (m), 1715  $\text{cm}^{-1}$ (s), 1460  $\text{cm}^{-1}$ (m)
  - iii) NMR= quartet at 2.48  $\delta$  (12 squares), singlet at 2.12  $\delta$  (17.6 squares), triplet at 1.08 (18.2 squares)
  - iv) Molecular mass =72

\*\*\*\*\*