Seat No.: _____ Enrolment No._____

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–III (New) EXAMINATION – WINTER 2015**

**Subject Code:2133502** **Date:21/12/2015**

**Subject Name: Analytical Techniques**

**Time: 2:30pm to 5:00pm** **Total Marks: 70**

**Instructions:**

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

| | | | MARKS |
|---|---|---|---|
| **Q.1** | | **Short Questions** | **14** |
| | **1** | Define the term : Bathochromic shift | |
| | **2** | What is the range IR spectroscopy? | |
| | **3** | Full form of GLP. | |
| | **4** | What is determinate error? | |
| | **5** | Which internal reference is used in NMR spectroscopy? | |
| | **6** | Which pump is suitable for both the techniques used in HPLC? | |
| | **7** | Define the term: Gravimetric Estimation. | |
| | **8** | What is Gradient Elution? | |
| | **9** | Define the term: $R_f$ factor | |
| | **10** | What is TQA? | |
| | **11** | Define the term: Chromophore. | |
| | **12** | What is reverse phase chromatography? | |
| | **13** | Which indicator is used in EDTA titration? | |
| | **14** | Name the two techniques used in paper chromatography. | |
| **Q.2** | **(a)** | Write a short note on guard column used in chromatography. | **03** |
| | **(b)** | Explain any redox titration with procedure and calculation. | **04** |
| | **(c)** | Write notes on Chemical shift, shielding, deshielding effect and spin-spin coupling in NMR spectroscopy. | **07** |
| | | **OR** | |
| | **(c)** | Define the term: Chromatography. Explain theory and instrumentation of Gas chromatography | **07** |
| **Q.3** | **(a)** | Define the term: Derivertization | **03** |
| | **(b)** | Enlist different methods for the preparation of Column. | **04** |
| | **(c)** | What are the characteristics should pumps have used in HPLC. Discuss any one in detail with diagram. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain importance of temperature programming in GC. | **03** |
| | **(b)** | Write short notes on: Mclafferty rearrangement and nitrogen rule. | **04** |
| | **(c)** | What are absorption laws? Explain both the laws with derivation used in UV-Visible spectroscopy. | **07** |
| **Q.4** | **(a)** | Enlist different types of errors. | **03** |
| | **(b)** | What is good laboratory practices? Explain in detail. | **04** |
| | **(c)** | Define the term: co-precipitation and post precipitation. Explain Gravimetric estimation of Cu. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | Explain various factors affecting in Thin Layer Chromatography. | **03** |
| | **(b)** | Write a short note on TQM. | **04** |

| | | | |
|---|---|---|---|
| | **(c)** | Analysis of sample gave following values of Fe content: 41.33, 41.37, 41.27, 41.60 and 41.20.Calculate the mean, median, standard deviation, coefficient of variance and range. | **07** |
| **Q.5** | **(a)** | How will you distinguish inter and intra-molecular hydrogen bonding using IR spectroscopy? | **03** |
| | **(b)** | Explain difference between volumetric and gravimetric analysis. | **04** |
| | **(c)** | An organic compound (molecular formula :$C_6H_{12}O_2$) exhibits the following spectral data:<br>IR: 3330 $cm^{-1}$(m), 3042 $cm^{-1}$(m), 2862 $cm^{-1}$(w), 1722 $cm^{-1}$(s), 1405 $cm^{-1}$<br>UV: $\lambda_{max}$ at 268 nm<br>NMR: $\delta$ 1.1 (6H, singlet), 2.1 (3H,singlet), 2.6 (2H,singlet), 3.9 (1H, singlet)<br>Deduce the structure of the compound. | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Define the term: stoichiometry. | **03** |
| | **(b)** | Write a short note on Finger print region. | **04** |
| | **(c)** | What are titrations? Explain complexometric titration in detail with procedure and calculation. | **07** |

**********