Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – NOV/ DEC – 2019**

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| **Code :** | **17BT2007** | **Duration :** | **3 hrs** |
| **Sub. Name :** | **INSTRUMENTAL METHODS OF ANALYSIS** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | List any four methods of extraction of compounds in biotechnology. | CO1 | 4 |
| b. | Define accuracy. | CO1 | 4 |
| c. | Illustrate the working principle, apparatus and applications of soxhlet solid extraction technique. | CO1 | 12 |
| (OR) | | | | |
| 2. | a. | Explain the concept of relative concentration error and its application in real analysis. | CO6 | 10 |
| b. | Explain in detail the solvent extraction methods and application. | CO1 | 10 |
|  |  |  |  |  |
| 3. | a. | Define Beer – Lamberts’s Law. | CO2 | 5 |
|  | b. | Elaborate the principle, apparatus system of UV spectrophotometer with biological application. | CO2 | 15 |
| (OR) | | | | |
| 4. | a. | Why is a photomultiplier tube not used as a detector at infrared wavelengths? | CO2 | 5 |
|  | b. | Illustrate the principle of Raman Spectroscopy and its working principle in analytical science with a neat diagram. | CO2 | 15 |
|  |  |  |  |  |
| 5. | a. | Explain the following terms in chromatography.   1. Stationary phase 2. Mobile phase 3. Separation 4. Resolution | CO3 | 8 |
|  | b. | Discuss the functional properties and working principle of Thin layer Chromatography. | CO3 | 8 |
|  | c. | What key properties must an analyte have in order to be quantitated using gas chromatography? | CO3 | 4 |
| (OR) | | | | |
| 6. | a. | Define electrophoresis. | CO4 | 3 |
|  | b. | Explain the principle and working procedure of SDS-PAGE with a neat diagram. | CO4 | 17 |
|  |  |  |  |  |
| 7. | a. | What do you understand by differential thermal analysis? | CO5 | 4 |
|  | b. | Write short notes on heat of reaction. | CO5 | 4 |
|  | c. | What are thermogravimetrics titrations? Explain some important thermometric titrations with suitable examples. | CO5 | 12 |
| (OR) | | | | |
| 8. | a. | State the properties of X-rays. | CO6 | 2 |
|  | b. | What is the scintillation and G-M counter? Explain the types and their significance. | CO6 | 15 |
|  | c. | State the principle of NMR spectroscopy. | CO6 | 3 |
|  | |  |  |  |
|  | | **Compulsory**: |  |  |
| 9. | a. | Explain the principle and working procedure of high pressure liquid chromatography as analytical tools in biotechnology. | CO3 | 16 |
|  | b. | Give a schematic diagram of LC-MS and GC-MS. | CO3 | 4 |