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

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**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **17CH1001** | **Duration :** | **3hrs** |
| **Sub. Name :** | **INSTRUMENTAL TECHNIQUES IN CHEMISTRY** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | **Course Outcome** | **Marks** |
| **PART – A (20 X 1 = 20 MARKS)** | | | |
| 1. | A thermometer is used to read temperature for five times and registered degrees Celsius are: 39.1, 39.4, 39.1, 39.2, and 39.1. However, the real temperature is 37 degrees C. Then the measurements are.  (a) Precise and accurate (b) Precise but not accurate  (c) Accurate but not precise(d) Neither precise nor accurate | CO1 | 1 |
| 2. | Buffer is a solution of \_\_\_\_\_\_\_\_\_\_\_\_.  (a) NaCl and HCl (b) CH3COOH and HCl  (c) NH4OH and NH4Cl (d) NH4OH and NaCl | CO1 | 1 |
| 3. | What is buffer action? | CO1 | 1 |
| 4. | Give an example for neutralization reaction. | CO1 | 1 |
| 5. | Which of the following exhibit higher conductance?  (a) 0.1M CH3COOH (b) 0.1 M NaCl  (c) 0.1 M HCl (d) 0.1M AgCl | CO2 | 1 |
| 6. | Choose the correct option regarding the change of potential with solution concentration.  (a) Calomel electrode (b) Hydrogen electrode  (c) Quinhydron electrode (d) all the above | CO2 | 1 |
| 7. | What is liquid junction potential? | CO2 | 1 |
| 8. | Mention the use of salt bridge. | CO2 | 1 |
| 9. | Which of the following is not an electromagnetic wave?  (a) X-Ray (b) Sound  (c) Infrared (d) Micro | CO3 | 1 |
| 10. | Infrared spectroscopy is based on \_\_\_\_\_\_\_\_\_\_\_.  (a) rotational excitation energy (b) vibrational excitation energy (c) electronic excitation energy (d) Nuclear excitation energy | CO3 | 1 |
| 11. | Write the principle of atomic absorption spectroscopy. | CO3 | 1 |
| 12. | What is an electromagnetic spectrum? | CO3 | 1 |
| 13. | The effectiveness of a chromatographic column in separating two solutes depends on  (a) retention factor (b) migration rate  (c) nature of solute only (d) None of these | CO4 | 1 |
| 14. | In gas chromatography the mobile phase can be  (a) Nitrogen gas only (b) any gas which is non reactive with solute (c) Helium gas only (d) all of these | CO4 | 1 |
| 15. | Write the stationary phase materials used in solid – liquid chromatography. | CO4 | 1 |
| 16. | Write the required qualities of mobile phase in liquid – liquid chromatography. | CO4 | 1 |
| 17. | Which indicator should be used to find total alkalinity of water sample by titration method?  (a) Methyl orange (b) Phenolphthalein  (c) starch (d) Eriochrome black-T | CO5 | 1 |
| 18. | Continuous recording of mass changes of a sample of material, as a function of a combination of temperature with time is  (a) Volumetric analysis (b) Gravimetric analysis  (c) Thermogravimetric analysis (d) Differential scanning calorimetry | CO5 | 1 |
| 19. | Mention the applications of TGA. | CO5 | 1 |
| 20. | What do you mean by the terms heavy water and soft water? | CO5 | 1 |

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| **PART – B (10 X 5 = 50 MARKS)**  **(Answer any 10 from the following)** | | | |
| 21. | Explain complexometric titration with an example. | CO4 | 5 |
| 22. | Discuss the various conditions of precipitation in gravimetric analysis. | CO2 | 5 |
| 23. | What is a sensor? Write short note on its applications. | CO5 | 5 |
| 24. | Describe the primary and secondary reference electrodes with example. | CO5 | 5 |
| 25. | Discuss the applications of Infrared spectroscopy for identification of functional groups. | CO3 | 5 |
| 26. | Discuss principle and applications of UV-Visible spectroscopy. | CO3 | 5 |
| 27. | Discuss the parameters to be optimized to get better performance of column in chromatography. | CO6 | 5 |
| 28. | Write a note on ion exchange chromatography. | CO6 | 5 |
| 29. | Describe applications of differential scanning calorimetric method. | CO5 | 5 |
| 30. | Discuss the application of differential thermal analysis (DTA) technique to study the decomposition of materials. | CO5 | 5 |
| 31. | Discuss the various techniques used to analyze food materials. | CO4 | 5 |
| 32. | What is meant by the term redox? Describe redox titration with an example. | CO4 | 5 |

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| **PART – C (2 X 15 = 30 MARKS)**  **(Answer any 2 from the following)** | | | | |
| 33. | a. | State the principle of emission spectroscopy. | CO3 | 7 |
| b. | Discuss the applications of emission spectroscopy. | CO3 | 8 |
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| 34. | a. | State the principle of HPLC. | CO6 | 7 |
| b. | Discuss the applications of HPLC. | CO6 | 8 |
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| 35. | a. | Define Hardness of water. | CO4 | 7 |
| b. | Describe determination of hardness of water using EDTA method. | CO4 | 8 |