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

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

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| **Code :** | **19CH1003** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ENGINEERING CHEMISTRY FOR MECHANICAL ENGINEERING** | **Max. Marks :** | **100** |

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| **Q. No.** | **Questions** | | **Course**  **Outcome** | **Marks** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | |
| 1. | | How many sigma and pibonds are there in Acetylene molecule? | CO1 | 1 |
| 2. | | Why is HF more polar than HI? | CO1 | 1 |
| 3. | | Calgon treatment prevents scale formation in boilers. Give reason. | CO2 | 1 |
| 4. | | Water containing \_\_\_\_\_\_\_\_\_\_ salts is called as Hard water. | CO2 | 1 |
| 5. | | Name the monomers used in the manufacture of bakelite. | CO3 | 1 |
| 6. | | Natural rubber is basically a polymer of \_\_\_\_\_\_\_\_\_\_. | CO3 | 1 |
| 7. | | What is power alcohol? | CO4 | 1 |
| 8. | | Select the compound which possesses highest octane number and highest cetane number out of n-heptane, n-hexadecane, n-octane and isooctane. | CO4 | 1 |
| 9. | | Define electrode potential. | CO5 | 1 |
| 10. | | The electrolyte in a lead acid battery is \_\_\_\_\_\_\_\_\_\_. | CO5 | 1 |

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| **PART – B (6 X 3 = 18 MARKS)** | | | |
| 11. | Write the molecular orbital electronic configuration of nitrogen molecule and show its bond order. | CO1 | 3 |
| 12. | Write notes on sludge formation and its disadvantages. | CO2 | 3 |
| 13. | What do you understand by Tacticityin polymers? Explain. | CO3 | 3 |
| 14. | Mention any six important characteristics of a good fuel. | CO4 | 3 |
| 15. | Calculate the emf of a concentration cell at 250C consisting of two Zinc electrodes immersed in solutions of Zn2+ions of 0.1M and 0.01 M concentrations. | CO5 | 3 |
| 16. | Distinguish the types of hydrogen bonding by IR-spectroscopy. | CO6 | 3 |

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| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.no 17 to 23. Q.No 24 is a Compulsory Question)** | | | | |
| 17. | a. | Explain metallic bonding on the basis of free electron theory. | CO1 | 6 |
| b. | What is meant by intermolecular and intramolecular hydrogen bonding? Show examples. | CO1 | 3+3 |
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| 18. | a. | With neat sketch, explain ion-exchange process for removal of hardness. | CO2 | 8 |
| b. | Discuss on desalination by reverse osmosis method. | CO2 | 4 |
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| 19. | a. | Elaborate on the classification of polymers with example. | CO3 | 10 |
| b. | Natural rubber need vulcanization. Give reason. | CO3 | 2 |
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| 20. | a. | Define : calorific value, ignition temperature, knocking and octane number. | CO4 | 4 |
| b. | List the importance of flue gas analysis and demonstrate flue gas analysis by Orsat’s apparatus. | CO4 | 8 |
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| 21. | a. | Summarize the importance of electrochemical series. | CO5 | 4 |
| b. | Explain the costruction of Daniel cell and give the electrode reactions. | CO5 | 8 |
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| 22. | a. | i.Discuss the Heitler and London concept for covalence.  ii. List the properties of covalent compounds. | CO1  CO1 | 6  3 |
| b. | Calculate the temporary and total hardness of a sample of water containing  Mg(HCO3)2 = 73mg/L, Ca(HCO3)2 = 162 mg/L, MgCl2 = 95 mg/L and CaSO4 = mg/L. | CO2 | 3 |
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| 23. | a. | Sketch the injection moulding unit and explain its working. | CO3 | 6 |
| b. | Derive Nernst equation for the electrode potential. | CO5 | 6 |
|  |  | **Compulsory:** | |  |
| 24. | a. | i) Convert a wavelength of 4000A0 into nanometer.  ii) The range of Infra-Red radiation is \_\_\_\_\_\_\_\_\_\_.  iii) Give reason why absoption bands in UV spectrum are broad. | CO6  CO6  CO6 | 1  1  3 |
| b. | Summarize the general features of absorption spectrometers. | CO6 | 7 |