A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **11CH101/12CH201/CH106/13CH201** | **Duration** | **3hrs** |
| **Course Title** | **APPLIED CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Which is the correct example of electrovalent compound? | | CO1 | R | 1 |
| 2. | Atoms undergo bonding in order to \_\_\_\_\_\_\_\_\_\_. | | CO1 | U | 1 |
| 3. | Hardness of water is conventionally expressed in terms of equivalent amount of \_\_\_\_\_\_\_\_\_\_. | | CO2 | R | 1 |
| 4. | All carbonate and bicarbonates are \_\_\_\_\_\_\_\_\_\_\_\_\_. | | CO2 | R | 1 |
| 5. | Nylon is a \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | 1 |
| 6. | Which is the correct example of isotactic polymer? | | CO3 | U | 1 |
| 7. | Arrange wood, peat, lignite, bitminuous coal and anthracite in decreasing order of their moisture contents | | CO4 | R | 1 |
| 8. | What is the approximate composition in terms of hydrocarbon containing C atoms in Petrolium Ether? | | CO4 | R | 1 |
| 9. | A fuel cell is used to convert chemical energy into \_\_\_\_\_\_\_\_\_\_. | | CO5 | U | 1 |
| 10. | In HCHO → HCOOH conversion, indicate whether oxidation or reduction is occurring. | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Explain why H-O-H bond angel in H2O molecule is shorter than 109.5o. | | CO1 | A | 3 |
| 12. | Differentiate between scale and sludge. | | CO2 | R | 3 |
| 13. | Point out any two differences between thermosetting plastics and thermoplastics. | | CO3 | R | 3 |
| 14. | Define fuels and how it is forming. | | CO4 | R | 3 |
| 15. | Explain Redox reactions with example. | | CO5 | A | 3 |
| 16. | Write down features of absorption photometer. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No 17 to 23, Q.No 24 is Compulsory)** | | | | | |
| 17. | a. | Write down the electronic configurations for H2, Be2, C2 and F2 using MO theory. | CO1 | U | 6 |
|  | b. | Draw molecular orbital diagram of O2 molecule and find out bond order and magnetic properties. | CO1 | A | 6 |
| 18. | a. | How does the boiler corrosion happen in (DO & CO2) method? | CO2 | U | 6 |
|  | b. | A sample of water is found to contains following dissolving salts in milligrams per litre Mg(HCO3)2 = 73, CaCl2 = 111, Ca(HCO3)2 = 81. Calculate temporary and permanent hardness and total hardness. | CO2 | U | 6 |
| 19. | a. | Illustrate on the taxicity of polymers. | CO3 | An | 6 |
|  | b. | Explain the role of ingredients used in moulding of plastics with examples. | CO3 | A | 6 |
| 20. | a. | Write down calorific value and Dulong’s formula. | CO4 | U | 6 |
|  | b. | Explain flue gas analysis by Orsat method and rocket propellants. | CO4 | R | 6 |
| 21. | a. | Define types of combustion. | CO5 | U | 6 |
|  | b. | Explain lead acid battery and fuel cells. | CO5 | A | 6 |
| 22. | a. | Express the sp3 Hybridization with an example. | CO1 | R | 6 |
|  | b. | Draw the MO diagram of N2 molecular and find its bond order and magnetic properties. | CO1 | U | 6 |
| 23. | a. | Define addition polymer, condensation polymer and copolymer. | CO3 | R | 6 |
|  | b. | Write down preparation, properties and uses of polyethylene, polyvinyl chloride and Bakelite. | CO3 | R | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Arrange benzene, anapthalene, and anthracene in increasing order of λmax. | CO6 | R | 6 |
|  | b. | Calculate (i) the frequency (ii) wave number (iii) energy in ergs for typical UV radiation of 2000 Å. | CO6 | R | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **COURSE OUTCOMES** | | | | | | | |
| CO1 | Formulate electronic structures and correlate its properties. | | | | | | | |
| CO2 | Learn the various factors in water quality and its technology. | | | | | | | |
| CO3 | Realize the potential applications of polymers. | | | | | | | |
| CO4 | Analyze the combustion process of common fuels. | | | | | | | |
| CO5 | Learn the various energy storage systems and conversion devices. | | | | | | | |
| CO6 | Apply the instrumental methods for various types of analysis. | | | | | | | |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | | |
| **CO / BL** | | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | | 1 | 7 | 9 |  |  |  | 17 |
| CO2 | | 4 | 12 |  |  |  |  | 16 |
| CO3 | | 16 | 1 | 6 | 6 |  |  | 29 |
| CO4 | | 11 | 6 |  |  |  |  | 17 |
| CO5 | | 1 | 7 | 9 |  |  |  | 17 |
| CO6 | | 12 |  | 3 |  |  |  | 15 |
|  | | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **16CH2005 / 17CH2005** | **Duration** | **3hrs** |
| **Course Title** | **REACTION MECHANISM AND HETEROCYCLIC CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Elaborate Benzyne mechanism with examples. | CO1 | An | 10 |
|  | b. | Discuss the effect of leaving group and attacking nucleophile in SN2 reactions. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss SNAr mechanism with examples. | CO1 | An | 10 |
|  | b. | Narrate the effect of leaving group and attacking nucleophile in SN2 reactions. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the mechanism of SE2 with example. | CO2 | An | 10 |
|  | b. | Narrate the Stork-Enamine Reactions with mechanism. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss the mechanism of SE1 with example. | CO2 | A | 10 |
|  | b. | Discuss the reactivity of Aliphatic Diazonium Coupling with example. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Summarize the Electrophilic and Free radical addition reaction to double bonds with mechanism. | CO3 | A | 10 |
|  | b. | Describe the Mannich reaction with mechanism. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss the Micheal addition with example. | CO3 | A | 10 |
|  | b. | Illustrate Bredt’s rule with Chugaev reaction. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the aromaticity of Pyrrole with structure. | CO4 | An | 10 |
|  | b. | Discuss the general preparation of heterocyclic compounds. | CO4 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Illustrate the electrophilic substitution reactions of Pyrrole. | CO5 | E | 10 |
|  | b. | Summarize the preparation and reactions of pyridine. | CO5 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Illustrate the electrophilic substitution reactions of Imidazole. | CO6 | E | 10 |
|  | b. | Describe the aromaticity and Electrophilic substitution reaction of Pyrazole. | CO6 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | elucidate the mechanisms of organic reactions |
| CO2 | propose more complex syntheses |
| CO3 | predict the reactivity of an organic compound from its structure |
| CO4 | develop the knowledge on the fundamental theoretical understanding of heterocyclic chemistry |
| CO5 | propose syntheses of heterocycles from the major classes |
| CO6 | get the ability to relate significant chemical properties to structure |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 |  |  | 20 | 20 |  |  | 40 |
| CO2 |  |  | 20 | 20 |  |  | 40 |
| CO3 |  |  | 20 | 20 |  |  | 40 |
| CO4 |  |  |  | 10 | 10 |  | 20 |
| CO5 |  |  |  | 10 | 10 |  | 20 |
| CO6 |  |  |  | 10 | 10 |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **14CH1003 / 17CH1004** | **Duration** | **3hrs** |
| **Course Title** | **ENVIRONMENTAL STUDIES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | List the natural uses of forest resources which are an important asset of a nation. | CO1 | A | 4 |
|  | b. | Based on scientific analysis, write a detailed report on renewable energy resources. | CO1 | U | 16 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Based on a thorough scientific and practical understanding of natural resources, list out few non-renewable resources. | CO1 | An | 4 |
|  | b. | Explain the anthropogenic factors involved in land degradation which is a major issue now-a-days. | CO1 | R | 16 |
|  |  |  |  |  |  |
| 3. | a. | Analyze the different values of biodiversity. | CO2 | An | 4 |
|  | b. | Explain in detail about abiotic components of an ecosystem which form an important factor in an ecosystem. | CO2 | R | 16 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain in detail the nature of grazing food chains. | CO2 | A | 4 |
|  | b. | Discuss in detail about the various threats to biodiversity without which life would become monotonous. | CO2 | U | 16 |
|  |  |  |  |  |  |
| 5. | a. | Explain in detail about the control measures of marine pollution. | CO3 | U | 4 |
|  | b. | Explain in detail about the man-made causes of noise pollution. | CO3 | An | 16 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe the ways to control thermal pollution. | CO6 | An | 4 |
|  | b. | Explain in detail the man-made causes of air pollution. | CO6 | A | 16 |
|  |  |  |  |  |  |
| 7. | a. | Explain the effects of when carbon-di-oxide increases in our atmosphere. | CO4 | U | 4 |
|  | b. | Describe the environmental effects of global warming which is global issue now-a-days. | CO4 | A | 16 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Mention the ways in which Sustainable Development Goals can be achieved. | CO4 | U | 4 |
|  | b. | Identify the factors causing the population to grow exponentially which has affected the development of countries like India. | CO4 | R | 16 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | List the sources of artificial sources of radiation. | CO6 | R | 10 |
|  | b. | Discuss in detail how natural disaster management can be carried out effectively. | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the natural environment and its relationships with human activities. |
| CO2 | Acquire practical skills for solving pollution related problems. |
| CO3 | Design and evaluate strategies and apply green technologies. |
| CO4 | Identify the methods for sustainable development and for the remediation or restoration of degraded environments. |
| CO5 | Integrate facts, concepts, and methods from multiple disciplines and apply to environmental and social problems. |
| CO6 | Analyze the connectivity between the man-made activities, pollution, environmental issues, social problems, and ecofriendly solutions. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 16 | 16 | 4 | 4 | -- | -- | 40 |
| CO2 | 16 | 16 | 4 | 4 | -- | -- | 40 |
| CO3 | -- | 4 | -- | 16 | -- | -- | 20 |
| CO4 | 16 | 8 | 16 | -- | -- | -- | 40 |
| CO5 | -- | -- | 4 | 16 | -- | -- | 20 |
| CO6 | -- | -- | 16 | 4 | -- | -- | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **17CH3019** | **Duration** | **3hrs** |
| **Course Title** | **SPECTROSCOPIC METHODS FOR STRUCTURAL ELUCIDATION** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Illustrate the principles of UV-Vis spectroscopy and its instrumentations. | CO1 | A | 10 |
|  | b. | Discuss the Woodward Fieser rules of dienes and trienes with examples. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Elaborate the Woodward Fieser rules for aromatic compounds and α, β- unsaturated compounds with examples. | CO1 | R | 10 |
|  | b. | Describe the application of UV-Vis spectroscopy in any five subject areas. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Narrate the principles of FT-IR spectroscopy and its instrumentations. | CO2 | A | 10 |
|  | b. | Analyze the possible mode of stretching and bending vibrations in IR spectroscopy. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | How will identify nitriles, amino acids and carbonyl compounds using IR spectroscopy? Explain with examples. | CO2 | E | 10 |
|  | b. | Discuss the factors influence chemical shifts with examples. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the concept of spin-spin & spin-lattice coupling in NMR spectroscopy. | CO3 | R | 10 |
|  | b. | Describe the principles of FT-IR spectroscopy and its instrumentations. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Write a short notes on proton decoupled 13C spectra and NOE effect. | CO4 | An | 10 |
|  | b. | Discuss the concept of COSY and NOESY spectroscopy | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | How will combine 1H, 13C NMR and Mass spectra to elucidate the structure of the organic compounds? | CO4 | E | 10 |
|  | b. | Describe the molecular ion peak, base peaks, and metastable ions peak. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Narrate the principles of Mass spectroscopy and its instrumentations. | CO5 | A | 10 |
|  | b. | Discuss the any two ionization methods in Mass spectroscopy. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Illustrate the concept of Nitrogen Rule and Odd even rule in Mass spectra. | CO6 | U | 10 |
|  | b. | Describe the Mclafferty rearrangement in Mass spectroscopy with examples. | CO6 | R | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the principle and applications of UV-Vis and IR Spectroscopy |
| CO2 | Elucidate the structure of the unknown compounds using the provided UV-Vis and IR spectral data |
| CO3 | Know the principle and applications of NMR Spectroscopy |
| CO4 | Classify the types of 2D NMR spectroscopy |
| CO5 | Understand Mass Spectrometry |
| CO6 | Derive the structure of the unknown organic molecule using the provided spectroscopic data |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | 10 |  |  |  | 40 |
| CO2 |  |  | 10 | 10 | 10 |  | 30 |
| CO3 | 10 | 20 |  |  |  |  | 30 |
| CO4 | 10 | 10 |  |  | 10 |  | 30 |
| CO5 |  | 20 | 10 |  |  |  | 30 |
| CO6 | 10 | 10 |  |  |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **18CH2001** | **Duration** | **3hrs** |
| **Course Title** | **ENVIRONMENTAL STUDIES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define non-renewable energy resources. | | CO1 | R | 1 |
| 2. | Give any two examples of forest resources. | | CO1 | U | 1 |
| 3. | List any two types of marine water ecosystems. | | CO2 | R | 1 |
| 4. | Explain the term ‘food web. | | CO2 | U | 1 |
| 5. | Identify one significant biodiversity hotspot in India. | | CO3 | R | 1 |
| 6. | Differentiate between in-situ and ex-situ conservation techniques. (Write any one difference) | | CO3 | U | 1 |
| 7. | List any one cause for water pollution. | | CO4 | R | 1 |
| 8. | Infer an effect of air pollution. | | CO4 | U | 1 |
| 9. | State an importance of watching documentary movies on environmental issues. | | CO5 | R | 1 |
| 10. | Distinguish between sustainable and unsustainable developments. (Write any one distinction) | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Illustrate any three harmful effects of land degradation. | | CO1 | A | 3 |
| 12. | Examine the importance of ecological succession. | | CO2 | A | 3 |
| 13. | Establish the need for stopping wildlife poaching. | | CO3 | A | 3 |
| 14. | Write the most important reasons for noise pollution. | | CO4 | A | 3 |
| 15. | Sketch an effective watershed management method. | | CO5 | A | 3 |
| 16. | Interpret any two causes for floods. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain the causes and effects of deforestation. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Analyze the structure and functions of an aquatic ecosystem. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Illustrate the different values to biodiversity and suggest effective ways to tackle the same. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Analyze the various roles that can be played by an individual in curbing the menace of pollution to the environment. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Apply the principles of efficient energy management and explain the ways to solve urban energy problems. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Explain any four forms of alternate energy resources. | CO1 | A | 8 |
|  | b. | Compare decomposers with consumers in an ecosystem. | CO2 | An | 4 |
|  |  |  |  |  |  |
| 23. | a. | Illustrate the concept of global biodiversity with suitable examples. | CO3 | A | 8 |
|  | b. | Compare the causes of industrial and agricultural pollutions. | CO4 | An | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the role of information and communication technology in preserving environment. | CO6 | A | 8 |
|  | b. | Differentiate between eco-friendly technology and polluting technology. | CO6 | An | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Understand the natural environment and its relationships with human activities |
| **CO2** | Acquire practical skills for solving pollution related problems |
| **CO3** | Design and evaluate strategies and apply green technologies |
| **CO4** | Identify the methods for sustainable development and for the remediation or restoration of degraded environments |
| **CO5** | Integrate facts, concepts, and methods from multiple disciplines and apply to environmental and social problems |
| **CO6** | Analyze the connectivity between the man-made activities, pollution, environmental issues, social problems, and ecofriendly solutions |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 1 | 23 | - | - | - | 25 |
| **CO2** | 1 | 1 | 3 | 16 | - | - | 21 |
| **CO3** | 1 | 1 | 23 | - | - | - | 25 |
| **CO4** | 1 | 1 | 3 | 16 | - | - | 21 |
| **CO5** | 1 | 1 | 15 | - | - | - | 17 |
| **CO6** | - | - | 11 | 4 | - | - | 15 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **18CH2001** | **Duration** | **3hrs** |
| **Course Title** | **ENVIRONMENTAL STUDIES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define renewable energy resources. | | CO1 | R | 1 |
| 2. | Give any two examples of natural resources. | | CO1 | U | 1 |
| 3. | List any two types of fresh water ecosystems. | | CO2 | R | 1 |
| 4. | Explain the term ‘food chain’. | | CO2 | U | 1 |
| 5. | Identify one significant threat to tiger population in India. | | CO3 | R | 1 |
| 6. | Differentiate between endangered and endemic species. (Write any one difference) | | CO3 | U | 1 |
| 7. | Describe any one cause for air pollution. | | CO4 | R | 1 |
| 8. | Infer an effect of water pollution. | | CO4 | U | 1 |
| 9. | State an importance of raising public awareness on environmental issues. | | CO5 | R | 1 |
| 10. | Distinguish between global warming and acid rain. (Write any one distinction) | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Illustrate any three harmful effects of dams. | | CO1 | A | 3 |
| 12. | Examine the flow of energy in an ecosystem. | | CO2 | A | 3 |
| 13. | Establish the importance of preserving biodiversity. | | CO3 | A | 3 |
| 14. | Write the most important reasons for thermal pollution. | | CO4 | A | 3 |
| 15. | Sketch an effective rain-harvesting method. | | CO5 | A | 3 |
| 16. | Interpret any two causes for earthquakes. | | CO6 | A | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain the role of an individual in conservation of natural resources. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Analyze the structure and functions of a terrestrial ecosystem. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Illustrate the threats to biodiversity and suggest effective ways to tackle the same. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Analyze the various steps that can be taken to stop pollution due to nuclear radiation hazards. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Apply the principles of sustainable development and sketch a pathway to a greener and cleaner future. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Explain the nature of natural and man-induced landslides. | CO1 | A | 8 |
|  | b. | Compare producers with consumers in an ecosystem. | CO2 | An | 4 |
|  |  |  |  |  |  |
| 23. | a. | Illustrate the concept of genetic and species biodiversity. | CO3 | A | 8 |
|  | b. | Compare the Bhopal gas tragedy with the Chernobyl nuclear accident. | CO4 | An | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the role of information and communication technology in preserving human health. | CO6 | A | 8 |
|  | b. | Differentiate between a linear population growth and population explosion. | CO6 | An | 4 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Understand the natural environment and its relationships with human activities |
| **CO2** | Acquire practical skills for solving pollution related problems |
| **CO3** | Design and evaluate strategies and apply green technologies |
| **CO4** | Identify the methods for sustainable development and for the remediation or restoration of degraded environments |
| **CO5** | Integrate facts, concepts, and methods from multiple disciplines and apply to environmental and social problems |
| **CO6** | Analyze the connectivity between the man-made activities, pollution, environmental issues, social problems, and ecofriendly solutions |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 1 | 23 | - | - | - | 25 |
| **CO2** | 1 | 1 | 3 | 16 | - | - | 21 |
| **CO3** | 1 | 1 | 23 | - | - | - | 25 |
| **CO4** | 1 | 1 | 3 | 16 | - | - | 21 |
| **CO5** | 1 | 1 | 15 | - | - | - | 17 |
| **CO6** | - | - | 11 | 4 | - | - | 15 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **19CH1003** | **Duration** | **3hrs** |
| **Course Title** | **ENGINEERING CHEMISTRY FOR MECHANICAL ENGINEERING** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | How many sigma and pibonds are there in Ethylene molecule? | | CO1 | U | 1 |
| 2. | Why is HF more polar than HI? | | CO1 | R | 1 |
| 3. | Calgon treatment prevents scale formation in boilers. Give reason. | | CO2 | An | 1 |
| 4. | Permanent hardness is due to presence of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ . | | CO2 | A | 1 |
| 5. | Name the monomers used in the manufacture of PVC. | | CO3 | U | 1 |
| 6. | Natural rubber is basically a polymer of \_\_\_\_\_\_\_\_\_\_. | | CO3 | R | 1 |
| 7. | What is power alcohol? | | CO4 | R | 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 | U | 1 |
| 9. | Define electrode potential. | | CO5 | R | 1 |
| 10. | The electrolyte in a lead acid battery is \_\_\_\_\_\_\_\_\_\_. | | CO5 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Write the molecular orbital electronic configuration of N2 molecule and show its bond order. | | CO1 | U | 3 |
| 12. | Write notes on scale formation and its disadvantages. | | CO2 | R | 3 |
| 13. | Explain the types of tacticity in polymers. | | CO3 | U | 3 |
| 14. | Mention any six important characteristics of a good fuel. | | CO4 | R | 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 | An | 3 |
| 16. | Explain the carbonyl group identification by IR-spectroscopy. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the types of hydrogen bonding with suitable example. | CO1 | U | 6 |
|  | b. | Highlight the importance of desalination by reverse osmosis method. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain metallic bonding on the basis of free electron theory. | CO1 | R | 6 |
|  | b. | Briefly discuss the ion-exchange process of removal of hardness with neat diagram. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Explain the importance of vulcanization process in natural rubber. | CO3 | U | 6 |
|  | b. | Define: calorific value, ignition temperature, knocking and octane number. | CO4 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | List out the importance of flue gas analysis and demonstrate flue gas analysis by Orsat’s apparatus. | CO4 | U | 6 |
|  | b. | Classify of polymers with suitable example. | CO3 | E | 6 |
|  |  |  |  |  |  |
| 21. | a. | Explain the construction of Daniel cell and give the electrode reactions. | CO5 | U | 6 |
|  | b. | Summarize the importance of electrochemical series. | CO5 | R | 6 |
|  |  |  |  |  |  |
| 22. | a. | 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 = 55 mg/L. | CO1 | An | 6 |
|  | b. | Discuss the Heitler and London concept for covalence and their properties. | CO3 | R | 6 |
|  |  |  |  |  |  |
| 23. | a. | Derive Nernst equation for the electrode potential. | CO3 | A | 6 |
|  | b. | Explain the injection moulding with suitable diagram. | CO5 | R | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Summarize the principle and instrumentation of absorption spectrometers. | CO6 | An | 6 |
|  | b. | Explain the give reason why absoption bands in UV spectrum are broad. | CO6 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Formulate electronic structures and correlate its properties |
| CO2 | Learn the various factors in water quality and its technology |
| CO3 | Realize the potential applications of polymers |
| CO4 | Analyze the combustion process of common fuels |
| CO5 | Learn the various energy storage systems and conversion devices |
| CO6 | Apply the instrumental methods for various types of analysis |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 7 | 10 |  | 6 |  |  | 23 |
| CO2 | 3 | 6 | 7 | 1 |  |  | 17 |
| CO3 | 7 | 10 | 6 |  | 6 |  | 29 |
| CO4 | 4 | 7 | 6 |  |  |  | 17 |
| CO5 | 13 | 6 | 1 | 3 |  |  | 23 |
| CO6 | 3 | 6 |  | 6 |  |  | 15 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **19CH3002** | **Duration** | **3hrs** |
| **Course Title** | **WASTE TO ENERGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Describe the methods of proximate analysis of municipal solid waste. | CO1 | U | 8 |
|  | b. | Highlight the salient features of solid waste management with suitable examples. | CO1 | R | 8 |
|  |  |  |  |  |  |
| 2. | a. | Enumurate the waste materials that are converted to catalyst. Explain with suitable research example. | CO2 | An | 8 |
|  | b. | Explain the preparation of the catalyst using top down and bottom up methods. | CO2 | A | 8 |
|  |  |  |  |  |  |
| 3. | a. | Predict the mechanism of transesterification reaction for biodiesel. | CO3 | E | 8 |
|  | b. | List the physical properties of biodiesel compared with corresponding oil. | CO3 | R | 8 |
|  |  |  |  |  |  |
| 4. | a. | Describe the construction and working model of fixed dome Biogas plant with schematic representation. | CO4 | U | 8 |
|  | b. | Highlight the advantages of biogas as a fuel. | CO4 | R | 8 |
|  |  |  |  |  |  |
| 5. | a. | Briefly discuss the preparation and application of activated charcoal. | CO5 | A | 8 |
|  | b. | Define the word “biomass pyrolysis”. Explain the types of pyrolysis process. | CO5 | An | 8 |
|  |  |  |  |  |  |
| 6. | a. | Calculate the energy content of solid waste having following composition using modified Dulongs formula:  Carbon is 36.5%, Hydrogen is 7.3%, Oxygen is 51.1%, Nitrogen 0.5%, Sulfur is 0.1% and Ash is 4.7%. | CO1 | A | 8 |
|  | b. | Explain the preparation method for homogeneous acid and base catalyst with suitable diagram. | CO2 | R | 8 |
|  |  |  |  |  |  |
| 7. | a. | Solve the problem of “Energy crisis” using biodiesel. Explain the importance of biodiesel. | CO3 | E | 8 |
|  | b. | Describe the application of solid fuel and pyrolytic oil. | CO5 | U | 8 |
| **PART – B (1 X 20 = 20 MARKS)**  **(Compulsory Question)** | | | | | |
| 8. | a. | Briefly discuss the construction and working method for downdraft gasifier. | CO6 | U | 10 |
|  | b. | Write short notes on pench mark performance parameter in gasifier. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the concept of waste to energy conversion, based on its properties |
| CO2 | Select the conditions for biomass pyrolysis. |
| CO3 | Develop a small size biomass gasifier. |
| CO4 | Prepare biodiesel and analyze its performance. |
| CO5 | Understand the current research scenario in waste to energy application |
| CO6 | Design a community biogas plant. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 8 | 8 | 8 |  |  |  | 24 |
| CO2 | 8 |  | 8 | 8 |  |  | 24 |
| CO3 | 8 |  |  |  | 16 |  | 24 |
| CO4 | 8 | 8 |  |  |  |  | 16 |
| CO5 |  | 8 | 8 | 8 |  |  | 24 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
|  | | | | | | | **132** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH1001** | **Duration** | **3hrs** |
| **Course Title** | **ESSENTIALS OF CHEMISTRY FOR AEROSPACE**  **ENGINEERS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | Describe Thomson’s plum pudding model of an atom. | | CO1 | U | 1 |
| 2. | Name the scientist who discovered neutron. | | CO1 | R | 1 |
| 3. | Describe the use of pigments in paint. | | CO2 | U | 1 |
| 4. | Write the name of the metal generally used in galvanizing. | | CO2 | A | 1 |
| 5. | Differentiate fuel from oxidizer. | | CO3 | U | 1 |
| 6. | Name the element with highest electronegativity. | | CO3 | R | 1 |
| 7. | Classify different types of explosives based on their detonation nature. | | CO4 | U | 1 |
| 8. | List out two examples of primary explosive. | | CO4 | R | 1 |
| 9. | State any one example of redox reactions. | | CO5 | R | 1 |
| 10. | Explain electronic energy from the context of spectroscopy. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Write down the electron configuration of chlorine (Z=17), potassium (Z=19), iron (Z=26). | | CO1 | A | 3 |
| 12. | Briefly explain the hot dipping process, tinning with the help of neat sketch. | | CO2 | U | 3 |
| 13. | Classify different types of fuels based on their origin and physical state. State two examples for each category. | | CO3 | U | 3 |
| 14. | Explain the purpose of fuse in an explosive. Compare the characteristics of safety fuse and detonating fuse. | | CO4 | U | 3 |
| 15. | Describe the final form of Nernst Equation and explain each term present in the expression. | | CO5 | R | 3 |
| 16. | Explain the fundamental concept behind the Frank-Condon principle. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Write down the significance of all four quantum numbers. | CO1 | A | 6 |
|  | b. | Deduce the electron configuration of Chromium (Z=24). Find out the all four quantum numbers of the last electron of Chromium. | CO1 | An | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain the process of galvanizing with necessary diagram and explain different steps involved in the process, and mention any two applications. | CO2 | A | 5 |
|  | b. | Describe the significance of nickel plating, gold plating, chrome plating. | CO2 | U | 7 |
|  |  |  |  |  |  |
| 19. | a. | Illustrate the working of bomb calorimeter with neat sketch. | CO3 | A | 4 |
|  | b. | Describe the method of calculating calorific value of samples using bomb calorimeter with relevant expressions. | CO3 | A | 8 |
|  |  |  |  |  |  |
| 20. | a. | Distinguish between binary and plastic explosives in terms of their composition. | CO4 | U | 4 |
|  | b. | Classify the different types of propellants based on their phase of existence. Provide detailed descriptions of each classification. | CO4 | U | 8 |
|  |  |  |  |  |  |
| 21. | a. | Draw a detailed diagram that illustrates the inner working of a hydrogen-oxygen fuel cell. Write the anodic and cathodic reactions. | CO5 | A | 10 |
|  | b. | List out any three advantages of using hydrogen-oxygen fuel cells as a clean energy source. | CO5 | R | 2 |
|  |  |  |  |  |  |
| 22. |  | Illustrate the working of fixed bed catalytic cracking with neat diagram. Explain the step by step procedure. Also state the disadvantage of fixed bed catalytic cracking process. | CO3 | U | 12 |
|  |  |  |  |  |  |
| 23. |  | Explain the working principle of absorption spectroscopy. | CO6 | A | 12 |
|  |  |  |  |  |  |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Evaluate the proximate analysis of given coal sample:  Given:  40 gm of coal was placed in silica crucible and heated at 110 0C for one hour. The residue left was 28.015 gm and after further heating in crucible with lid at 950 0C for 7 minutes, the quantity left was 16.528 gm. The residue on further burning produced ash, that weighted 12.245 gm. | CO3 | E | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | describe the atomic structures and correlate its properties. |
| CO2 | discuss and summarize the potential applications of protective coating. |
| CO3 | compare and contrast the unique characteristics of fuels. |
| CO4 | analyze and illustrate the principles of explosion and propulsion |
| CO5 | identify the various energy storage systems and conversion devices. |
| CO6 | assess the theory and principles involved in spectroscopy. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 1 | 1 | 9 | 6 | - | - | 17 |
| CO2 | - | 11 | 6 | - | - | - | 17 |
| CO3 | 1 | 16 | 12 | - | 12 | - | 41 |
| CO4 | 1 | 16 | - | - | - | - | 17 |
| CO5 | 6 | - | 10 | - | - | - | 16 |
| CO6 | - | 4 | 12 | - | - | - | 16 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH1003** | **Duration** | **3hrs** |
| **Course Name** | **APPLIED CHEMISTRY FOR FOOD PROCESSING TECHNOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | The degree of polymerization, is the number of \_\_\_\_\_\_\_\_\_ in a macromolecule. | | CO1 | R | 1 |
| 2. | Give an example of thermosetting plastics. | | CO1 | U | 1 |
| 3. | Dispersion of gas in liquid is called \_\_\_\_\_\_\_\_\_\_\_\_ | | CO2 | R | 1 |
| 4. | Dust is an example of \_\_\_\_\_\_\_\_\_\_\_\_ | | CO2 | U | 1 |
| 5. | A science which deals the objects of the range 1-100 nm is \_\_\_\_\_\_\_\_ | | CO3 | R | 1 |
| 6. | Quantum dots are an example for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ dimensional materials. | | CO3 | U | 1 |
| 7. | When two or more materials with very different properties are combined together they form --------------- material. | | CO4 | U | 1 |
| 8. | Fiber reinforced polymers are also called as \_\_\_\_\_\_\_\_\_\_\_\_ | | CO4 | R | 1 |
| 9. | Lead acid battery is an example of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | CO5 | R | 1 |
| 10. | In a battery, oxidation occurs at \_\_\_\_\_\_\_\_\_\_\_\_ | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Write short notes on tacticity with example. | | CO1 | R | 3 |
| 12. | List any four differences between thermo and thermoset plastics. | | CO2 | U | 3 |
| 13. | List the application of Nanomaterials in Energy sector. | | CO3 | U | 3 |
| 14. | Explain laminar and sandwich composite with example. | | CO4 | R | 3 |
| 15. | Summarize the solar and wind energy. | | CO5 | U | 3 |
| 16. | Highlight the application of UV- Visible spectroscopy technique. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Discuss the classification of polymers. | CO1 | R | 6 |
|  | b. | Explain the process of compounding plastics and provide a suitable example. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | What is the role of colloids in food products? | CO2 | R | 6 |
|  | b. | Enumerate the different classifications of colloids based on their physical states and the nature of their interactions. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 19. | a. | Discuss the chemical vapor deposition (CVD) method used for the synthesis of nanomaterials. | CO3 | U | 6 |
|  | b. | How is renewable energy generated from food waste through the use of bio-batteries? Elaborate on the underlying mechanisms and processes involved. | CO3 | R | 6 |
|  |  |  |  |  |  |
| 20. | a. | Define nanocomposite. Classify nanocomposite based on the reinforcement materials. | CO4 | An | 6 |
|  | b. | What are the applications of nanocomposites? | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Decribe the H2-O2 fuel cell with neat schematic diagram. | CO5 | U | 6 |
|  | b. | Explain the secondary battery with neat schematic diagram. | CO5 | R | 6 |
|  |  |  |  |  |  |
| 22. | a. | Describe the natural composite with wood and bones. | CO5 | An | 6 |
|  | b. | Explain the renewable energy resources with suitable diagram. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | What is a secondary battery and provide a brief discussion along with a neat schematic diagram? | CO4 | R | 6 |
|  | b. | Explain the process of anaerobic digestion and provide an example to illustrate with mechanism. | CO3 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Describe the instrumentation and various applications of UV-visible spectroscopy in food technology. | CO6 | U | 6 |
|  | b. | Explain the principles and applications of infrared (IR) spectroscopy. | CO6 | U | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Categorize various types of polymers used in food processing technology |
| **CO2** | Describe the applications of colloids in food processing |
| **CO3** | Summarize the use of nanomaterials in food processing technology |
| **CO4** | Apply the nano-composites in food processing technology |
| **CO5** | Describe the use of bio-batteries |
| **CO6** | Discuss about the characterization techniques of biomolecules |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 10 | 7 | - | - | - | - | 17 |
| **CO2** | 7 | 4 | 6 | - | - | - | 17 |
| **CO3** | 7 | 10 | 6 | - | - | - | 23 |
| **CO4** | 16 | 1 | - | 6 | - | - | 23 |
| **CO5** | 13 | 10 | - | 6 | - | - | 29 |
| **CO6** | - | 15 | - | - | - | - | 15 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH1005** | **Duration** | **3hrs** |
| **Course Title** | **PRINCIPLES OF ENVIRONMENTAL CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | **Identify the common unit used to express the hardness of water.** | | CO1 | U | 1 |
| 2. | Recall the pH range in which EDTA titration for hardness determination typically take place. | | CO1 | R | 1 |
| 3. | Identify the chemical which is first added to the water sample in Winkler’s method to react with dissolved oxygen. | | CO2 | R | 1 |
| 4. | \_\_ to \_\_ seconds is the detention period of flash mixers. | | CO2 | R | 1 |
| 5. | The bar spacing in coarse screen is \_\_\_\_\_mm. | | CO3 | U | 1 |
| 6. | List out the three stages in precipitation method of water treatment. | | CO3 | R | 1 |
| 7. | Identify which of the following metals could provide cathodic protection to iron: Al, Zn, Cu, Ni. | | CO4 | U | 1 |
| 8. | Chemical formula of rust is \_\_\_\_\_\_. | | CO4 | R | 1 |
| 9. | Give the constituent of cement that causes its initial setting. | | CO5 | U | 1 |
| 10. | Mention the Municipal Solid Waste (MSW). | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Differentiate Calgon and Carbonate conditioning in caustic embrittlement. | | CO1 | An | 3 |
| 12. | Describe desalination of water. | | CO2 | U | 3 |
| 13. | Explain the principle and function of flow equalization. | | CO3 | R | 3 |
| 14. | Describe Pilling - Bedworth rule. | | CO4 | U | 3 |
| 15. | Explain Wet process in manufacturing Portland Cement. | | CO5 | R | 3 |
| 16. | Describe any 3 types of solid wastes in detail. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | A sample of water contains the following dissolved salts in mgs/lit.  Mg (HCO3)2 = 73. CaCl2 =111, Ca (HCO3)2 = 81, MgSO4 = 40, MgCl2 =50, CaSO4 = 13.6. Calculate the temporary, permanent and total  Hardness of water. | CO1 | An | 6 |
|  | b. | Discuss the determination of dissolved oxygen in water. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Discuss in detail about Electro dialysis with a diagram. | CO2 | U | 6 |
|  | b. | Explain Reverse Osmosis with mechanism and a suitable diagram. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Explain precipitation methods and its limitations in waste water treatment. | CO3 | U | 6 |
|  | b. | Discuss the Activated Sludge treatment and Trickling Filter method in detail with suitable diagrams. | CO3 | U | 6 |
| 20. | a. | Compare Galvanizing and Tinning in prevention of corrosion. | CO4 | A | 6 |
|  | b. | Discuss about Oxidation and Galvanic corrosion with mechanisms. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Give an account on 1) heat of hydration 2) soundness of cement 3) merits and demerits of wet and dry processes of manufacturing Portland cement. | CO5 | U | 6 |
|  | b. | Describe any 3 special cements | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Describe the Effects of solid waste in environment | CO6 | U | 6 |
|  | b. | Explain in detail the determination of hardness of water by EDTA method | CO1 | R | 6 |
|  |  |  |  |  |  |
| 23. | a. | Describe the determination of Alkalinity of water. | CO4 | U | 6 |
|  | b. | Explain the reasons for corrosion in boilers and its preventive measures. | CO2 | R | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain the methods used to control corrosion in detail. | CO4 | R | 6 |
|  | b. | Explain the manufacturing of Portland cement by rotary kiln with layout diagram. | CO5 | R | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | To understand the various factors in water quality |
| **CO2** | To learn the various purification process and their applications |
| **CO3** | To describe the process of corrosion |
| **CO4** | To identify the methods of control corrosion |
| **CO5** | To analyze the components present in cement |
| **CO6** | To realize the solid waste management applications |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 7 | 7 |  | 9 |  |  | 23 |
| **CO2** | 8 | 15 |  |  |  |  | 23 |
| **CO3** | 4 | 13 |  |  |  |  | 17 |
| **CO4** | 7 | 16 | 6 |  |  |  | 29 |
| **CO5** | 9 | 13 |  |  |  |  | 22 |
| **CO6** |  | 10 |  |  |  |  | 10 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH2001** | **Duration** | **3hrs** |
| **Course Title** | **COMPLEMENTARY CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the Arrhenius and Lewis theory of acid and base with suitable example. | CO1 | A | 10 |
|  | b. | What is buffer solution? Discuss the various types of buffer solution with examples. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the following with appropriate example:   1. Mole 2. Conjugate acid 3. Conjugate base 4. Atomic mass | CO1 | A | 10 |
|  | b. | Describe the Brønsted–Lowry acid–base theory with examples. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the Bohr’s atomic theory with merits and limitations. | CO2 | A | 10 |
|  | b. | Explain the types of quantum number. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the following   1. Pauli’s exclusion principle 2. Heisenberg’s uncertainty principle | CO2 | U | 10 |
|  | b. | Draw and explain the shapes of s, p and d orbitals. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Distinguish the ionic bond and covalent bond. | CO3 | An | 10 |
|  | b. | Describe molecular orbital theory with Illustration. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss VSEPR theory with examples. | CO3 | An | 10 |
|  | b. | Analyze the various types of hybridization with example. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the following   1. Vapor Pressure 2. Surface tension 3. Molar refraction | CO4 | U | 10 |
|  | b. | Summarize the importance of phase diagrams. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Summarize the physical parameter of the liquids. | CO4 | A | 10 |
|  | b. | Discuss about the expressing concentration of solutions with example. | CO5 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the properties of colloidal solutions. | CO5 | A | 10 |
|  | b. | Explain the types and characteristics of adsorption. | CO6 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | To realize the importance of acids and bases |
| CO2 | To summarize the importance of the atomic structure |
| CO3 | To understand the theories of chemical bonding |
| CO4 | To learn the physical properties of the liquid |
| CO5 | To understand the basics of surface chemistry |
| CO6 | To recognize the importance of colloids in forensic science |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 10 | 20 | 10 | - | - | 40 |
| CO2 | - | 20 | 10 | - | - | - | 30 |
| CO3 | - | - | 20 | 30 | - | - | 50 |
| CO4 | - | 10 | 20 | - | - | - | 30 |
| CO5 | - | - | 20 | - | - | - | 20 |
| CO6 | - | - | - | 10 | - | - | 10 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH2003** | **Duration** | **3hrs** |
| **Course Title** | **INORGANIC CHEMISTRY FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the periodic properties of the following.  a) Atomic radii b) Ionization enthalpy  c) Diagonal relationship d) Electronegativity. | CO1 | U | 10 |
|  | b. | Discuss various periodic tables with examples | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain general characteristics of s, p, d and f block with suitable examples | CO1 | R | 20 |
|  |  |  |  |  |  |
| 3. | a. | Describe the applications of radioisotopes with examples | CO2 | U | 10 |
|  | b. | Explain the following terms with suitable examples.  a) Isobars b) Isotones c) Isotopes d) Binding Energy | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Explain various characteristics of α, β and γ radiation with suitable examples | CO2 | R | 20 |
|  |  |  |  |  |  |
| 5. | a. | Illustrate Crystal field theory with suitable diagrams | CO3 | A | 10 |
|  | b. | Enumerate Valence bond theory and explain suitable examples with tetrahedral structural | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Enumerate Molecular O realize the role of metals in Forensic science rbital theory with suitable diagrams | CO4 | A | 20 |
|  |  |  |  |  |  |
| 7. | a. | Discuss biochemistry of iron with suitable examples | CO5 | U | 10 |
|  | b. | Explain the mechanism of O2, CO2 transportation | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Elaborate the biochemistry of zinc and cobalt | CO5 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Give an account on heavy metal poisoning of the following metals   1. Barium b) Copper c) Lead d) mercury– detection & effects - | CO6 | A | 10 |
|  | b. | Describe schiff bases and their applications in forensic sciences | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Analyze the periodic properties |
| CO2 | Recognize the applications of radioisotopes |
| CO3 | Relate the nature of bonding in coordination complexes |
| CO4 | Predict the factors affecting the stability of metal complexes |
| CO5 | Summarize the importance of metals in biology |
| CO6 | Realize the role of metals in Forensic science |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | 20 | - | - | - | - | 40 |
| CO2 | 30 | 10 | - | - | - | - | 40 |
| CO3 | - | - | 20 | - | - | - | 20 |
| CO4 | - | - | 20 | - | - | - | 20 |
| CO5 | 10 | 30 | - | - | - | - | 40 |
| CO6 | - | 10 | 10 | - | - | - | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH2005** | **Duration** | **3hrs** |
| **Course Name** | **ANALYTICAL CHEMISTRY FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the hygiene and the necessary safety in the chemical laboratory and the handling of acids. | CO1 | U | 10 |
|  | b. | Narrate the concept of absolute and relative errors in chemical analysis. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the following: average deviation, mean, median, and coefficient of variation. | CO1 | A | 10 |
|  | b. | Elaborate significant figures and the importance of normal error curve. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the purification techniques of solids and use as drying agents. | CO2 | A | 10 |
|  | b. | Illustrate the various process of distillation techniques | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | How will you extract of organic compounds using solvents? | CO2 | An | 10 |
|  | b. | Describe the chemical methods of purification and test for purity. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Illustrate the criteria for primary standard and its process of preparation. | CO3 | R | 10 |
|  | b. | Write a notes on the complexometric titrations using EDTA titrations. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | What do you mean by volumetric titrations and explain with examples. | CO3 | U | 10 |
|  | b. | Define molarity, molality, weight percentage, ppm, mole equivalence. | CO3 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the gravimetric titrations and its indicators with examples. | CO4 | An | 10 |
|  | b. | Discuss the neutralization titrations and the theory of indicators. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss the estimation of chloride containing samples by Volhard’s method. | CO4 | An | 10 |
|  | b. | Illustrate the concept of TGA and DTA with diagrams. | CO5 | A | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Outline the instrumentation of TGA with diagram and applications of TGA. | CO5 | A | 10 |
|  | b. | Describe the factors affecting TGA and DTA. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | know the methodology to handle chemicals, heating methods and error analysis |
| CO2 | understand the principle of techniques used for the purification of compounds |
| CO3 | know about importance of various titrimetric methods |
| CO4 | get knowledge about solubility criteria, precipitation titrations and gravimetric analysis |
| CO5 | receive the importance of thermogravimetric, differential thermal and electrogravimetry analysis |
| CO6 | understand the basics of analytical chemistry for application in forensic science |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO2 | 10 | -- | 20 | 10 |  |  | 40 |
| CO3 | 20 | 10 | 10 |  |  |  | 40 |
| CO4 |  |  | 10 | 20 |  |  | 30 |
| CO5 |  |  | 20 |  |  |  | 20 |
| CO6 |  |  | 10 |  |  |  | 10 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH2006** | **Duration** | **3hrs** |
| **Course Title** | **ORGANIC CHEMISTRY FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Illustrate the **sp2** hybridization with an example. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain the different types of bonds with examples in chemical bonding. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Identify the general name for the following structures. | CO2 | A | 10 |
|  | b. | Differentiate between Carbocation and Carbanion with examples. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Examine the utility of Heterocyclic compounds in forensic science. | CO3 | E | 10 |
|  | b. | Prepare a report on the following citing examples.   1. Carbenes 2. Free radicals | CO3 | U | 10 |
|  |  |  |  |  |  |
| 5. |  | Evaluate the role of organic chemistry in forensic science. | CO4 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Discuss the **SN2** reaction mechanism with an example. | CO4 | R | 20 |
|  |  |  |  |  |  |
| 7. |  | Summarize Geometrical Isomerism taking 2-butene as an example. | CO5 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Differentiate racemization and resolution taking tartaric acid as an example. | CO5 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Categorize the natural amino acids. | CO6 | R | 10 |
|  | b. | Elucidate the detailed structure of protein. | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Describe the basic principles of chemical structures and its bonding characteristics |
| CO2 | Predict the organic reaction mechanisms of organic reactions |
| CO3 | Understand the structures of heterocyclic compounds |
| CO4 | Describe the reaction intermediates |
| CO5 | Explain the principles of stereochemistry. |
| CO6 | Relate The Applications Of The Biological Molecules In Various Domains |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 40 |  |  |  |  | 40 |
| CO2 |  | 10 | 10 |  |  |  | 20 |
| CO3 |  | 10 |  |  | 10 |  | 20 |
| CO4 | 20 |  |  |  | 20 |  | 40 |
| CO5 |  |  | 20 | 20 |  |  | 40 |
| CO6 | 10 | 10 |  |  |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH2007** | **Duration** | **3hrs** |
| **Course Title** | **INSTRUMENTATION TECHNIQUES FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the principle and instrumentation of Infra-Red spectroscopy with a neat block diagram. | CO1 | R | 10 |
|  | b. | Prepare a detailed report on the Electromagnetic Radiation with examples. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Provide examples of how NMR spectroscopy is utilized in forensic analyses and investigations. | CO1 | An | 10 |
|  | b. | Water Molecule Photograph by Friedrich Saurer | Fine Art AmericaFind out the fundamental vibrations of the following molecule with suitable explanations.  Carbon Dioxide Molecule Icon Stock Illustration - Illustration of ... i) ii) | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the different types of molecular transitions in UV Vis spectroscopy with examples. | CO2 | U | 10 |
|  | b. | Illustrate the principle and instrumentation of UV-Visible spectrometer with a neat block diagram. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Distinguish between Chromophore and Auxochrome. | CO3 | A | 10 |
|  | b. | “UV-Visible spectroscopy is an important tool in Forensic Science” Justify the statement with suitable examples. | CO3 | E | 10 |
|  |  |  |  |  |  |
| 5. | a. | Demonstrate the “Jablonski diagram” with a neat sketch. | CO4 | U | 10 |
|  | b. | Illustrate the Principle and instrumentation of Fluorescence spectroscopy with pictorial representations. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the various factors that affect fluorescence. | CO4 | U | 10 |
|  | b. | Evaluate the fluorescence techniques utilized in various forensic analyses, including crime scene investigation, evidence detection, and forensic toxicology. | CO4 | E | 10 |
|  |  |  |  |  |  |
| 7. | a. | Summarize the principle, instrumentation, and application of Polarography in forensic investigations. | CO5 | An | 10 |
|  | b. | Briefly discuss any two electro analytical techniques highlighting their importance in in a forensic investigation? | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Exemplify the principle and instrumentation, and application of potentiometry in forensic science. | CO5 | U | 10 |
|  | b. | Discuss in detail on X- ray spectroscopy. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Outline the fundamental principle and forensic applications of electrophoresis. | CO6 | A | 10 |
|  | b. | Assess the forensic applications of sensors with suitable examples. | CO6 | E | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | know the importance of IR and NMR spectroscopy techniques and their application in forensic science. |
| CO2 | understand the forensic applications of UV and visible spectroscopic techniques. |
| CO3 | know the principle and instrumentation of fluorescence and phosphorescence spectrophotometry. |
| CO4 | understand the importance of electrochemical techniques in forensic science. |
| CO5 | understand the principle of radio analytical techniques. |
| CO6 | know the concepts and forensic applications of advanced techniques. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | - | 10 | 20 | - | - | 40 |
| CO2 | 10 | 10 | - | - | - | - | 20 |
| CO3 | - | - | 10 | - | 10 | - | 20 |
| CO4 | 10 | 20 | - | - | 10 | - | 40 |
| CO5 | - | 30 | - | 10 | - | - | 40 |
| CO6 | - | - | 10 | - | 10 | - | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH2009** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Prepare a report on the various types of petrochemicals obtained from crude oil with respect to their commercial uses. | CO1 | A | 10 |
|  | b. | Discuss the various fractions obtained in fractional distillation of crude oil with a pictorial representation. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the following terms with examples  Simple distillation, Fractional distillation, Steam distillation, Octane number and Cetane number. | CO1 | R | 10 |
|  | b. | Highlight the test for the adulterated petrol found in the Crime Scene and list out the composition of petrol. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Evidence collection and preservation is one of the most important tasks associated with fire investigation. Justify the statement with proper examples | CO2 | E | 10 |
|  | b. | Predict the possible information that a forensic investigator receives from different types of fire patterns in a fire scene? | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Pen down the possible forensic informations from the smokes produced in different fire scences as shown in the below pictures.  Wildfires: what are the health hazards of smoke? | MeersensThe Art of Reading Smoke: The Next Generation - FirefighterNation: Fire  Rescue - Firefighting News and Community | CO2 | E | 10 |
|  | b. | Categorize the method of evidence collection and packing. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Discuss the identification, consequences and warning signs of a Flash over using the graphical representation, | CO3 | U | 10 |
|  | b. | Illustrate the chemistry of fire, its composition and the products formed? | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Envisage the various types of ignitable materials that one can encounter in an arson scene as a forensic expert. | CO4 | E | 10 |
|  | b. | Classify the different search methods in the scene of explosion. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the structure, synthesis, properties and applications of RDX and PETN. | CO4 | R | 10 |
|  | b. | Demonstrate the mechanism of explosion in detail with examples. | CO6 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Represent any three improvised explosive devices (IED) with examples. | CO5 | An | 10 |
|  | b. | As a forensic investigator, summarize the possible observations do be documented during the ‘Bomb Scene Management’. | CO6 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. |  | Explain the diverse ways of the detection of hidden explosives with proper justification. | CO5 | A | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the methods of analyzing trace amounts of petroleum products in crime scene evidence. |
| CO2 | Comprehend the method of searching, collecting, preserving and analyzing arson evidence |
| CO3 | Deliver the process of post-fire analysis of materials. |
| CO4 | Realize the classification of explosives, including the synthesis and characterization of representative analogs |
| CO5 | Apply the techniques of locating hidden explosives |
| CO6 | Interpret the significance of bomb scene management |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | 10 | 10 | - | - | - | 40 |
| CO2 | - | - | - | 10 | 20 | - | 30 |
| CO3 | - | 30 | 10 | - | - | - | 40 |
| CO4 | 10 | - | - | - | 10 | - | 20 |
| CO5 | - | - | 20 | 10 | - | - | 30 |
| CO6 | - | 10 | - | 10 | - | - | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH2010** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC TOXICOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain any five tests used for the detection of petroleum products. | CO1 | U | 20 |
|  | b. | Describe chemical properties of petroleum products. | R |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the method for collection and packaging of evidences at the arson crime scene. | CO2 | U | 20 |
|  | b. | Discuss the chemistry of fire – fire triangle and fire tetrahedron. | U |
|  |  |  |  |  |  |
| 3. | a. | Explain the methods for the detection of ignitable liquid residues on the crime scene based on headspace. | CO3 | A | 20 |
|  | b. | Explain the phases of combustion. | R |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write a note on ‘Ecstasy Poisoning’. | CO4 | U | 20 |
|  | b. | Give any three presumptive tests for diacetyl morphine. | A |
|  |  |  |  |  |  |
| 5. | a. | Explain the absorption, metabolism and excretion of alcohol in the human body. | CO5 | AN | 20 |
|  | b. | Explain any three color tests used for detection of alcohol | R |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the method used for estimation of alcohol from blood with its formula. | CO5 | U | 20 |
|  | b. | Explain the procedure for dope test. | CO4 | U |
|  |  |  |  |  |  |
| 7. | a. | Tabulate different classes of poisons according to their extraction methods. | CO4 | R | 20 |
|  | b. | Write a note snake venom. Include its signs, symptoms and medico legal  significance | U |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe ‘Mercury Poisoning’ in detail. | CO6 | U | 20 |
|  | b. | Explain the stages of acute poisoning of alcohol. | U |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain carbon monoxide poisoning. Give its symptoms, treatment and medico legal significance. | CO6 | U | 20 |
|  | b. | Write a case study related to medico legal significance of poisons. | R |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Know about chemistry of petroleum products forensic science. |
| CO2 | Understand the method of searching, collecting, preserving and analyzing arson evidence |
| CO3 | Know the techniques of locating hidden explosives. |
| CO4 | Know the narcotics, drugs and psychotropic substances forensic science |
| CO5 | Know the forensic identification of illicit liquors. |
| CO6 | Know about toxicology and poisons |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 |  |  |  |  | 20 |
| CO2 |  | 20 |  |  |  |  | 20 |
| CO3 | 10 |  | 10 |  |  |  | 20 |
| CO4 | 10 | 30 | 10 |  |  |  | 50 |
| CO5 | 10 | 10 |  | 10 |  |  | 30 |
| CO6 | 10 | 30 |  |  |  |  | 40 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH2012** | **Duration** | **3hrs** |
| **Course Title** | **CRIME INVESTIGATION TECHNIQUES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the basic principle of chromatography? Elaborate the factors affecting chromatography methods. | CO1 | U | 10 |
|  | b. | Explain the instrumentation and applications of HPLC. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define column efficiency and discuss the applications of chromatography in crime scene investigations. | CO1 | U | 10 |
|  | b. | Explain the following terms:   1. Normal Phase HPLC 2. Reverse Phase HPLC 3. Isocratic elution 4. Gradient elution | CO1 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the procedure involved in TLC technique. | CO2 | R | 10 |
|  | b. | Describe the principle and working mechanism of paper chromatography. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss the applications, advantages and disadvantages of TLC in Forensic Science. | CO2 | U | 10 |
|  | b. | Explain the instrumentation, working principle and applications of GC. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | How are X-rays produced? List the properties of X-rays. | CO3 | U | 10 |
|  | b. | Explain the types of unit cell with illustration. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the types of techniques used in the extraction of sample. | CO2 | U | 10 |
|  | b. | Discuss the methods that are used to determine the crystal structures. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the working principle and instrumentation of SEM. | CO4 | U | 10 |
|  | b. | Describe the instrumentation and working principle of the XRD technique. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Provide the sample preparation method used for TEM and draw the schematic diagram of TEM instrument. | CO4 | U | 10 |
|  | b. | Explain the instrumentation and applications of comparison microscope in Forensic Science. | CO5 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the types of photography used for scene of crime documentation. | CO6 | U | 10 |
|  | b. | What are UV and IR Photography? How they are utilized in Forensic Science? | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Know principle of chromatographic techniques |
| CO2 | Know applications of chromatographic techniques |
| CO3 | Understand the principles of X-Ray diffraction techniques |
| CO4 | Realize the importance of Electron Microscopy |
| CO5 | Understand the applications of electron microscopic techniques |
| CO6 | Understand advance photographic methods for Forensic Science |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 30 | - |  |  |  | 40 |
| CO2 | 10 | 20 | 20 |  |  |  | 50 |
| CO3 | - | 20 | 20 |  |  |  | 40 |
| CO4 | - | 20 | - |  |  |  | 20 |
| CO5 | - | - | 10 |  |  |  | 10 |
| CO6 | - | 10 | 10 |  |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH3042** | **Duration** | **3hrs** |
| **Course Title** | **SUPRAMOLECULAR CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Differentiate Lock and key model from Induced fit model. | CO1 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss Co-operativity and their types. | CO1 | U | 10 |
|  | b. | Illustrate the different types of non-covalent interactions in Supramolecular Chemistry with examples. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Examine the hydrogen sponge and proton sponge with examples. | CO2 | A | 10 |
|  | b. | Identify the following four structures. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Illustrate the criteria for construction of suitable receptors for anions with examples. | CO3 | U | 10 |
|  | b. | Prepare a detailed report on lariat ethers. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Categorize the different types of synthesis of rotaxanes with pictorial representations. | CO4 | R | 10 |
|  | b. | Elaborate the structure and applications of Helicates. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | “Metals and ligands form supramolecular structures, such as racks, ladders, and grids.” Provide justification with pictorial representations. | CO4 | U | 10 |
|  | b. | Predict the general name for the following structures. | CO4 | An | 10 |
|  |  |  |  |  |  |
| 7. |  | Evaluate the importance of metal organic frameworks (MOF’s) in Supramolecular Chemistry. | CO5 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Describe the structure, composition, and catalysis property of Zeolites. | CO5 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Compare the advantages and limitations of different supramolecular materials as molecular machines. | CO6 | An | 10 |
|  | b. | Outline the medical applications and implications of supramolecular chemistry. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the various types of bonding in supramolecular chemistry |
| CO2 | Recognize the selectivity in formation of supramolecular chemistry and catalysis |
| CO3 | Identify and design receptors for cations, anions and neutral molecules |
| CO4 | Synthesize and assemble molecular structures of different shapes and dimensions |
| CO5 | Construct supramolecular architecture based on of crystal engineering concepts |
| CO6 | Identify the application of supramolecular chemistry in appropriate fields |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 20 | 10 | 10 |  |  | 40 |
| CO2 |  |  | 10 | 10 |  |  | 20 |
| CO3 |  | 10 | 10 |  |  |  | 20 |
| CO4 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO5 |  | 20 |  |  | 20 |  | 40 |
| CO6 |  |  | 10 | 10 |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH3045** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC TOOLS AND TECHNIQUES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Explain the nature and scope of analytical chemistry. Give the classification of analytical methods. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Give the basic principle of the centrifugation technique and explain the types of centrifugation. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | Describe the steps involved in gravimetric analysis. | CO3 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Explain the principle, procedure and significance of complexometric titration. | CO4 | U | 20 |
|  |  |  |  |  |  |
| 5. |  | Explain the liquid-liquid extraction process in detail with diagram. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Explain the principle and procedure for acid-base titration with example. | CO4 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | Explain the theory of indicators with example. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain the following methods of separation:   1. Distillation 2. Precipitation 3. Crystallization 4. Solvent extraction | CO6 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Explain the chemistry of phenolphthalein in bribe cases and give its significance. | CO6 | U | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the methods involved in analytical chemistry |
| CO2 | Understand the terms used in analytical chemistry |
| CO3 | Realize the significance qualitative analysis |
| CO4 | Realize the importance of volumetric analysis |
| CO5 | Understand the importance of gravimetric analysis |
| CO6 | Apply the various types of separation methods |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 20 |  |  |  |  | 20 |
| CO2 |  | 20 |  |  |  |  | 20 |
| CO3 |  | 20 |  |  |  |  | 20 |
| CO4 |  | 20 | 40 |  |  |  | 60 |
| CO5 |  | 20 |  |  |  |  | 20 |
| CO6 |  | 20 | 20 |  |  |  | 40 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH3046** | **Duration** | **3hrs** |
| **Course Title** | **INSTRUMENTAL METHODS OF ANALYSIS - I** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A(4 X 20= 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | What is electromagnetic spectrum? Explain various source of radiations and their utility and limitations. | CO1 | R | 10 |
| b. | Briefly explain the instrumentation of Mass spectroscopy and its applications with examples. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Write a short notes on the spectroscopy? Explain its Forensic applications. | CO1 | U | 10 |
|  | b. | What is meant by the X-ray fluorescence spectroscopy? Discuss its principles and nomenclature. | CO1 | A | 10 |
| 3. | a. | What is Lambert-Beer’s law? Derive the law. | CO2 | U | 10 |
| b. | Write short notes on the Fluorescence spectroscopy? Briefly explain the Jablonski diagram with fluorescence and phosphorescence. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | What are absorption laws? How is an ultraviolet spectrum plotted? | CO2 | U | 10 |
|  | b. | Define the following terms:  1. Bathochromic Shift.  2. Hypsochromic Shift.  3. Hyperchromic Shift.  4. A Chromophore. | CO2 | R | 10 |
| 5. | a. | Bring out the differences between IR & Raman spectra. What are Stokes and Anti-Stokes lines in the Raman spectra? | CO3 | U | 10 |
|  | b. | Define IR spectroscopy. Describe the various molecular vibrations in the technique. What is the major requirement or IR absorption? | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe some of the absorption bands with their probable region and intensity for the following functional groups:   1. Primary Amines. 2. Secondary Amines. 3. Tertiary Amines.   Alcohols | CO3 | U | 10 |
|  | b. | How to determine structures of following compounds from NMR spectroscopy?  (a) C3H8  (b) CH4O  (c) C4H10  (d) C2F3HO2 | CO4 | An | 10 |
| 7. | a. | Write short notes on the NMR spectroscopy? Briefly explain the nuclear quantum numbers with examples. | CO4 | U | 10 |
|  | b. | What is mean by Redox titrations? Explain with suitable reactions. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Briefly explain the general principles, instrumentations, and applications of Conductometry and Potentiometry. | CO5 | U | 10 |
|  | b. | How can you detect the methanol sample using different spectroscopy? | CO5 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Define Radiochemical methods. Write the applications of radiochemical techniques in forensic science? | CO6 | U | 10 |
|  | b. | Summarize the spectroscopic techniques in forensic science applications. | CO6 | R | 10 |

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | To understand the principles of atomic spectroscopy. |
| CO2 | To realize the importance of IR and Raman Spectroscopy. |
| CO3 | To apply the principles of electronic spectroscopy. |
| CO4 | To understand the principles of NMR spectroscopy. |
| CO5 | To realize the importance of radiochemical methods in forensic science. |
| CO6 | To utilize the role of electrochemical methods in forensic science. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| CO / BL | **Remember** | **Understand** | **Apply** | **Analyze** | **Evaluate** | **Create** | **Total** |
| CO1 | 10 | 20 | 10 | - | - | - | 40 |
| CO2 | 20 | 20 | - | - | - | - | 40 |
| CO3 | - | 20 | 10 | - | - | - | 30 |
| CO4 | - | 10 | - | 10 |  |  | 20 |
| CO5 | - | 20 | 10 | - | - | - | 30 |
| CO6 | 10 | 10 | - | - | - | - | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **20CH3048** | **Duration** | **3hrs** |
| **Course Title** | **INSTRUMENTAL METHODS OF ANALYSIS - II** | **Max Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the working principle and instrumentation of Gas Chromatography. | CO1 | R | 10 |
|  | b. | Develop a chromatographic method for separating a mixture of two organic compounds using TLC. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Outline the applications of chromatography in chemical analysis. | CO1 | A | 10 |
|  | b. | Distinguish between adsorption and partition chromatography with applications. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the principle, instrumentation and applications of capillary electrophoresis. | CO2 | U | 10 |
|  | b. | Compare the Super Critical Fluid Chromatography with Gas Chromatography. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | List the types of detectors used in HPLC and their applications. | CO2 | A | 10 |
|  | b. | Describe the principle, instrumentation, and types of HPLC. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the principle, components and instrumentation of a mass spectrometer. | CO3 | U | 10 |
|  | b. | Prepare a detailed report on the importance of isotopic patterns in Mass Spectroscopy. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | "Mass Spectrometry plays a vital role in forensic investigations. Justify." | CO3 | E | 10 |
|  | b. | Predict the fragmentation pattern of the following mass spectrum of Ethyl Benzoate. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Evaluate the significance of accuracy versus precision in analytical measurements. | CO4 | E | 10 |
|  | b. | Illustrate the principle and instrumentation of LC-MS. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss the principles of signal-to-noise ratio (SNR) and its importance in instrumental analysis. | CO5 | U | 10 |
|  | b. | Demonstrate the principle and instrumentation of Gas Chromatography-Fourier Transform Infrared Spectroscopy (GC-FTIR) with diagram. | CO5 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the instrumentation suitable for differential thermal analysis. | CO6 | U | 10 |
|  | b. | Discuss the role microscopy techniques in forensic analysis. | CO6 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Summarize the types of chromatographic techniques |
| CO2 | Realize the importance of High-Performance Liquid Chromatography |
| CO3 | Apply the principles of mass spectrometry in forensic science |
| CO4 | Realize the importance of hyphenated techniques |
| CO5 | Realize the use of microscopic techniques in forensic science |
| CO6 | Utilize the role of X-ray diffraction techniques in forensic science |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 |  | 20 | 10 |  |  | 40 |
| CO2 |  | 20 | 10 | 10 |  |  | 40 |
| CO3 |  | 10 | 10 | 10 | 10 |  | 40 |
| CO4 |  | 10 |  |  | 10 |  | 20 |
| CO5 | 10 | 10 |  |  |  |  | 20 |
| CO6 | 10 |  |  | 10 |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **21CH2068** | **Duration** | **3hrs** |
| **Course Title** | **RECENT TRENDS IN FORENSIC SCIENCE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define forensic odontology. | | CO1 | R | 1 |
| 2. | Central Forensic Science Laboratories are functioning under the administrative control of the directorate of \_\_\_\_\_\_\_\_ | | CO1 | R | 1 |
| 3. | Define crime scene. | | CO1 | R | 1 |
| 4. | The Indian evidence act was enacted in the year of \_\_\_\_\_\_\_\_\_\_\_ | | CO2 | R | 1 |
| 5. | Specify the most suitable method used for the identification of a human individual. | | CO3 | U | 1 |
| 6. | List the functions of CNS. | | CO3 | A | 1 |
| 7. | What is the main component of alcoholic beverages? | | CO4 | U | 1 |
| 8. | How carboxyhemoglobin is formed in the red blood cells? | | CO4 | A | 1 |
| 9. | Mention the name of the enzyme present in saliva. | | CO5 | A | 1 |
| 10. | How to test the presence of chloride content in concrete? | | CO6 | A | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Mention the name of scientific divisions of CFSL in India. | | CO1 | A | 3 |
| 12. | What are the main causes of crime? | | CO2 | U | 3 |
| 13. | Identity the method used for the analysis of questioned documents. | | CO3 | An | 3 |
| 14. | What is “Chain of custody”? | | CO2 | U | 3 |
| 15. | Differentiate between antigen and antibody. | | CO4 | A | 3 |
| 16. | Explain the forensic significance of cement analysis. | | CO6 | An | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the different branches of forensic science. | CO1 | U | 6 |
|  | b. | What are the objectives and functions of criminal justice system? | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain the significance of crime scene in forensic science. | CO2 | R | 6 |
|  | b. | Describe the types of fingerprint patterns. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Discuss the scope of forensic science. | CO1 | A | 6 |
|  | b. | Explain the different types of questioned documents with example. | CO3 | U | 6 |
|  |  |  |  |  |  |
| 20. | a. | Explain the security features and forensic examination of Indian passport. | CO3 | A | 6 |
|  | b. | Discuss pharmacokinetics of ethanol and its forensic significance. | CO4 | An | 6 |
|  |  |  |  |  |  |
| 21. | a. | Discuss the classification of drugs. | CO4 | U | 6 |
|  | b. | What is computer crime? Describe the types of computer crimes. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Discuss the following   1. Dose-response relationship 2. Blood alcohol content | CO4 | An | 6 |
|  | b. | Explain the composition, functions and forensic significance of analysis of body fluids. | CO5 | An | 6 |
|  |  |  |  |  |  |
| 23. | a. | Explain the method and forensic significance of bloodstain analysis. | CO5 | An | 6 |
|  | b. | Discuss the importance of photography and videography in forensic science. | CO6 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | What are the chemical compositions of cement? Explain the forensic importance of analysis of cement. | CO6 | An | 6 |
|  | b. | Discuss the forensic significance of analysis of chemical fertilizers. | CO6 | A | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Understand the basic concepts of forensic science |
| **CO2** | Know the procedures involved in Crime scene management |
| **CO3** | Recognize the importance analysis of finger prints and questioned documents |
| **CO4** | Classify the various types of toxins and their analysis |
| **CO5** | Know the importance of forensic serology |
| **CO6** | Understand the importance of forensics for workplace investigation |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 3 | 6 | 15 | - | - | - | 24 |
| **CO2** | 7 | 12 | - | - | - | - | 19 |
| **CO3** | - | 13 | 7 | 3 | - | - | 23 |
| **CO4** | - | 7 | 4 | 12 | - | - | 23 |
| **CO5** | - | - | 1 | 12 | - | - | 13 |
| **CO6** | - | - | 13 | 9 | - | - | 22 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **22CH2001** | **Duration** | **3hrs** |
| **Course Title** | **BIOCHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Give salient features of the Double-helix structure of DNA in detail. | CO1 | R | 10 |
|  | b. | Explain the process of replication and its significance in nucleic acids with help of diagrams. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the functions of the following cell organelles with a proper diagram.   * ER * Golgi apparatus * Mitochondria * Lysosome * Ribosome | CO2 | R | 10 |
|  | b. | Describe the process of transcription and the role of the TATA box. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain hydrolysis of nucleic acid in detail. | CO2 | U | 10 |
|  | b. | Discuss methods for the analysis of amino acid mixtures. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Define protein denaturation and explain the agents that contribute to it. | CO4 | A | 10 |
|  | b. | Describe the process of transcription in prokaryotes and the role of RNA polymerase. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the chemical properties of amino acids by discussing the following reaction of amino acid with   * Formaldehyde * Nitrous acid * Ninhydrin | CO4 | R | 10 |
|  | b. | Antibodies, classified as glycoproteins, are pivotal components of the immune system, undertaking essential tasks in diverse immune responses and operations. Describe the architecture of an antibody. Elaborate on the involvement of antibodies in hypersensitivity reactions. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define enzymes and categorize them according to their biological functions. | CO5 | A | 10 |
|  | b. | Explain the structure of proteins. Differentiate between any two secondary structures of protein with diagrams. | CO5 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the characteristics of denatured proteins. Explain the process of irreversible denaturation with examples. | CO5 | U | 10 |
|  | b. | Describe the process of translation and the role of tRNA in protein synthesis. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | What are codons? Who discovered Genetic code? Explain salient features of genetic code in detail. | CO2 | R | 10 |
|  | b. | Discuss the main types of biomolecules in detail. | CO1 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the types of Protein mutations. Provide examples of diseases caused by each mutation. | CO6 | R | 10 |
|  | b. | Explain the principles, procedures and applications of PCR technique and DNA sequencing. | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Classify the various types of biomolecules |
| CO2 | Summarize the role of amino acids in forensic science |
| CO3 | Predict the composition of proteins |
| CO4 | Analyze the enzyme action |
| CO5 | Demonstrate the role of nucleic acids in forensic science |
| CO6 | Describe the principles of electrophoresis |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | 10 |  |  |  |  | 30 |
| CO2 | 10 | 20 |  |  |  |  | 30 |
| CO3 | 10 | 10 |  |  |  |  | 20 |
| CO4 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO5 | 10 | 20 | 10 |  |  |  | 40 |
| CO6 | 10 | 10 |  |  |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH1001** | **Duration** | **3hrs** |
| **Course Title** | **ENVIRONMENTAL STUDIES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the effect of over utilization of forest and water resources. | CO1 | U | 10 |
|  | b. | List the advantages and disadvantages of dams | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the different types of energy resources and their uses. | CO1 | A | 10 |
|  | b. | Analyze the role of an individual in the conservation of natural resources. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Elaborate the types and process of ecological succession. | CO2 | U | 10 |
|  | b. | Describe the major threats to biodiversity, with a focus on habitat destruction, climate change, and over-exploitation. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the carbon and nitrogen cycles. | CO2 | A | 10 |
|  | b. | Explain the concept of biodiversity hot spots, and list the biodiversity hot spots in India. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Discuss the causes, effects, and control methods for noise pollution. | CO3 | U | 10 |
|  | b. | Compare the thermal and water pollution. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain its causes, effects, and control methods of air pollution. | CO3 | A | 10 |
|  | b. | Describe the twelve principles of green chemistry. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | How the urban energy problem plays in important role in sustainable development? | CO4 | A | 10 |
|  | b. | Discuss the wild life protection and forest conservation act. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Highlight the causes, symptoms, and diagnostic tests of HIV. | CO5 | An | 10 |
|  | b. | Write short note on the following:   1. Acid rain ii) Ozone layer depletion | CO4 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the management process of the following natural disasters   1. Earthquake ii) Cyclone | CO6 | U | 10 |
|  | b. | Summarize the role of information technology (IT) in safeguarding the environment and human health. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify environmental hazards and its impact on the biosphere. |
| CO2 | Apply practical skills for solving pollution related problems. |
| CO3 | Design strategies to combat environmental issues adopting green technologies. |
| CO4 | Adopt appropriate methods to preserve the environment for sustainable development. |
| CO5 | Assess environmental and social issues by integrating facts, concepts, and trending technologies |
| CO6 | Recommend innovative solutions to the policy makers of the Nation to save Planet Earth |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO2 | 10 | 20 | 10 |  |  |  | 40 |
| CO3 |  | 20 | 10 | 10 |  |  | 40 |
| CO4 | 10 |  | 10 |  |  |  | 20 |
| CO5 |  |  | 10 | 10 |  |  | 20 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH1002** | **Duration** | **3hrs** |
| **Course Title** | **ESSENTIALS OF CHEMISTRY FOR AEROSPACE ENGINEERS** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Describe Isobar. | | CO1 | U | 1 |
| 2. | Recall Rutherford’s atomic model. | | CO1 | R | 1 |
| 3. | State the purpose of protective coatings. | | CO2 | R | 1 |
| 4. | State the purpose of Thinner in paints. | | CO2 | R | 1 |
| 5. | State the analysis of coal. | | CO3 | U | 1 |
| 6. | State the difference between LCV and HCV. | | CO3 | R | 1 |
| 7. | List different types of propellants. | | CO4 | U | 1 |
| 8. | Describe the explosive ‘TNT’. | | CO4 | R | 1 |
| 9. | List the types of electrochemical cell. | | CO5 | U | 1 |
| 10. | State the significance of Absorption Spectroscopy. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | State Heisenberg uncertainty principal in detail. | | CO1 | R | 3 |
| 12. | Define oxidation and reduction reactions. | | CO2 | U | 3 |
| 13. | List and explain any three solid fuels. | | CO3 | R | 3 |
| 14. | Briefly classify explosive. | | CO4 | U | 3 |
| 15. | Explain the working of electro chemical cell with example. | | CO5 | U | 3 |
| 16. | Define EM wave in spectrum. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Illustrate cathode ray tube and thin gold foil experiment in detail. | CO1 | U | 12 |
| 18. |  | Describe the constitutes involved in manufacturing paint and varnish. | CO2 | U | 12 |
| 19. |  | Explain HCV and LCV and list the characteristic of a good fuel. | CO3 | A | 12 |
| 20. |  | Explain the working principle, construction, and application of Bomb Calorimeter with neat sketch. | CO4 | A | 12 |
| 21. |  | Describe primary cell and explain the working principle of the Dry cell, with its advantages and disadvantages. | CO5 | U | 12 |
| 22. |  | Explain the process of analysis of flue gas using Orsat apparatus. | CO4 | A | 12 |
| 23. |  | List and explain different types of high explosives in detail. | CO4 | U | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | A sample of coal was analysed as follows: 2 g of an air-dried coal sample was taken. After heating for an hour at 105-1100C, the dry coal residue weighted 1.985 gm. The crucible was covered with a vented lid and then heated strongly for exactly 7 minutes at 9500C. The residue weighted 1.80 gm. The crucible was then heated strongly in air, until a constant weight was obtained. The last residue was found to weigh 1.10 gm. Evaluate the proximate analysis of given coal sample | CO6 | An | 12 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Examine atomic structures and correlate its properties. |
| **CO2** | Identify the potential applications of protective coating. |
| **CO3** | Summarize the unique properties of fuels and propellants. |
| **CO4** | Illustrate the working principles of explosives. |
| **CO5** | Evaluate the various energy storage systems and conversion devices. |
| **CO6** | Report the techniques involved in spectroscopy. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 4 | 13 | - | - | - | - | 17 |
| **CO2** | 2 | 15 | - | - | - | - | 17 |
| **CO3** | 4 | 1 | 12 | - | - | - | 17 |
| **CO4** | 1 | 16 | 24 | - | - | - | 41 |
| **CO5** | - | 16 | - | - | - | - | 16 |
| **CO6** | - | 4 | - | 12 | - | - | 16 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH1003** | **Duration** | **3hrs** |
| **Course Title** | **APPLIED CHEMISTRY FOR FOOD PROCESSING TECHNOLOGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Give an example of cross linkers used in biopolymer. | | CO1 | U | 1 |
| 2. | A substance or material consisting of very large molecules composed of many repeating subunits is called as \_\_\_\_\_\_\_\_\_\_ | | CO1 | R | 1 |
| 3. | **Which of the following has the weakest bond?**   1. ionic b) covalent c) coordinate d) hydrogen | | CO2 | R | 1 |
| 4. | The shape of ‘p’ orbital is \_\_\_\_\_\_\_\_\_\_\_ | | CO2 | R | 1 |
| 5. | Heterolytic bond cleavage leads to form \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_ | | CO3 | U | 1 |
| 6. | Electrophilic Aromatic Substitution involves the attack on the electrophile by the \_\_\_\_\_\_\_\_\_\_ | | CO3 | R | 1 |
| 7. | Give an example for oxidation (corrosion) product. | | CO4 | U | 1 |
| 8. | Oxidation state of N in NH3 is \_\_\_\_\_\_ | | CO4 | R | 1 |
| 9. | Chemical kinetics is the part of chemical science dealing with the study of \_\_\_\_\_\_\_\_\_\_ reactions. | | CO5 | U | 1 |
| 10. | Visible light range is from \_\_\_\_\_\_\_nm to \_\_\_\_\_\_\_\_\_\_\_\_\_\_nm | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Write short notes on Elasticity and yield stress. | | CO1 | An | 3 |
| 12. | Differentiate between ionic and covalent bond. | | CO2 | R | 3 |
| 13. | Suggest anti Markownikoff’s Rule with an example. | | CO3 | An | 3 |
| 14. | Find out the oxidized and reduced reaction for the following reaction.  Zn(s) + Cu2+ 🡪Zn2+ (aq) +Cu(s) | | CO4 | A | 3 |
| 15. | Explain the chain reaction in chemical kinetics. | | CO5 | U | 3 |
| 16. | Write the short notes on absorption and emission. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the synthesis methods poly caprolactone and poly lactic acid. | CO1 | R | 6 |
|  | b. | Classify the biopolymer based on sources with relevant examples. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Illustrate the types of Chemical Bonds with suitable examples. | CO2 | A | 6 |
|  | b. | Explain the resonance effect with suitable examples. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Describe the **SN1** reaction mechanism with an example. | CO3 | U | 6 |
|  | b. | Write the Mechanism of nitration, bromination and Fridel Crafts reactions. | CO3 | R | 6 |
|  |  |  |  |  |  |
| 20. | a. | Define corrosion of metals. Explain the different type of Corrosion. | CO4 | R | 6 |
|  | b. | Derive Nernst equation and give its application. | CO4 | An | 6 |
|  |  |  |  |  |  |
| 21. | a. | Discuss the reaction rate with the help of Arrehenius theory. | CO5 | U | 6 |
|  | b. | Highlight the kinetics of zero, first, second and third order reactions. | CO5 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain the properties and application of biopolymers. | CO1 | R | 6 |
|  | b. | Describe the inductive effect with suitable example. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 23. | a. | Predict the products with explanation. | CO3 | E | 6 |
|  | b. | Highlight the corrosion control by coating methods with suitable examples. | CO4 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Briefly discuss the instrumentation of UV –Visible spectroscopy and its application. | CO6 | U | 6 |
|  | b. | Describe the principle of Flame photometer and mass spectroscopy and its application. | CO6 | R | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Distinguish between biopolymers and polymers. |
| **CO2** | Identify the effects of functional groups on the stability of molecules. |
| **CO3** | Develop the organic reaction mechanism |
| **CO4** | Test different types of corrosion |
| **CO5** | Predict the order and rate of a chemical reaction |
| **CO6** | Validate the principles of spectroscopy in food technology. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 13 | 1 | 6 | 3 |  |  | 23 |
| **CO2** | 5 | 12 | 6 |  |  |  | 23 |
| **CO3** | 7 | 7 |  | 3 | 6 |  | 23 |
| **CO4** | 7 | 10 | 6 |  |  |  | 23 |
| **CO5** | 1 | 9 | 6 |  |  |  | 16 |
| **CO6** | 6 | 10 |  |  |  |  | 16 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH2001** | **Duration** | **3hrs** |
| **Course Title** | **INORGANIC CHEMISTRY FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the periodic properties of the following.  a) Atomic radii b) Ionization energy  c) Diagonal relationship d) Actinoids contraction. | CO1 | U | 10 |
|  | b. | Discuss salient features of modern periodic table | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain general characteristics of alkali and alkali earth block elements with suitable examples. | CO1 | R | 10 |
|  | b. | Illustrate the periodic trends in d and f block elements. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe various applications of radioisotopes in medical field. | CO2 | U | 10 |
|  | b. | Explain the following terms with suitable examples.   1. Nuclear stability b) Binding energy. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | i) Explain various characteristics of α, β and γ radiation with suitable examples.  ii) Find out the isobars, isotopes and isotones of the following.  a) **234**U92 234Pa91; b) 1H1, 2H1, 3H1 ; c) 40Ar18 40Ca20; d) 226Ra88 227Ac89 | CO2  CO2 | R  A | 06 04 |
|  | b. | Illustrate nuclear reaction classification with examples. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Enumerate Valence bond theory for octahedral complexes. | CO3 | A | 10 |
|  | b. | Describe the key features of Werner’s theory in coordination complex formation. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss the crystal field theory with suitable diagrams. | CO3 | A | 10 |
|  | b. | Enumerate molecular orbital theory with an example. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the role of iron in biochemistry. | CO5 | U | 10 |
|  | b. | Explain the transportation mechanism of O2 and CO2 in biological system. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Elaborate the biochemistry of Zn and Co elements. | CO5 | U | 10 |
|  | b. | Discuss the dietary elements and its sources. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Summarize the effects of the following metal as heavy metal poisoning   1. Cu b) Ba c) Hg d) Pb | CO6 | A | 10 |
|  | b. | What are Schiff bases? Discuss their applications in forensic sciences | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Analyze the periodic properties |
| CO2 | Recognize the applications of radioisotopes |
| CO3 | Relate the nature of bonding in coordination complexes |
| CO4 | Predict the factors affecting the stability of metal complexes |
| CO5 | summarize the importance of metals in biology |
| CO6 | Realize the role of metals in Forensic science |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | 10 | - | - | - | 40 |
| CO2 | 14 | 10 | 16 | - | - | - | 40 |
| CO3 | - | - | 20 | - | - | - | 20 |
| CO4 | - | 10 | 10 | - | - | - | 20 |
| CO5 | 10 | 30 | - | - | - | - | 40 |
| CO6 | - | 10 | 10 | - | - | - | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH2002** | **Duration** | **3hrs** |
| **Course Title** | **PHYSICAL CHEMISTRY FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the determination of dissolved oxygen by Winkler’s method. . | CO1 | U | 10 |
|  | b. | Give an account of the following.   1. Caustic Embrittlement ii) removal methods of DO and DCO2 from boilers | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the sludges and scales with neat diagram. | CO1 | U | 10 |
|  | b. | i) Calculate the carbonate and non carbonate hardness of a sample of water containing the dissolved salts as given below in mgs/lit.Mg(HCO3)2 = 8.3; Ca(HCO3)2 = 41.5; CaSO4 = 14.6; MgCl2 = 22.75 and NaCl = 50.  (Molecular weight Mg(HCO3)2 = 146; Ca(HCO3)2 = 162; CaSO4 = 136; MgCl2 = 95.)  ii) Give the conditions table of alkalinity of water with nature of alkalinity. | CO1  CO1 | A  A | 07  03 |
|  |  |  |  |  |  |
| 3. | a. | Enumerate the refractive index by Abbe's refractometer method. | CO2 | An | 10 |
|  | b. | Discuss surface tension determination by stalagnometer method with neat diagram. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Distinguish viscosity by Ostwald's viscometer method with neat diagram | CO2 | U | 10 |
|  | b. | Describe the effect of temperature on surface tension viscosity. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain differential aeration theory with suitable diagram and equation. | CO3 | U | 10 |
|  | b. | Discuss in detail about mechanism of chemical corrosion with the types of oxide layers. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain electrochemical series with its significance. | CO3 | U | 10 |
|  | b. | Describe in detail about mechanism of hydrogen and hydroxide evolution types corrosion | CO3 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the cell construction hydrogen – oxygen fuel cell with its merits and demerits. | CO4 | R | 10 |
|  | b. | Explain the enzymatic with neat diagram. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Sketch the biogas and biomass plant and explain its working principle with advantages. | CO5 | U | 10 |
|  | b. | Describe the cell construction of dry battery with its merits and demerits. | CO4 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the conditions for low and high quantum yield. Give the laws of photochemistry. | CO6 | U | 10 |
|  | b. | Give an account on phosphorescence principles, instrumentation and applications. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | acquire knowledge on water technology |
| CO2 | analyze various properties of liquid |
| CO3 | gain knowledge on electrochemistry |
| CO4 | differentiate types of corrosion |
| CO5 | learn the applications of bio batteries |
| CO6 | apply the principles of photochemistry |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | 20 | 20 | - | - | - | 40 |
| CO2 | 10 | 20 | - | 10 | - | - | 40 |
| CO3 | 10 | 30 | - | - | - | - | 40 |
| CO4 | 20 | - | - | - | - | - | 20 |
| CO5 | 20 | - | - | - | - | - | 20 |
| CO6 | 10 | 10 | - | - | - | - | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH2003** | **Duration** | **3hrs** |
| **Course Title** | **ORGANIC CHEMISTRY FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Distinguish between covalent and ionic bonds, providing suitable examples. | CO1 | R | 10 |
|  | b. | Explain the inductive effect and their types with examples. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Illustrate hyperconjugation and its role in stabilizing molecular structures. | CO1 | U | 10 |
|  | b. | Identify and explain the electronic effects present in the following compounds.   1. ii. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Evaluate the role of organic chemistry in forensic science. | CO2 | E | 10 |
|  | b. | Describe the characteristics of carbocations, carbanions and free radicals. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Examine the utility of heterocyclic compounds in forensic science. | CO3 | E | 10 |
|  | b. | Identify the general name for the following structures. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the mechanisms of sulfonation and nitration of aromatic electrophilic substitution reactions. | CO4 | R | 10 |
|  | b. | Distinguish between **E1** and **E2** mechanisms with suitable examples. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Predict and explain the products formed in the following reaction. | CO4 | An | 10 |
|  | b. | Discuss the **SN2** reaction mechanism with an example. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Illustrate the “conformation” in the molecule of cyclohexane. | CO5 | U | 10 |
|  | b. | Prepare a detailed report on Geometrical Isomerism with suitable example. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Differentiate between conformation and configuration providing examples. | CO5 | A | 10 |
|  | b. | Analyze the significance of chirality in crime investigations. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe the types of amino acid with suitable examples. | CO6 | R | 10 |
|  | b. | Explain the molecular architecture of proteins with pictorial representations. | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Interpret the chemical structures and its bonding characteristics |
| CO2 | Predict the type of organic reaction mechanisms |
| CO3 | Assess the structures of heterocyclic compounds during the crime scene investigations |
| CO4 | Envisage the reaction intermediates |
| CO5 | Apply the principles of stereochemistry in analyzing organic compounds of forensic importance |
| CO6 | Recommend the nature of the compounds as evidences during forensic investigations |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 |  |  |  |  | 30 |
| CO2 |  | 10 |  | 10 | 10 |  | 30 |
| CO3 |  |  |  | 10 | 10 |  | 20 |
| CO4 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO5 |  | 10 | 10 | 10 |  |  | 30 |
| CO6 | 10 | 10 |  | 10 |  |  | 30 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH2016** | **Duration** | **3hrs** |
| **Course Title** | **CHEMISTRY IN EVERYDAY LIFE** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Differentiate between sickness and disease. | | CO1 | R | 1 |
| 2. | Which of the following is used externally to stop the spread of pathogens: antibiotics or antiseptics? | | CO1 | R | 1 |
| 3. | The quality controller in a perfume industry is known as -------------. | | CO 2 | U | 1 |
| 4. | -------- components in vegetables and fruits eliminate the free radicals generated in our body. | | CO2 | U | 1 |
| 5. | Five different tastes put together as one is known as -------- taste. | | CO 3 | A | 1 |
| 6. | What do you mean by Chinese Syndromes? | | CO3 | A | 1 |
| 7. | The burning sensation of chilly is due to \_\_\_\_\_\_\_\_\_\_. | | CO4 | E | 1 |
| 8. | Air is considered as one among the other ingredients in ice cream. State True/False. | | CO4 | E | 1 |
| 9. | Reason out- why organic foods are costly? | | CO5 | R | 1 |
| 10. | Molecule of excitement is ------ | | CO5 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Write a note on common natural disinfectants. | | CO1 | R | 3 |
| 12. | Stress free life reduces risk on getting diseases – comment on this. | | CO2 | U | 3 |
| 13. | Give the advantages of microban technology used in household articles. | | CO3 | A | 3 |
| 14. | Kitchen gas burner burns yellow when a pot of boiling water overflows. Why? | | CO4 | E | 3 |
| 15. | Chocolates relieve depression – justify. | | CO5 | R | 3 |
| 16. | Write a short note on dopamine. | | CO6 | R | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Can cancer be detected at an early stage? Why is it detected in our country at the 3rd or 4th stage only? | CO1 | R | 6 |
|  | b. | As an individual and engineer, what way can you help yourself and the society to avoid and eradicate so called incurable diseases like AIDS, cancer etc as it was done in the case of polio. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | On what basis a drug will be categorized under ‘Banned Drug’? Give example. | CO3 | E | 6 |
|  | b. | Write a note on ‘NOTES’ term used in perfume industry. When can one use perfume and deodorant? | CO4 | R | 6 |
|  |  |  |  |  |  |
| 19. | a. | Give the advantages and disadvantages of natural dyes. | CO2 | R | 6 |
|  | b. | What is MSG? By regularly adding MSG in our diets the effects like obesity, behavioral changes can be found - give reasons. | CO4 | E | 6 |
|  |  |  |  |  |  |
| 20. | a. | ‘Crying’ is it needed? While cutting onion, our eyes get irritated followed by tears, explain the chemistry involved in this process. | CO5 | A | 6 |
|  | b. | Write a short note on PAH. Are you exposed to PAH? What are the effect of it and how will you avoid the same? | CO6 | U | 6 |
|  |  |  |  |  |  |
| 21. | a. | Give an example for disappearing ink with the chemistry concept. | CO5 | An | 6 |
|  | b. | Negative emotions releases a hormone ‘CORTISOL’ which destroys the immune system - How will you handle your negative emotions and help your immune system? | CO5 | E | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain the chemistry concepts involved in ice cream making. (emulsifier, stabilizer, depression in freezing point). | CO3 | U | 6 |
|  | b. | Write a note on certification marks on grains and pulses. | CO4 | R | 6 |
|  |  |  |  |  |  |
| 23. | a. | Cotton fabrics absorb more water: reason out. | CO4 | An | 6 |
|  | b. | Give the test for identification of adulterant for the following and state the effect of the adulterant.  i) Mango ii) Apple iii) Ghee | CO5 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Iodine – an important element in controlling thyroid gland: give the effect on its deficiency and excess, also which food items can supply the same. | CO4 | A | 6 |
|  | b. | Relate the emotion joy/happiness on the function of serotonin. | CO6 | E | 6 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Discern the practical aspects of chemistry in day-to-day life. |
| **CO2** | Learn chemistry topics through daily activities |
| **CO3** | Contemplate innovative and develop application-oriented products. |
| **CO4** | Gain knowledge in buying certified food products |
| **CO5** | Make the right choice in choosing the right food |
| **CO6** | Acquire right perspective to guard the environment |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 11 |  |  |  |  |  | 11 |
| **CO2** | 6 | 11 |  |  |  |  | 17 |
| **CO3** |  | 6 | 5 |  | 6 |  | 17 |
| **CO4** | 12 |  | 6 | 6 | 11 |  | 35 |
| **CO5** | 5 |  | 12 | 6 | 6 |  | 29 |
| **CO6** | 3 | 6 |  |  | 6 |  | 15 |
|  | | | | | | | **124** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3001** | **Duration** | **3hrs** |
| **Course Title** | **CHEMICAL KINETICS AND SURFACE CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | For a first order reaction t1/2 is 60 mins, what is the rate constant? | CO1 | R | 10 |
|  | b. | Derive the rate constant for the following reaction and give its half-life period.  CaCO3 ⟶ CaO + CO2 | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Derive the rate constant for the following reaction and give its half-life period.  A + B ⟶ C + D | CO1 | U | 10 |
|  | b. | In a first order reaction, the time required was one hour for the decomposition of 50% of the reactant, calculate the rate constant. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Differentiate between molecularity and order of reaction with suitable examples. | CO2 | U | 10 |
|  | b. | Catalyst reduces the activation energy of a chemical reaction and thus speeds the rate- Justify with suitable example. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Given that the rate constant is 11/ M/ s at 345 K and the pre-exponential factor is 20/ M/ s, calculate the activation energy. | CO3 | A | 10 |
|  | b. | Explain in detail on primary and secondary kinetic isotopic effect with suitable example. | CO3 | R | 10 |
|  |  |  |  |  |  |
| 5. |  | Derive an expression for the energy of activation.  If a reaction's rate constant at 298K is 33 /M/ s and 45/ M/ s at 675 K, what is the activation energy? | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Differentiate homogeneous and heterogeneous catalysis with example. | CO4 | E | 10 |
|  | b. | Derive the kinetics of enzyme catalyzed reaction. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the BET isotherm's importance in adsorption studies. | CO5 | A | 10 |
|  | b. | Semiconductor catalysts are efficient in water splitting reactions than metal catalysts- Justify. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Apply Langmuir-Hinshelwood adsorption mechanism for the synthesis of ammonia and give its significance. | CO5 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Explain different photochemical processes with the help of Jablonski diagram. | CO6 | R | 20 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Distinguish the types and kinetics of fast reactions |
| CO2 | Ascertain the kinetics of flow techniques |
| CO3 | Realize the theory of acid – base catalysis |
| CO4 | Learn the applications of surface chemistry |
| CO5 | Recognize the importance of photosensitization of Chemiluminescence |
| CO6 | Apply the principles of photochemistry |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 |  |  |  |  | 20 |
| CO2 |  | 30 | 10 |  |  |  | 40 |
| CO3 | 10 |  | 30 |  |  |  | 40 |
| CO4 | 10 |  |  |  | 10 |  | 20 |
| CO5 |  |  | 30 | 10 |  |  | 40 |
| CO6 | 20 |  |  |  |  |  | 20 |
| 50 40 70 10 10 | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3002** | **Duration** | **3hrs** |
| **Course Title** | **CHEMICAL BONDING AND MAIN GROUP CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Summarize the salient features of valence bond theory. | CO1 | U | 10 |
|  | b. | Provide justification for the following statements:   1. Alkali metals are strong reducing agents. 2. Lithium bromide (LiBr) has greater covalent character compared to potassium bromide (KBr). 3. Crown ethers are used for the extraction of alkali and alkaline earth metals. 4. Most of the beryllium compounds exhibit covalent bonding characteristics. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the Berry pseudorotation with an example. | CO2 | A | 10 |
|  | b. | Draw the energy level diagrams for the He2+ and H2 molecules using molecular orbital theory. Calculate their bond orders and comment on their magnetic behavior. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the following with an example.   1. Hydrogen bond 2. F-centre 3. Perovskite structure 4. Enantiotropic allotropes | CO1 | R | 10 |
|  | b. | Determine the enthalpy of formation of NaCl using the Born–Haber cycle method, if ΔHsub = 108.5 kJ mol−1, IE = 495.8 kJ mol−1, ΔHdiss = +122 kJ mol−1, EA = −349 kJ mol−1, U = −788 kJ mol−1 | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Derive the Born–Landé equation. | CO3 | A | 10 |
|  | b. | Discuss the defects in solid-state lattices with suitable examples. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | What is Grignard reagent? Explain the preparation and application of Grignard reagent. | CO3 | An | 10 |
|  | b. | Complete the following reaction   1. P4 + O2 → 2. XeF2 + AsF5 → 3. XeF4 + H2O **→** 4. B2H6 + NH3 → 5. Na + NH3 → | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the following   1. Fajans rule 2. Lattice Energy 3. Hess' Law 4. Radius ratio rule | CO3 | A | 10 |
|  | b. | Describe the synthesis and structural characteristics of beryllium chloride, beryllium dihydride, and dimethylberyllium. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Define allotrope? Explain the synthesis and structural properties of sulphur allotropes. | CO4 | A | 10 |
|  | b. | Explore the synthesis and structure of oxides of nitrogen. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Examine the synthesis, structure and bonding properties of interhalogens and pseudohalides. | CO5 | A | 10 |
|  | b. | Explain the preparation, properties and structure of the xenon-fluorine compounds. | CO5 | A | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the classification of borane with suitable examples. | CO6 | A | 10 |
|  | b. | Discuss the following   1. Wades rule 2. styx number 3. 3c-2e bond 4. Carborane | CO6 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Analyze the nature of chemical bonds and their properties |
| CO2 | Relate the chemistry properties of s-block elements |
| CO3 | Assess the structural and chemical properties of s-block elements |
| CO4 | Distinguish the structure, bonding and properties of nitrogen, phosphorous and sulfur |
| CO5 | Identify the structure, bonding and properties of interhalogen and compounds of xenon |
| CO6 | Recognize the inorganic chains, rings and cages |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 |  | 10 | - | - | 40 |
| CO2 | - | 10 | 10 | 10 | - | - | 30 |
| CO3 | - | - | 20 | 20 | - | - | 40 |
| CO4 | - | - | 20 | 10 | - | - | 30 |
| CO5 | - | - | 20 | - | - | - | 20 |
| CO6 | - | - | 10 | 10 | - | - | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3003** | **Duration** | **3hrs** |
| **Course Title** | **REACTION MECHANISMS AND STEREOCHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the aromaticity, anti aromaticity and nonaromaticity of the following annulenes with the structure.   1. [6] Annulene b) [8] Annulene c) [12] Annulene   d) [20] Annulene e) [22] Annulene | CO1 | U | 10 |
|  | b. | Explain hyperconjugation and resonance effects with examples. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain inductive and steric effects with suitable examples. | CO1 | R | 10 |
|  | b. | Illustrate the Hammett equation and linear free energy relationship. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the highest dipole moment of the following fulvene compounds.   1. Tria fulvene b) Penta fulvene c) Hepta fulvene d) Nona fulvene | CO2 | U | 10 |
|  | b. | Explain the types of fulvalene with suitable examples. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the bi-molecular substitution reaction with examples. | CO2 | R | 10 |
|  | b. | Prioritize the arenium ion mechanism and its steps. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Enumerate sulphonation electrophilic substitution reaction with suitable example. | CO3 | A | 10 |
|  | b. | Discuss the Friedel-Crafts alkylation reaction with suitable mechanism. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Summarize the effects of variations of substrates in SN reactions. | CO4 | U | 10 |
|  | b. | Enumerate the SNAr- Aromatic Nucleophilic Substitution with example. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the Cahn –Ingold-Prelog priority sequence rules with examples. | CO5 | U | 10 |
|  | b. | Explain the following projections of conformation with example.   1. Newman projection b) Sawhorse projection | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Elaborate the E-Z isomerism with examples. | CO5 | U | 10 |
|  | b. | Discuss the R-S configuration with suitable examples. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Summarize the conformational analysis of cyclohexane with neat diagram. | CO6 | A | 10 |
|  | b. | Describe the conformations of butane with neat diagram. | CO6 | U | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Elucidate the role of electronic effects in predicting the reaction pathway. |
| CO2 | Propose the possible mechanism for organic transformation. |
| CO3 | Predict the product formed in the reaction by applying the mechanism. |
| CO4 | Explicate the product selectivity in the organic reactions. |
| CO5 | Assign configuration for chiral molecule and predict stable conformer. |
| CO6 | Create newer stereoselective molecules by applying the organic reactions |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 20 | 10 | - | - | - | 40 |
| CO2 | 20 | 10 | 10 | - | - | - | 40 |
| CO3 | - | - | 20 | - | - | - | 20 |
| CO4 | - | - | 20 | - | - | - | 20 |
| CO5 | 10 | 30 | - | - | - | - | 40 |
| CO6 | - | 10 | 10 | - | - | - | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3016** | **Duration** | **3hrs** |
| **Course Title** | **ANALYTICAL CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the various types of errors in chemical analysis. | CO1 | A | 10 |
|  | b. | Explain the following: Mean, median, mode, accuracy and precision. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define the Significant figures and how will you improve accuracy of analysis. | CO1 | A | 10 |
|  | b. | Classify the concept of covariance and coefficient correlations. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the principle, instrumentation and applications of GC. | CO2 | A | 10 |
|  | b. | Narrate the concept of ion-exchange resin for purification of water. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Illustrate the principle and applications of paper and column chromatography. | CO2 | A | 10 |
|  | b. | How to examine the purity of organic compounds using various chromatography techniques? | CO3 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Discuss the principle, instrumentation and applications of HPLC technique. | CO3 | A | 10 |
|  | b. | Classify the factors affecting the thermometric curves and DSC curves. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Elaborate the principle, instrumentation of TGA and DSC techniques. | CO4 | An | 10 |
|  | b. | Discuss the applications of thermometric analysis and DTA analysis. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | How the thermometric titration will be used to estimate the heat change in the reactions? Explain. | CO4 | An | 10 |
|  | b. | Discuss the application of SEM in surface analysis. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss the instrumentation and application XRD technique. | CO5 | A | 10 |
|  | b. | Describe the instrumentation and application of AAS system. | CO5 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the suitable instrumental method used for water analysis. | CO6 | U | 10 |
|  | b. | List the chemical sensors used in food analysis and body fluid analysis. | CO6 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | understand the range and theories of instrumental methods available in analytical chemistry |
| CO2 | select the appropriate instruments for analyzing complex mixtures |
| CO3 | choose the proper separation technique |
| CO4 | know the importance of thermal methods of analysis |
| CO5 | analyze the sample using microscopic techniques |
| CO6 | recognize the importance of instrumentation techniques in paint, glass, paper, water, food, body fluid analysis. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO2 |  |  | 20 | 10 |  |  | 30 |
| CO3 |  |  | 10 | 20 |  |  | 30 |
| CO4 |  | 10 |  | 20 |  |  | 30 |
| CO5 |  | 10 | 20 |  |  |  | 30 |
| CO6 |  | 10 |  | 10 |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3022** | **Duration** | **3hrs** |
| **Course Title** | **APPLIED ELECTROCHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Analyze the procedure to measure the electrode potential using standard hydrogen electrode and potentiometer. | CO1 | An | 15 |
|  | b. | By applying Nernst equation explain the e.m.f of a concentration cell. | CO1 | A | 05 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain redox reactions and applying this concept design Daniel cell and calculate its e.m.f. | CO1 | A | 15 |
|  | b. | What are the valuable informations provided by electromotive series and explain each of them. | CO1 | U | 05 |
|  |  |  |  |  |  |
| 3. | a. | Explain the principles of coulometry and analyse the relationship between Q and I. | CO2 | U | 05 |
|  | b. | Applying the principles of current-voltage relation explain chronoamperometry technique with a diagram. | CO2 | A | 15 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Analyse the conductivity of ions in strong and weak acid pairs and the results of conductometric titrations for the four types of acid-base pairs. Write the advantages and disadvantages of conductometric titrations. | CO2 | An | 20 |
|  |  |  |  |  |  |
| 5. |  | By applying the principles of electrochemical synthesis explain the preparation of chlorate synthesis. | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Analyze how carbonyl groups undergo electro reduction process. | CO3 | An | 10 |
|  | b. | Explain the electrodimerisation process and how adiponitrile is prepared using this process. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Analyze the process of electro winning of copper and explain how it helps in the electro refining process of copper. | CO4 | A | 15 |
|  | b. | Explain the reactions at anode and cathode in an electrochemical cell for magnesium extraction. | CO4 | U | 05 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Analyze the process of anodizing and explain the various steps involved in the process with a diagram. | CO4 | An | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Apply the principles of redox reactions for the process of lead acid battery operation. | CO5 | A | 10 |
|  | b. | Analyse the types of batteries used for battery electric vehicles. | CO6 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recollect the fundamentals of electrochemistry. |
| CO2 | Relate the principles of electroanalytical techniques. |
| CO3 | Recognize different electrochemical synthetic routes. |
| CO4 | Apprehend the concept of electrometallurgy and electroplating procedures. |
| CO5 | Classify the batteries based on their application. |
| CO6 | Apply electrochemical principles on efficiency of electrical vehicles. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 05 | 20 | 15 |  |  | 40 |
| CO2 |  | 05 | 15 | 20 |  |  | 40 |
| CO3 |  | 10 | 20 | 10 |  |  | 40 |
| CO4 |  | 05 | 15 | 20 |  |  | 40 |
| CO5 |  |  | 10 |  |  |  | 10 |
| CO6 |  |  |  | 10 |  |  | 10 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3023** | **Duration** | **3hrs** |
| **Course Title** | **RESEARCH METHODOLOGY AND IPR** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | What do you mean by Literature Search? Explain its salient features. | CO1 | A | 10 |
|  | b. | Expand CAS and DOI number. Discuss its significance in the research. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | How will you calculate impact factor of anyresearch journal. | CO1 | An | 10 |
|  | b. | Explain the protocols in the identification of research problem from the literature. | CO1 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the tools available in the structure ballet in chemdraw software. | CO2 | U | 10 |
|  | b. | How many structure tools were used to draw the following structures? | CO2 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the tools available in the cyber forensics. | CO2 | An | 10 |
|  | b. | How will you extract phytochemicals using soxhlet apparatus? Explain with diagram. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Illustrate the process of Karl-Fisher titrations to estimate the moisture content. | CO3 | A | 10 |
|  | b. | Describe the concept of rotary evaporator to remove the organic solvents. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Outline the components present in a manuscript of the research publication. | CO4 | An | 10 |
|  | b. | Differentiate the formal report and informal report with examples | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the various components in a research proposal draft. | CO4 | E | 10 |
|  | b. | What do you mean by research ethics and research misconduct? Explain. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss the various types of plagiarism and its consequences. | CO5 | A | 10 |
|  | b. | Elaborate the deciding factors of a best researcher in terms of their research contributions. | CO5 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | We need to file a patent of our innovations with its procedure? Justify. | CO6 | An | 10 |
|  | b. | Differentiate the patent designs, trademarks, copyright and GIR. | CO6 | E | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | formulate the chemical reaction design and set-ups |
| CO2 | realize the potential applications of chemical softwares |
| CO3 | relate the available informatics applications for the design of potential molecules |
| CO4 | analyze the components of rating like impact factor, citation index |
| CO5 | learn the procedure for IPR |
| CO6 | describe a research problem using the available chemistry resources. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 10 | 10 | 10 | 10 |  | 40 |
| CO2 |  | 10 |  | 10 | 10 |  | 30 |
| CO3 |  |  | 20 | 10 |  |  | 30 |
| CO4 |  |  | 10 | 10 | 10 |  | 30 |
| CO5 |  |  | 10 | 20 |  |  | 30 |
| CO6 |  |  |  | 10 | 10 |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3025** | **Duration** | **3hrs** |
| **Course Title** | **MEDICINAL CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Illustrate the process of drug discovery development with a suitable example. | CO1 | A | 10 |
|  | b. | How will you design drugs for the delivery system? Explain with examples. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the concept of receptor structure and active sites. | CO1 | An | 10 |
|  | b. | Describe the mechanism of drug action on lipids and carbohydrates. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | What do you mean by ADME? Explain the concept of pharmacokinetics. | CO2 | An | 10 |
|  | b. | Narrate the pharmacokinetic parameters and its uses in drug developments. | CO2 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the process of enzyme stimulation and enzymatic inhibition. | CO2 | A | 10 |
|  | b. | Discuss the parameters for the development of new drugs. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Illustrate the concept of pro-drugs and soft-drugs with examples | CO3 | E | 10 |
|  | b. | Write a short notes on the concepts of lead compound and lead modification. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss the benefits of QSAR. | CO4 | A | 10 |
|  | b. | Discuss the process of synthesis and evaluation of Enzyme Inhibitors. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Outline the process of DNA-Receptor and DNA-Drug interactions. | CO5 | E | 10 |
|  | b. | Elaborate the concept of LD50 and ED5 with suitable examples. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain Lipophilicity and partition coefficient. | CO5 | U | 10 |
|  | b. | Describe the side effects and use of Penicillin-V and Cephalosporin. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Write short notes on cardiovascular disease and arteriolar dilators. | CO6 | A | 10 |
|  | b. | Illustrate the mode of action and side effects of cardiovascular drugs. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Comprehend the basic principles of drug metabolism and pharmacokinetics |
| CO2 | Assess the biochemical and physiological effects of drugs through pharmacodynamics |
| CO3 | Build knowledge on the drug design with their classification and their recent developments |
| CO4 | Acquire the importance of various enzyme structure elucidation & DNA drug interactions |
| CO5 | Analyze the different medicines required for different diseases with respect to their metabolism |
| CO6 | Create a general awareness about the medicines and diseases in the society. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  |  | 20 | 20 |  |  | 40 |
| CO2 |  |  | 10 | 10 | 10 |  | 30 |
| CO3 |  |  | 10 | 10 | 10 |  | 30 |
| CO4 |  |  | 20 |  |  |  | 20 |
| CO5 |  | 10 |  | 10 | 10 |  | 30 |
| CO6 |  |  | 20 | 10 |  |  | 30 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3028** | **Duration** | **3hrs** |
| **Course Title** | **WASTE TO ENERGY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (5 X 16 = 80 MARKS)**  **(Answer any five from the following)** | | | | | |
| 1. | a. | Describe the chemical properties of Municipal Solid waste (MSW). Find out total energy of MSW. | CO1 | U | 10 |
|  | b. | Calculate the energy content of solid waste having following composition using modified Dulongs formula: Carbon is 36.5%, Hydrogen is 7.3%, Oxygen is 51.1%, Nitrogen 0.5%, Sulfur is 0.1% and Ash is 4.7%. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 2. | a. | Define the top-down and bottom-up methods for synthesizing catalysts and briefly explain each approach. | CO2 | A | 10 |
|  | b. | Describe the mechanism for heterogeneous catalysts and include a schematic diagram to illustrate the process. | CO2 | R | 6 |
|  |  |  |  |  |  |
| 3. | a. | Highlight the principle and instrumentation of Gas chromatography. | CO3 | R | 8 |
|  | b. | Explain the mechanism of the transesterification reaction for biodiesel production. | CO3 | U | 8 |
|  |  |  |  |  |  |
| 4. | a. | Describe the construction and working model of floating dome biogas plant. | CO4 | R | 10 |
|  | b. | Explain the steps involved in the production of biogas, highlighting the mechanism of each stage. | CO4 | U | 6 |
|  |  |  |  |  |  |
| 5. | a. | Define the biomass pyrolysis. Explain the heat rate involved in pyrolysis process. | CO5 | U | 10 |
|  | b. | Highlight the application of activated charcoal. | CO5 | R | 6 |
|  |  |  |  |  |  |
| 6. | a. | Explain the synthesis method of homogeneous catalyst with suitable schematic diagram. | CO2 | U | 10 |
|  | b. | Write short note on physical and chemical properties of biodiesel. | CO3 | R | 6 |
|  |  |  |  |  |  |
| 7. | a. | Analyze the issue of the energy crisis and evaluate how biodiesel can be a solution. | CO4 | An | 10 |
|  | b. | Explain the supercapacitor mechanism with Helmholtz electrode double layer. | CO5 | U | 6 |
| **PART – B (1 X 20 = 20 MARKS) [Compulsory Question]** | | | | | |
| 8. | a. | Briefly discuss the construction and working method for fixed bed gasifier. | CO6 | U | 10 |
|  | b. | Write a short notes on the benchmark performance parameters in a gasifier. | CO6 | A | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Understand the concept of waste to energy conversion, based on its properties |
| CO2 | Select the conditions for biomass pyrolysis. |
| CO3 | Develop a small size biomass gasifier. |
| CO4 | Prepare biodiesel and analyze its performance. |
| CO5 | Understand the current research scenario in waste to energy application |
| CO6 | Design a community biogas plant. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 |  | 10 | 6 |  |  |  | 16 |
| CO2 | 6 | 10 | 10 |  |  |  | 26 |
| CO3 | 14 | 8 |  |  |  |  | 22 |
| CO4 | 10 | 6 |  | 10 |  |  | 26 |
| CO5 | 6 | 16 |  |  |  |  | 22 |
| CO6 |  | 10 | 10 |  |  |  | 20 |
|  | | | | | | | **132** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3030** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC CHEMISTRY** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Clarify the test methods for adulteration of petroleum products. | CO1 | An | 10 |
|  | b. | Highlight the BIS specifications of petrol, kerosene and diesel. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the extraction method of petroleum products from crude oil. | CO1 | U | 10 |
|  | b. | Explain the importance of analysis of dyes in petroleum products related to forensic science | CO1 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe flashover in a fire case, providing a suitable example to illustrate the phenomenon. | CO2 | R | 10 |
|  | b. | Explain the procedure of an explosion incident with suitable diagram? | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss the instrumental techniques used to analyze the arson residues. | CO2 | An | 10 |
|  | b. | Discuss the types of fire extinguishers with suitable examples. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Discuss the chemistry of explosives with suitable examples. | CO3 | U | 10 |
|  | b. | Classify the explosive materials based on their properties. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the following:   1. Vapor cloud explosion 2. Dust Explosion | CO3 | R | 10 |
|  | b. | Classify the different types of cement materials, providing suitable examples for each category. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Examine the methods used to analyze cosmetic materials and assess their role in crime investigations. | CO4 | An | 10 |
|  | b. | Explain the health effect of chemical dyes used in food products. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the forensic significance of trap chemicals. | CO5 | U | 10 |
|  | b. | Discuss the method used for fertilizer analysis. | CO5 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the powers of Central Govt. and Licensing Authority, offences and penalties under the Explosives Act 1984. | CO6 | R | 10 |
|  | b. | Enunciate the salient features of Narcotic Drugs & Psychotropic Substances Act 1985. | CO6 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | understand the types of petroleum products and their analysis |
| CO2 | relate the conditions for fire and scientific concept of evaluation of clue materials |
| CO3 | analyze the classification and composition of important explosive substances |
| CO4 | learn the characteristics of narcotics, drugs, psychotropic substances and alcoholic beverages |
| CO5 | illustrate about testing of narcotics, drugs and psychotropic substances |
| CO6 | outline the importance of analyzing narcotics, drugs and psychotropic substances |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | 20 | 10 |  | 10 |  |  | 40 |
| CO2 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO3 | 10 | 10 | 10 | 10 |  |  | 40 |
| CO4 |  | 10 |  | 10 |  |  | 20 |
| CO5 | 10 | 10 |  |  |  |  | 20 |
| CO6 | 10 |  |  | 10 |  |  | 20 |
|  | | | | | | | **180** |

A black background with red text

Description automatically generated

**END SEMESTER EXAMINATION – NOV / DEC 2024**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3032** | **Duration** | **3hrs** |
| **Course Title** | **INSTRUMENTAL METHODS OF ANALYSIS – I** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Elaborate the principle, instrumentation, and forensic uses of atomic emission spectroscopy | CO1 | A | 10 |
|  | b. | Discuss the key principle of atomic absorption spectrometry (AAS), its instrumentation, and forensic applications | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the principle, instrumentation, and forensic uses of Inductively Coupled Plasma Mass Spectrometry. | CO1 | A | 10 |
|  | b. | Define the following terms:   1. Beer-Lambert Law 2. Chromophore 3. Fluorescence 4. Phosphorescence | CO3 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the principle, instrumentation, and forensic applications of photoacoustic spectroscopy with a case study. | CO1 | An | 10 |
|  | b. | What is photophysical process? Describe the different photophysical processes, illustrating them with a Jablonski diagram. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Define the following terms:   1. What is the Stokes shift? 2. What is quantum yield? 3. Can you explain the photoacoustic effect? 4. How fluorescence lifetime is measured? | CO3 | U | 10 |
|  | b. | Describe the principles, instrumentation, and potential uses of X-ray fluorescence spectrometry in the field of forensic science. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Provide a summary of the principles and forensic applications for the following techniques:   1. Near-IR Spectroscopy 2. IR Micro Spectroscopy 3. Far-IR Spectroscopy | CO2 | U | 10 |
|  | b. | Explain the principle and instrumentation of Mid-IR spectroscopy, as well as its utilization in forensic investigations. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss the principles, instrumentation, and forensic applications of Raman spectroscopy, with the case study. | CO2 | A | 10 |
|  | b. | Provide a brief explanation of the following concepts:   1. Stokes scattering 2. Anti-Stokes scattering. 3. Combination bands 4. Fingerprint region | CO2 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Provide the definitions for the following concepts:   1. Coupling constant 2. Shielding 3. Deshielding 4. Chemical shift 5. Zeeman effect | CO4 | U | 10 |
|  | b. | Analyze the expected number of signals, chemical shifts, and splitting patterns in the 1H NMR spectrum for each of the following compounds. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Could you elaborate on the principles, instrumentation, and forensic applications of Coulometry? | CO6 | A | 10 |
|  | b. | (i) What are the different types of conductometric titrations?  (ii) What is the process of radioactive decay? | CO5 | R | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe the forensic significance of radiochemical methods and neutron activation analysis | CO5 | An | 10 |
|  | b. | Explain the principle, instrumentation, and forensic applications of potentiometry with an case study | CO6 | An | 10 |

**CO** – COURSE OUTCOME **BL** – BLOOM’S LEVEL **M** – MARKS ALLOTTED

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Describe the fundamental principles of atomic spectroscopy |
| CO2 | Recognize and comprehend the principles underlying IR and Raman spectroscopy. |
| CO3 | Apply the principles of electronic spectroscopy effectively |
| CO4 | Demonstrate a thorough understanding of the principles of NMR spectroscopy |
| CO5 | Anticipate and appreciate the significance of radiochemical methods in forensic science. |
| CO6 | Utilize the role of electrochemical methods in forensic science to enhance their investigative skills. |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Assessment Pattern as per Bloom’s Taxonomy** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| CO1 | - | - | 30 | 10 | - | - | 40 |
| CO2 | - | 20 | 20 |  | - | - | 40 |
| CO3 | 10 | 10 | 20 |  | - | - | 40 |
| CO4 | - | 10 | - | 10 | - | - | 20 |
| CO5 | 10 | - | - | 10 | - | - | 20 |
| CO6 | - | - | 10 | 10 | - | - | 20 |
|  | | | | | | | **180** |