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**END SEMESTER EXAMINATION – NOV/DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **18CH2001** | **Duration** | **3hrs** |
| **Course Title** | **Environmental Studies** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)**  **(Answer all the questions)** | | | | | |
| 1. | List at least two renewable energy resources. | | CO1 | R | 1 |
| 2. | Infer the problems due to water logging in a densely populated area. | | CO1 | U | 1 |
| 3. | Give an example for an apex predator in a forest ecosystem. | | CO2 | R | 1 |
| 4. | The food chains in an ecosystem will never end even if they are exploited uncontrollably. Say True or False. | | CO2 | U | 1 |
| 5. | Define the term biodiversity. | | CO3 | R | 1 |
| 6. | List two mega-biodiverse nations of the world. | | CO3 | U | 1 |
| 7. | Point out the sources of land polluting agents. | | CO4 | R | 1 |
| 8. | Identify any two harmful effects of thermal pollution. | | CO4 | U | 1 |
| 9. | Name any two natural disasters in the recent times in India. | | CO5 | R | 1 |
| 10. | List at least two worst industrial disasters which happened in the world outside India. | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)**  **(Answer all the questions)** | | | | | |
| 11. | Identify the causes of soil erosion that is accelerated by human activities. | | CO1 | U | 3 |
| 12. | Compare and contrast natural ecosystems and artificial ecosystems. | | CO2 | A | 3 |
| 13. | Explain ecosystem biodiversity in brief. | | CO3 | U | 3 |
| 14. | List out the major air pollutants. | | CO4 | A | 3 |
| 15. | Point out the ways in which Sustainable Development Goals (SDGs) can be achieved. | | CO5 | U | 3 |
| 16. | Identify the factors causing the population to grow exponentially in a developing nation like India. | | 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. |  | Assess the harmful effects of deforestation in about 400 words. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Describe in detail about the biotic components of an ecosystem. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Elaborate in detail the values of biodiversity which is the essence of life on planet earth. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Examine the causes, and effects of water pollution and suggest a few control measures to curb water pollution. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Describe in detail about the causes of climate change and suggest steps to control climate change. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | List out a few advantages and disadvantages of dams. | CO1 | R | 6 |
|  | b. | Explain the process of energy flow in an ecosystem. | CO2 | R | 6 |
|  |  |  |  |  |  |
| 23. | a. | Based on the understanding of biodiversity, explain how habitat loss is a threat to biodiversity. | CO3 | U | 6 |
|  | b. | Outline the harmful effects of noise pollution. | CO4 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Evaluate in detail the methods of controlling flash floods which have become a threat to national security in the recent days. | CO6 | E | 6 |
|  | b. | Enumerate the efforts carried out by governments to curb population explosion. | CO6 | E | 6 |

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

|  |  |
| --- | --- |
|  | **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 |

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**END SEMESTER EXAMINATION – NOV/DEC 2025**

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

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Give an account of the following.   1. Caustic Embrittlement ii) removal methods of DO and DCO2 from boilers | CO1 | A | 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 = 6.3; Ca(HCO3)2 = 39.5; CaSO4 = 12.6; MgCl2 = 22.5 and NaCl = 45.  (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 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the determination of dissolved oxygen by Winkler’s method. . | CO1 | R | 10 |
|  | b. | Describe the reverse Osmosis method for desalination of water | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss surface tension determination by stalagnometer method with neat diagram. | CO2 | U | 10 |
|  | b. | Distinguish Viscosity by Ostwald's viscometer method with neat diagram | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the effect of temperature on surface tension viscosity. | CO2 | R | 10 |
|  | b. | Enumerate the refractive index by Abbe's refractometer method. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain in detail about mechanism of hydrogen and hydroxide evolution types corrosion | CO3 | R | 10 |
|  | b. | Explain differential aeration theory with suitable diagram and equation. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain in detail about mechanism of chemical corrosion with the types of oxide layers. | CO4 | U | 10 |
|  | b. | Describe the electrochemical series with its significance. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the enzymatic mechanism with neat diagram. | CO5 | U | 10 |
|  | b. | Sketch the biogas plant and explain its working principle with advantages. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the cell construction hydrogen – oxygen fuel cell with its merits and demerits. | CO4 | U | 10 |
|  | b. | Describe the cell construction of lead acid battery with its merits and demerits. | CO4 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Give an account on phosphorescence principles, instrumentation and applications. | CO6 | A | 10 |
|  | b. | State the laws of photochemistry. Explain the conditions for low and high quantum yield. | CO6 | U | 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 |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Differentiate between covalent and ionic bonds, providing suitable examples. | CO1 | R | 10 |
|  | b. | Illustrate the sp3hybridization with an example. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Illustrate hyperconjugation and its role in stabilizing molecular structures. | CO2 | U | 10 |
|  | b. | A diagram of a chemical structure  AI-generated content may be incorrect. Identify and explain the electronic effects present in the following compounds.   1. ii. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Evaluate the significance of organic chemistry in resolving forensic cases. | CO2 | E | 10 |
|  | b. | Draw the structures for the following heterocyclic compounds.  i. Quinoline ii. Pyridine iii. Pyrimidine iv. Indole  v. Imidazole | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Examine the characteristics of carbocations, carbanions and free radicals. | CO3 | A | 10 |
|  | b. | Categorize the following as Aromatic / Non-Aromatic. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the E1 elimination mechanism with an example. | CO4 | U | 10 |
|  | b. | Illustrate the mechanism of bromination with an example. | CO4 | U | 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 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Envisage the potential consequences of isomerism in forensic drug analysis. | CO5 | A | 10 |
|  | b. | Discuss the conformation in the molecule of Ethane. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Distinguish racemization and resolution taking Lactic acid as an example. | CO5 | A | 10 |
|  | b. | Summarize Geometrical Isomerism taking 2-butene as an example. | CO5 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Elucidate the structural organization of proteins, describing each hierarchical level in detail. | CO6 | U | 10 |
|  | b. | Classify natural amino acids. | 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 |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23CH2005** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC TOXICOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | | |
| 1. | a. | Explain the broad classifications of drugs, providing examples for each category | | CO1 | U | 10 |
|  | b. | Analyze the postmortem changes affect the determination of approximate time of death in forensic investigation | | CO1 | An | 10 |
|  |  | **(OR)** | |  |  |  |
| 2. | a. | Illustrate the presumptive and screening tests are available for detecting narcotics and psychotropic substances in biological samples | | CO1 | A | 10 |
|  | b. | Discuss the methods used for collecting ante-mortem blood and post-mortem blood | | CO2 | A | 10 |
|  |  |  | |  |  |  |
| 3. | a. | Describe the classification and chemical composition of alcoholic beverages | | CO3 | U | 10 |
|  | b. | Explain the instrumental methods used for analysis of narcotic drugs | | CO2 | A | 10 |
|  |  | **(OR)** | |  |  |  |
| 4. | a. | Analyze the processes involved in the pharmacokinetics of ethanol in the human body | | CO3 | An | 10 |
|  | b. | Describe the methods used for estimating ethyl alcohol in blood and urine | | CO4 | A | 10 |
|  |  |  | |  |  |  |
| 5. | a. | Explain the steps involved in managing a crime scene for illicit liquor cases | | CO5 | U | 10 |
|  | b. | Explain the classification of poisons with example | | CO4 | A | 10 |
|  |  | **(OR)** | |  |  |  |
| 6. | a. | Discuss the different mode of action of animal poisons | | CO4 | A | 10 |
|  | b. | Describe the methods employed in the extraction process of poisons from different matrices | | CO4 | A | 10 |
|  |  |  | |  |  |  |
| 7. | a. | Summarize the significance of toxicological analysis in forensic investigations | | CO6 | An | 10 |
|  | b. | Analyze the similarities and differences between drug dependence, drug addiction, and drug habituation | | CO3 | An | 10 |
|  |  | **(OR)** | |  |  |  |
| 8. | a. | Explain the various factors that contribute to the drug dependence | | CO3 | U | 10 |
|  | b. | Critique the relationship between drug addiction and criminal behavior. | | CO6 | E | 10 |
| **COMPULSORY QUESTION** | | | | | | |
| 9. | a. | Analyze the causes, symptoms and different treatment methods of bacterial food poisoning | | CO6 | U | 10 |
|  | b. | Evaluate the salient features of the NDPS Act | | CO6 | An | 10 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Define the properties of Narcotics, Drugs and Psychotropic Substances |
| CO2 | Classify the various types of toxins and their analysis as per the nature of crime |
| CO3 | Summarize the medico-legal importance of the narcotic drugs and psychotropic substances |
| CO4 | Identify the post-mortem findings for different poisons |
| CO5 | Evaluate the forensic identification of illicit liquors |
| CO6 | Speculate drugs using various methods |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23CH2013** | **Duration** | **3hrs** |
| **Course Title** | **BIOCHEMISTRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define nucleic acids and mention their main components. | CO1 | R | 10 |
|  | b. | Explain the difference between DNA and RNA. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the structure of a nucleotide with an example. | CO1 | U | 10 |
|  | b. | Explain the role of nitrogenous bases in nucleic acid pairing. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | List the essential and non-essential amino acids. | CO2 | R | 10 |
|  | b. | Explain the physicochemical properties of amino acids. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the chemical reactions of amino acids. | CO2 | R | 10 |
|  | b. | Explain how amino acid composition is determined from polypeptides. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Define proteins and state their biological importance. | CO3 | U | 10 |
|  | b. | Explain the structure and types of peptides. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe the process of protein estimation using simple methods. | CO3 | R | 10 |
|  | b. | Explain the general metabolism of carbohydrates, fats, and amino acids. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe enzymes and list their types. | CO4 | R | 10 |
|  | b. | Explain enzyme inhibition with examples. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the factors affecting enzyme activity. | CO5 | U | 10 |
|  | b. | Explain the principle of enzyme assay using UV-Vis method. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe electrophoresis and its basic principle. | CO6 | R | 10 |
|  | b. | Explain the forensic applications of electrophoresis. | CO6 | U | 10 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Identify the various types of biomolecules. |
| CO2 | Review the role of biomolecules such as amino acids and proteins. |
| CO3 | Relate to concepts of enzyme kinetics. |
| CO4 | Illustrate antigen–antibody interactions. |
| CO5 | Differentiate biochemical techniques based on application. |
| CO6 | Assess the role of electrophoretic techniques. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

|  |  |  |  |
| --- | --- | --- | --- |
| **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. | Differentiate between: antiseptic, sterilization and disinfection? | | CO1 | R | 3 |
| 12. | Write a note on preventing diabetes through proper diet and stress free life? | | CO2 | U | 3 |
| 13. | The foaming in tooth paste is due to what? How much % of SLS is allowed? | | CO3 | A | 3 |
| 14. | Give reason. Kitchen gas burner burns yellow when a pot of boiling water overflows? | | CO4 | E | 3 |
| 15. | What is a balanced diet? | | 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 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 |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23CH3007** | **Duration** | **3hrs** |
| **Course Title** | **CHEMICAL THERMODYNAMICS AND ELECTROCHEMISTRY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the types of thermodynamic processes with suitable example. | CO1 | R | 10 |
|  | b. | Define the Zeroth, first, second and third thermodynamic Laws. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the concept of **spontaneous processes** with reference to entropy. | CO1 | R | 10 |
|  | b. | Determine the absolute entropies of solid, liquid and gas. | CO1 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | The standard enthalpies of formation of C2H5OH (l). CO2 (g) and H2O(l) are -277, -393.5 and -285.5 KJ mole-1 respectively. Calculate the standard enthalpy change for the reaction.  C2H5OH (l) + 3O2 2CO2 (g) + 3H2O (l).  The enthalpy of formation of O2 (g) in the standard state is Zero | CO2 | E | 10 |
|  | b. | Derive the Kirchoff Equation | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Evaluate the **importance of Helmholtz and Gibbs free energy** in predicting the maximum work obtainable in chemical and physical systems | CO2 | E | 10 |
|  | b. | Analyze the relationship between **Gibbs free energy, enthalpy, and entropy** to determine whether a reaction is spontaneous at constant temperature and pressure | CO2 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the Gibbs free energy and derive Gibbs Helmholtz free energy equation. | CO3 | R | 10 |
|  | b. | Derive Clapyron – Clapyron Clasious Equation. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define partition functions and applications. | CO4 | U | 10 |
|  | b. | Derive Bose Einstein distribution law. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the evidence and limitation of Arrhenius theory of electrolytic dissociation. | CO4 | R | 10 |
|  | b. | Determine the transport number by moving boundary method. | CO5 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the Fermi Dirac system with examples and define transport number and ionic mobility. | CO5 | R | 10 |
|  | b. | Derive Debye-Huckel-Onsager equation | CO5 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe the lithium ion and lead acid batteries and its application. | CO6 | U | 10 |
|  | b. | Highlight the working principles of methanol fuel cell with schematic diagram. | CO6 | R | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Quote the principles of chemical thermodynamics |
| CO2 | Evaluate the physical parameters in chemical thermodynamics |
| CO3 | Apply the laws of thermodynamicsin day today matters |
| CO4 | Analyze basic principles of thermodynamics and electrochemistry |
| CO5 | Utilize the knowledge of electrochemistry in everyday life |
| CO6 | Evaluate the efficiency of fuel cells. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23CH3008** | **Duration** | **3hrs** |
| **Course Title** | **ORGANOMETALLICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the 18-Electron rule and describe the electron counting method used for organometallic complexes with example. | CO1 | U | 10 |
|  | b. | Calculate the number of Metal-Metal bonds in the following complexes.   1. Co2(CO)9 (ii) Fe3(CO)12 | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the various methods of synthesis of metal carbonyl complexes. | CO1 | A | 10 |
|  | b. | Analyze the FT-IR spectroscopic features of metal carbonyl complexes with example. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the differences between Fischer and Schrock carbenes and discuss their structural significance. | CO2 | U | 10 |
|  | b. | Analyze the mechanisms involved in oxidative addition and reductive elimination, providing relevant examples for each. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Evaluate the insertion and migration reaction processes in organometallic chemistry | CO3 | A | 10 |
|  | b. | What is fluxionality? Discuss the analysis of molecular dynamics behaviour using suitable spectroscopy. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Discuss Wilkinson's catalyst with the mechanism of the catalytic cycle. | CO4 | An | 10 |
|  | b. | Explain the Oxo process with catalytic cycle mechanism, and discuss its practical applications | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the catalytic transformation of alkenes to aldehydes and provide an appropriate mechanism for the catalytic cycle. | CO3 | U | 10 |
|  | b. | Discuss the metathesis reactions with applications | CO4 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the synthesis and application of organometallic compounds of magnesium. | CO5 | A | 10 |
|  | b. | Describe the synthesis, structure, bonding and applications of organometallics of Tin. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the synthesis, structure, bonding and applications of organometallics of silicon and selenium. | CO5 | A | 10 |
|  | b. | Analyze the synthesis, structure and bonding characteristics of organometallic compounds of beryllium. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the significance of chromium, iron, and cobalt carbonyl reagents in organic synthesis. | CO6 | U | 10 |
|  | b. | Discuss the classification of metal carbonyl complexes with example. | CO6 | An | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Correlate the bonding and properties of organometallic complexes. |
| CO2 | Describe the structure of various types of transition metal organometallic complexes. |
| CO3 | Utilize the reactions and apply the respective mechanism of organometallic complexes. |
| CO4 | Practice the applications of organometallic complexes in catalysis. |
| CO5 | Illustrate the organometallics of s- and p-block elements. |
| CO6 | Identify the organometallic cluster complexes that can be used for various applications |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23CH3009** | **Duration** | **3hrs** |
| **Course Title** | **PERICYCLIC REACTIONS AND NATURAL PRODUCTS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Classify pericyclic reactions. | CO1 | R | 10 |
|  | b. | Explain in detail the [n,m]-sigmatropic rearrangement with examples. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Interpret the π-orbital interactions in 1,3-butadiene to generate its molecular orbital correlation diagram. | CO1 | A | 10 |
|  | b. | Predict the products formed with a suitable mechanism. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the Jablonski Diagram with illustration. | CO2 | An | 10 |
|  | b. | Discuss the Norrish Type I reactions with examples. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the Photo Fries rearrangement and di-pi-methane rearrangement with examples. | CO2 | U | 10 |
|  | b. | Evaluate the role of Paterno–Büchi reaction in photochemical carbonyl chemistry using examples. | CO2 | E | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the synthesis and applications of pyrazole. | CO3 | A | 10 |
|  | b. | Examine synthesis and chemical reactivity of imidazole. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Discuss synthetic strategies for constructing diazine nuclei and illustrate one reliable method each for pyridazine and pyrimidine with mechanisms. | CO4 | An | 20 |
|  |  |  |  |  |  |
| 7. | a. | Explain the synthesis of Camphor. | CO5 | R | 10 |
|  | b. | Discuss the various methods of extraction of Natural products. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Outline the general methods of structure elucidation of alkaloids. | CO5 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Elucidate the structural organization of proteins, describing each hierarchical level in detail. | CO6 | E | 10 |
|  | b. | Classifynatural amino acids. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Relate the principles and applications of pericyclic reactions to predict the product. |
| CO2 | Reason out for the product formed in the photochemical reaction. |
| CO3 | Describe the synthesis of heterocycles molecules from suitable precursors. |
| CO4 | Summarize the properties and applications of heterocyclic compounds. |
| CO5 | Elaborate the extraction and structural elucidation of natural products. |
| CO6 | Report the structure and role of biomolecules in living system. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23CH3019** | **Duration** | **3hrs** |
| **Course Title** | **SUPRAMOLECULAR CHEMISTRY AND GREEN CHEMISTRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define supramolecular chemistry and explain its importance in modern science. | CO1 | R | 10 |
|  | b. | Describe the lock and key principle with a simple example. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | List the types of non-covalent interactions with one example each. | CO1 | U | 10 |
|  | b. | Explain the terms “selectivity” and “complementarity” in host–guest chemistry. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Write short notes on crown ethers and cryptands. | CO2 | R | 10 |
|  | b. | Explain the role of cyclodextrins as molecular receptors. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss the structure and function of calixarenes in supramolecular systems. | CO2 | R | 10 |
|  | b. | Explain with an example the concept of biomimetic systems in supramolecular chemistry. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Define self-assembly. Give two examples of self-assembled structures. | CO3 | U | 10 |
|  | b. | Explain what are rotaxanes and catenanes with neat sketches. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe the concept of metal-directed self-assembly. | CO3 | R | 10 |
|  | b. | Explain the working principle of a molecular switch. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe cyclodextrins and their applications. | CO4 | R | 10 |
|  | b. | Explain the role of hydrogen bonding in crystal engineering. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Define clathrates. Give two examples and their uses. | CO5 | U | 10 |
|  | b. | Explain the structure and applications of metal–organic frameworks (MOFs). | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | List any six principles of green chemistry. | CO6 | R | 10 |
|  | b. | Explain the use of microwave-assisted reactions as a green alternative. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Comprehend the fundamental principles governing non-covalent interactions. |
| CO2 | Develop the skills to design and synthesize supramolecular host–guest systems. |
| CO3 | Understand the formation of self-assembled and interlocked structures. |
| CO4 | Explain the concepts of solid-state supramolecular chemistry and crystal engineering. |
| CO5 | Identify the applications of supramolecular chemistry in various fields. |
| CO6 | Apply green chemistry principles to design eco-friendly reactions. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe important points to be followed in drafting a research paper. | CO1 | R | 10 |
|  | b. | Explain how literature review helps in identifying a research gap. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe primary and secondary information sources in the science literature. | CO1 | U | 10 |
|  | b. | Explain the use of Scopus and Web of Science databases in research. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | List and define any five research metrics such as impact factor and h-index. | CO2 | R | 10 |
|  | b. | Explain how citation index and impact factor are used to evaluate research performance. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss the importance of Q1 and Q2 journal ratings in publication. | CO2 | R | 10 |
|  | b. | Illustrate with an example how SciFinder or Reaxys assists in literature search. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | List any four chemical structure drawing software and their uses. | CO3 | U | 10 |
|  | b. | Explain the role of DFT calculations in chemical research. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe computer aided drug design, molecular modeling, and quantum approximation. | CO3 | R | 10 |
|  | b. | Explain the Dean Stark and Saxhlet apparatus employed in the purification of plant extracts. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the research ethics that every researcher must follow. | CO4 | R | 10 |
|  | b. | Describe the structure and contents of a research proposal. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain flash chromatography, its applications, and advantages. | CO5 | U | 10 |
|  | b. | Describe the principle of Karl Fischer titration with a neat sketch of the apparatus used. | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Define intellectual property rights (IPR) and list its main types. | CO6 | R | 10 |
|  | b. | Explain the procedure for patent filing and grant under WIPO or PCT. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Identify a research problem using the available literature. |
| CO2 | Analyze the metrics involved in research. |
| CO3 | Realize the potential applications of chemical software tools. |
| CO4 | Formulate chemical reaction designs, set-ups, and technical writings. |
| CO5 | Create a research problem/proposal/manuscript with awareness of plagiarism. |
| CO6 | Recommend the procedure to obtain IPR. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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

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| **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 catalysis 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 notes 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. Explain the importance of biodiesel in addressing energy challenges. | 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. | Discuss the construction and working method for Updraft and fixed bed gasifier. | CO6 | U | 10 |
|  | b. | Apply your knowledge of gasification systems to write short notes on the benchmark performance parameters in a gasifier. | CO6 | A | 10 |

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

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|  | **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. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Provide the forensic importance for analysis of dyes used in petroleum products. | CO1 | A | 10 |
|  | b. | Give the test methods for adulteration of petroleum products | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Briefly discuss the extraction of petroleum products from crude oil and highlight the application of petroleum products? | CO1 | R | 10 |
|  | b. | Highlights the BIS specifications of petrol, kerosene and diesel. | CO1 | U | 10 |
|  | | | | |  |
| 3. | a. | As a forensic scientist, explain the procedure to follow an explosion incident with suitable diagram? | CO2 | A | 10 |
|  | b. | Explain the types of fire and fire extinguishers with suitable examples. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write a short note on the fire tetrahedron, arson, and fire extinguisher. | CO2 | U | 10 |
|  | b. | How arson residues are analyzed by conventional and instrumental methods? Explain. | CO2 | R | 10 |
|  | | | | |  |
| 5. | a. | State the characteristics of high and low explosives. | CO3 | A | 10 |
|  | b. | Discuss about the chemistry of explosives. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Classify the cement material with suitable example. | CO3 | An | 10 |
|  | b. | Explain the following   1. Vapour cloud explosion 2. Dust explosion | CO3 | R | 10 |
|  | | | | | |
| 7. | a. | Classify the types of dyes and the health effect of chemical dyes used in food items. | CO4 | An | 10 |
|  | b. | Discuss the analysis of cosmetics and their role in crime investigation. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the procedure to analysis of N, P and K in green leaf or soil? | CO5 | R | 10 |
|  | b. | Describe the forensic significance of trap chemicals. | CO5 | U | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Highlight the salient features of Explosive Substances Act 1908. | CO6 | A | 10 |
|  | b. | Briefly discuss the definition, adulterated, misbranded, spurious drugs and cosmetics, offenses and penalties based on Drugs and Cosmetics Act 1945. | CO6 | R | 10 |

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

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|  | **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 |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the principle, instrumentation details, and forensic uses of atomic absorption spectrometry | CO1 | A | 10 |
|  | b. | Describe the principle, instrumentation, and forensic uses of Inductively Coupled Plasma Mass Spectrometry. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Analyze the principle, instrumentation, and forensic applications of atomic emission spectroscopy. | CO1 | An | 10 |
|  | b. | Summarize the different sources of electromagnetic radiation. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the principle, instrumentation, and forensic applications of photoacoustic spectroscopy with a case study. | CO1 | An | 10 |
|  | b. | Explain the Jablonski diagram illustrating with different photophysical processes. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Define the following   1. Beer-Lambert Law 2. Fluorescence 3. Chemiluminescence 4. Stokes Shift | CO3 | U | 10 |
|  | b. | Explain the principle, instrumentation, and forensic science applications of X-ray fluorescence spectrometry | CO3 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Evaluate the key principle, instrumentation, and forensic uses of infrared spectroscopy. | CO2 | A | 10 |
|  | b. | Analyze the use of mid-infrared (Mid-IR) spectroscopy in forensic investigations, including a case study. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explore the principles, instrumentation, and forensic applications of Raman spectroscopy. | CO2 | A | 10 |
|  | b. | Explain the following   1. Stokes scattering 2. Anti-Stokes scattering. 3. Combination bands 4. Fingerprint region | CO2 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Write a short note on the following concepts:   1. Coupling constant 2. Shielding 3. Deshielding 4. Chemical shift | CO4 | U | 10 |
|  | b. | Evaluate the anticipated number of signals, chemical shifts, and splitting patterns in the 1H NMR spectrum for the following compounds. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss the various types of conductometric titrations and their applications in forensic science | CO6 | A | 10 |
|  | b. | Describe the principle, instrumentation, and forensic applications of potentiometry | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the forensic significance of radiochemical and electrochemical methods. | CO5 | An | 10 |
|  | b. | Analyze the forensic applications of neutron activation analysis with an case study. | CO5 | An | 10 |

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

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|  | **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. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2004** | **Duration** | **3hrs** |
| **Course Title** | **CRIME AND SOCIETY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define the concept of crime and discuss the major characteristics of crime in modern society. | CO1 | R | 10 |
|  | b. | Examine in detail the ‘Labelling Theory’ and the ‘Social learning theory’ in understanding the causes of crime. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the concept of juveniledelinquency and analyze the common types of crimes committed againstchildren, highlighting their social implications. | CO2 | U | 10 |
|  | b. | Differentiate between corporatecrimes and white*-*collarcrimes, and evaluate their impact on society with suitable examples. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss in detail the Preventive and Reformative Theories of Punishment, highlighting their principles, objectives, and significance in the modern criminal justice system. | CO3 | A | 10 |
|  | b. | **Explain the concept, significance, and various methods of rehabilitation of prisoners for their effective reformation and reintegration into society.** | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Discuss the human rights perspective towards prisoners, emphasizing the need for humane treatment, protection of dignity, and the safeguarding of their fundamental rights within correctional systems. | CO4 | An | 20 |
|  |  |  |  |  |  |
| 5. |  | Examine the role of media in crime prevention, focusing on its impact on public awareness, perceptions of crime, and promotion of law-abiding behaviour. | CO5 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Differentiate between probation and parole, highlighting their objectives, procedures, and the role they play in the rehabilitation of offenders. | CO1 | U | 10 |
|  | b. | Explain the different types of cybercrimes, illustrating each with examples and discussing their impact on individuals, organizations, and society. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 7. |  | Enumerate and discuss the major laws and acts related to environmental crimes, illustrating their objectives and significance in protecting the environment. | CO2 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss in detail the influence of politics on crime, highlighting how political factors shape criminal behaviour, and patterns of corruption in society. | CO6 | C | 10 |
|  | b. | Explain the concepts of **BNS** and **BNSS**, providing a brief description of each, and discuss in detail the role of these laws in crime prevention, highlighting their functions, strategies, and significance in maintaining law and order. | CO6 | C | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | **Explain the nature, causes, and key features of terrorism, highlighting its impact on society, governance, and national security.** | CO6 | E | 20 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Know the recent trends in criminology, changing profile of crime and criminals |
| CO2 | Understand the forms and recent trends in crime |
| CO3 | Learn the theories of Punishment and Prevention of crime |
| CO4 | Take up the professional roles of correctional agents in agencies of criminal justice administration |
| CO5 | Understand the social and governmental regulations with regard to crime |
| CO6 | Understand about Indian judicial system |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2005** | **Duration** | **3hrs** |
| **Course Title** | **CRIME SCENE INVESTIGATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Recall the different types of crime scenes and various factors involved in crime. | CO1 | R | 10 |
|  | b. | Analyze the possible reasons for committing crime in India and Worldwide. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain various types of evidences with suitable examples for each. | CO2 | U | 10 |
|  | b. | Infer the actions taken by the first responding officer. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Prepare a detailed note on all the process of Crime Scene Documentation. | CO3 | An | 10 |
|  | b. | Explain the application of Photography and Videography in a crime scene. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe about the collection and preservation of blood | CO4 | R | 10 |
|  | b. | Classify different biological fluids with collecting method and its procedure. | CO4 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain Polygraphy. | CO5 | U | 10 |
|  | b. | Discuss the process of Interrogation. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Write an overview of criminal profiling and brief knowledge about detective agencies in India. | CO2 | An | 10 |
|  | b. | Describe the forensic significance for each of the following evidences:   1. Blood 2. Saliva 3. Semen 4. Questioned documents 5. Fingerprints | CO2 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Summarize on Note making and Crime scene Sketching. | CO3 | U | 10 |
|  | b. | Compare the following with diagram and suitable example.   1. Line method and grid method 2. Spiral method and Wheel method 3. Inward spiral method and Outward spiral method 4. Zone method and line method | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Interpret on verbal and physical clues and voice stress analysis | CO6 | A | 10 |
|  | b. | Describe Interrogation and its importance. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Write a detailed note on Reid Technique. | CO6 | A | 10 |
|  | b. | Define the following terms   1. Mens Rea 2. Actus Rea 3. Confession Evidence 4. Direct Evidence 5. Corroborative evidence | CO6 | R | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Enumerate the reasons for committing crime and types of crime scenes |
| CO2 | Summarize the objectives of documentation and evidence classification |
| CO3 | Sketch the methods relevant to crime scene documentation |
| CO4 | Explain the methodology of collecting, packaging and preservation of evidences |
| CO5 | Analyze the concepts of crime scene reconstruction |
| CO6 | Evaluate the stages of crime scene reconstruction |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2006** | **Duration** | **3hrs** |
| **Course Title** | **FINGERPRINT ANALYSIS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define Fingerprints and explain History of Fingerprints. | CO1 | R | 10 |
|  | b. | Recall the concept of Poroscopy. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Classify Fingerprints and interpret **“MINUTIAE”** as an individual characteristic. | CO2 | U | 10 |
|  | b. | Explain the biological process of ridge formation. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Identify **Pattern** and find out at least **16 minutiae** from the image given below and **define each minutia** properly. | CO3 | A | 10 |
|  | b. | **Compare** plain and rolled fingerprints with suitable examples and discuss their forensic significance. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Compare the Footwear impressions and Fingerprint Impressions. Give your opinion which evidence will stand better in court as evidence. | CO4 | An | 10 |
|  | b. | Distinguish between Arch and Loop Patterns of Fingerprints. | CO4 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | **Explain Primary Classification of Fingerprint.** | CO5 | E | 10 |
|  | b. | **Compare** the characteristics and forensic significance of **palm prints.** | CO5 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | **Evaluate** the various types and patterns of fingerprints. | CO6 | U | 10 |
|  | b. | **Assess** the importance of **poroscopy and edgeoscopy**. | CO6 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | **Describe** the mechanism of fingerprint detection by various developing reagents. | CO3 | R | 10 |
|  | b. | Explain different Powders of Fingerprint Development. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | **Examine and interpret** the methods used for **fingerprinting the deceased.** | CO5 | U | 10 |
|  | b. | Fingerprint minutiae: (a) The common fingerprint minutiae types: (b)... |  Download Scientific Diagram  Explain all the fingerprint minutiae discussed above, including their types and forensic significance. | CO5 | R | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss different Lifting methods of 2D footwear impressions. | CO4 | C | 10 |
|  | b. | Explain any 3 classification of Fingerprint. | CO2 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Define the fundamental principles on which the science of fingerprinting is based. |
| CO2 | Interpret the importance of fingerprints |
| CO3 | Examine the methods of recording fingerprints |
| CO4 | Summarize the methods of classifying criminal records by fingerprints |
| CO5 | Explain the ways of physical and chemical techniques of developing fingerprints on crime scene evidence |
| CO6 | Discuss the significance of foot, palm, ear and lip prints |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2007** | **Duration** | **3hrs** |
| **Course Title** | **BASIC BIOLOGY FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the various theories of evolution and highlight their significance. | CO1 | U | 10 |
|  | b. | Evaluate the structural organization and functions of the plasma membrane and cell wall in prokaryotic and eukaryotic cells. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the various cellular organelles. | CO1 | A | 10 |
|  | b. | Summarize the key components and the role of the cytoskeleton in maintaining cell shape. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the classification of plant systems developed by Bentham and Hooker | CO2 | U | 10 |
|  | b. | Summarize the forensic applications of plant physiology, and evaluate how these applications impact forensic investigations. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the classification of plant tissues and their functions. | CO2 | A | 10 |
|  | b. | Discuss the various parts of plant anatomy and their significance in forensic science. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Analyze the components, structure and forensic significance of the central nervous system. | CO3 | An | 10 |
|  | b. | Evaluate the components, structure and functions of the human respiratory system. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Examine the composition and functions of human blood. | CO3 | U | 10 |
|  | b. | Describe the components, structure and function of the circulatory system. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the human blood groups and the implications of blood group determination in criminal investigations. | CO4 | A | 10 |
|  | b. | Examine the different categories of immunity and assess their importance in forensic science. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Assess the factors influencing immunity | CO5 | A | 10 |
|  | b. | Explain the structure, types and functions of antibodies | CO5 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the concept of pure culture technique and the steps involved in obtaining pure cultures. | CO6 | U | 10 |
|  | b. | Analyze various stains and staining techniques used in cell culture. | CO6 | An | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Recall the concepts of cell biology |
| CO2 | Infer the physiology of plants |
| CO3 | Summarize human physiology |
| CO4 | Interpret Antigen antibody interactions |
| CO5 | Relate antigen antibody interactions to serology |
| CO6 | Justify the role of microbiology in forensics |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2010** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC PSYCHOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **Marks** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Analyze how criminal profiling can be conducted from a crime scene, and evaluate the indicators that help distinguish between an organized and a disorganized offender. | CO1 | R | 10 |
|  | b. | Recall the concept of Brain Electrical Oscillation Signature (BEOS) profiling and Narcoanalysis. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Classify the different types of personality disorders. | CO2 | U | 10 |
|  | b. | Explain any two psychological tests commonly used in forensic. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the intelligence and aptitude tests, and explain their uses in psychological assessment. | CO3 | A | 10 |
|  | b. | Describe Probation and Parole. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Correlate the OCEAN theory of personality with psychopathic traits. | CO4 | An | 10 |
|  | b. | Describe the concept of psychological autopsy and explain how it is conducted. | CO4 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the concept of behavioral therapy. | CO5 | E | 10 |
|  | b. | Differentiate between serial killers and psychopaths. | CO5 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | **Scenario:** A 32-year-old man has been arrested for multiple violent assaults. During interrogation, he remains calm, shows no remorse, and attempts to manipulate the officers by fabricating emotional stories. He appears charming but displays a complete lack of empathy toward his victims.  **Que- Analyze the given scenario and identify the psychological signs that indicate psychopathic behavior. Explain how such traits can be assessed through psychological evaluation**. | CO6 | U | 10 |
|  | b. | Describe the characteristics, symptoms, and key features of Schizophrenia and Antisocial Personality Disorder (ASPD). | CO6 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the Thematic Apperception Test (TAT) and the Minnesota Multiphasic Personality Inventory (MMPI). | CO3 | R | 10 |
|  | b. | Describe the House-Tree-Person (HTP) test and the Locus of Control test. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Analyze the correlation between Attention Deficit Hyperactivity Disorder (ADHD) and Antisocial Personality Disorder (ASPD), highlighting shared behavioral and psychological traits. | CO5 | U | 10 |
|  | b. | **Match the Pair:**   1. Schizophrenia a. Disregard for others’ rights 2. Bipolar Disorder b. Hyperactivity, Impulsivity 3. ASPD c. Episodes of mania and depression 4. ADHD d. Delusions, hallucinations   **Explain any one mental disorder from the following list.** | CO5 | R | 10 |
| **PART – B (1 X 20 = 20 MARKS)**  **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Evaluate the strategies and methods used for the rehabilitation of prisoners | CO4 | C | 10 |
|  | b. | **Scenario(Read):** At a secluded house, a man is found brutally attacked with multiple stab wounds. The room is in disarray, showing signs of a struggle, and valuables are untouched. Blood patterns suggest the victim tried to defend himself before succumbing to his injuries.  **Question:** **Analyse the crime scene and conduct a criminal profiling assessment. Identify key behavioural and psychological indicators that could help determine the type of offender involved.** | CO2 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Develop the basics of Psychology |
| CO2 | Evaluate Psychological insight in forensic Science |
| CO3 | Describe the significance of psychological assessment |
| CO4 | Outline the principles of polygraph |
| CO5 | Describe the procedure of Narcoanalysis |
| CO6 | Demonstrate brain electrical oscillation signatures |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2011** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC BIOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Write in detail about the composition of blood and its constituents | CO1 | R | 10 |
|  | b. | Explain about levis blood grouping systems and any 5 blood grouping systems. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Elucidate preliminary and confirmatory tests associated with blood in detail. | CO2 | A | 10 |
|  | b. | Write about the types of blood spatter analysis and a case study associated with DNA analysis | CO2 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | Write about the composition and structure of semen and it’s forensic significance with proper diagram. | CO3 | U | 10 |
|  | b. | Write about the preliminary and confirmatory test associated with semen. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Write a case study related to which was solved by DNA analysis from semen sample. | CO4 | C | 10 |
|  | b. | Write about the production and analysis of saliva and it’s forensic significance. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Elaborate about the structure and origin of hair and write about it’s forensic relevance and significance with a proper diagram. | CO5 | An | 10 |
|  | b. | Evaluate and write 5 points about the difference between human and animal hair and a real case solved using hair analysis. | CO5 | C | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Evaluate in detail about fiber and the analysis techniques related to the analysis and it’s forensic significance. | CO2 | U | 10 |
|  | b. | Write in detail about the fibers along with it’s forensic significance. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe about the structure and morphology of any 4 long bones along with it’s diagrammatic representation. | CO5 | R | 10 |
|  | b. | Elucidate in detail about sex determination via any 3 bones and it’s forensic significance. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Write about the forensic significance of skeletal remains and a case study solves using skeletal analysis. | CO6 | C | 10 |
|  | b. | Explain in detail about forensic palynology and it’s forensic significance. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Elaborate in detail about the poisonous plants and it’s forensic significance. | CO6 | R | 10 |
|  | b. | Elucidate in detail about forensic entomology and estimation of time since death in relevance to forensic entomology. | CO6 | E | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Review the basics of forensic biology. |
| CO2 | Predict the methodology for analysis. |
| CO3 | Relate the evidences to their source of origin. |
| CO4 | Distinguish between different biological evidences. |
| CO5 | Differentiate between preliminary and confirmatory tests. |
| CO6 | Assess the evidentiary value of biological evidences. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2024** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC MEDICINE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe how a dying declaration differs from a dying deposition in legal proceedings. | CO1 | An | 10 |
|  | b. | Summarize the procedure for interviewing onlookers and identifying witnesses at a crime scene. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the importance of establishing a command post during crime scene management. | CO2 | U | 10 |
|  | b. | Explain the procedure for handling the buried bodies. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the procedure for examination of suicide injuries. | CO3 | U | 10 |
|  | b. | Differentiate between Laceration and incised wound. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe stages of death, its diagnosis and importance. | CO4 | U | 10 |
|  | b. | Explain any two sexual offences with relevant sections. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe the immediate changes in a dead body in brief. | CO5 | U | 10 |
|  | b. | Explain ‘Drowning’ and its types in brief. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Tabulate ‘Rule of Nine’ and give its significance. | CO3 | R | 10 |
|  | b. | Draw a flowchart showing types of injuries. | CO3 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Write a note on injuries caused by blunt force. | CO3 | U | 10 |
|  | b. | Write a note on ‘Mummification’. | CO6 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe ‘Rigor Mortis’ and its medico legal significance. | CO6 | U | 10 |
|  | b. | Illustrate how specific insect life cycles can be used to determine the minimum postmortem interval (PMI). | CO6 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the significance of entomological evidence. | CO6 | U | 10 |
|  | b. | Explain the procedure for the collection of entomological evidence. | CO6 | A | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Review the basics of forensic medicine. |
| CO2 | Predict the steps involved in crime scene management. |
| CO3 | Relate the medico legal findings to injuries. |
| CO4 | Distinguish between injuries based on ante mortem and post mortem injuries. |
| CO5 | Differentiate between the causes of death. |
| CO6 | Assess time since death based on entomological evidences. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2025** | **Duration** | **3hrs** |
| **Course Title** | **ACCIDENT INVESTIGATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the various sources of forensic information obtained from an accident scene and the role of photographs and visibility conditions in accident reconstruction. | CO1 | U | 10 |
|  | b. | Explain the significance of eyewitness accounts and extent of vehicle damage in identifying the background of vehicle accidents. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | A car was involved in a road accident and investigators measured skid marks of 25m on the road. The road is asphalt. Estimate the speed of the vehicle in km/h. | CO2 | A | 10 |
|  | b. | Justify in detail the estimation of vehicle speed from skid marks and tire marks, and explain how road surface conditions affect speed estimation. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Elaborate on the post-crash movement and collision model in accident analysis. How is the driver’s reaction time assessed? | CO3 | An | 10 |
|  | b. | Discuss **common mechanical failures** in automobiles that lead toaccidents. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Define biomechanics of injuries. Explain different types of injuries observed in road traffic accidents | CO4 | U | 10 |
|  | b. | Describe the forensic procedures involved in hit-and-run investigation and the importance of collecting control samples. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the forensic significance of tachograph data and the principles involved in chart analysis. | CO5 | U | 10 |
|  | b. | Discuss the role of falsification and diagnostic signals in identifying tampering of tachograph data during accident reconstruction. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss the influence of road surface texture and environmental conditions on the formation of tire marks. | CO2 | A | 10 |
|  | b. | Explain the different types of tire marks and their forensic significance. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the forensic importance of abandoned vehicles. | CO4 | A | 10 |
|  | b. | Explain **injuries caused by airbag deployment** and their forensicinterpretation. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the **working principle of a tachograph** and describe its different types. | CO6 | U | 10 |
|  | b. | Describe the **steps involved in CAD-based simulation** and its advantages. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain how CAD is used in the reconstruction of motor vehicle accidents. | CO6 | U | 10 |
|  | b. | Explain the following terms:   1. Accuracy of speed record 2. Tire slip effects 3. Falsification 4. Diagnostic signals 5. Route tracing. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Identify the background of vehicle accidents |
| CO2 | Analyze motor accidents |
| CO3 | Assess the post-crash movement |
| CO4 | Infer systematic analysis of injuries in accidents |
| CO5 | Evaluate the tachograph data analysis |
| CO6 | Predict the falsification and diagnostic signals |



END SEMESTER EXAMINATION – NOV / DEC 2025

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| **Course Code** | **20FS2029** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC STATISTICS** | **Max. Marks** | **100** |

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| **Q.**  **No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define probability. | CO1 | U | 10 |
|  | b. | Define a hypothesis and explain the concept of a null hypothesis. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define the following –   1. Probability 2. Forensic statistics 3. Equi-likely events 4. Complimentary events 5. Favorable events | CO1 | R | 10 |
|  | b. | Describe the key characteristics of research. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the Base line method of Sketching. | CO2 | R | 10 |
|  | b. | Describe Cross projection & Rectangular method of sketching. | CO2 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the following in brief -   1. Rough and fair sketch 2. Significance of sketching | CO2 | U | 10 |
|  | b. | Explain the polar coordinate method of sketching in the context of crime scene  Documentation. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | State the functions of the following factors involved in DNA profiling –   1. Agarose gel 2. Isoamyl alcohol 3. SDS | CO3 | R | 10 |
|  | b. | Describe the process and applications of gel electrophoresis. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the process and significance of the Polymerase Chain Reaction (PCR). | CO3 | U | 10 |
|  | b. | What are the challenges and controversies associated with DNA evidence? | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe types of Cyber crime | CO4 | R | 10 |
|  | b. | Define the following with the help of examples - | CO4 | U | 10 |

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|  |  | 1. Mean 2. Median 3. Mode |  |  |  |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Find the arithmetic mean of the above distribution table. | CO5 | U | 10 |
|  | b. | 10, 15, 15, 20, 20, 20, 25, 25, 25, 30, 30, 30, 30, 35, 35, 40, 40, 45, 50, 50.  Calculate Mean, Median and Mode from the given Data set. | CO5 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe the role of forensic statistician as an expert witness. | CO6 | U | 10 |
|  | b. | Cite the legal standards for admissibility of statistical evidence. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Crime scene reconstruction using statistical methods |
| CO2 | Explore the statistics in DNA matching |
| CO3 | Role of statistics in Forensics |
| CO4 | Analyzing digital evidence using statistical methods |
| CO5 | Understanding Forensic statistician as an expert witness |
| CO6 | Apply and recommend statistical concepts in Forensic Science |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS2035** | **Duration** | **3hrs** |
| **Course Title** | **MICROSCOPY IN FORENSIC SCIENCE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe basic principles of microscopy. | CO1 | R | 10 |
|  | b. | Explain the working principle of Comparison microscope and its parts. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain theory, principles and working of compound microscope. | CO2 | U | 10 |
|  | b. | Explain in detail about Forensic Application of Compound microscope | CO2 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain in detail about theory, principles and working of Ultraviolet microscope. | CO3 | U | 10 |
|  | b. | Explain forensic application of UV Microscope. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Differentiate Light microscopy and Electron Microscopy. | CO4 | An | 10 |
|  | b. | Draw and list out the main parts of Scanning electron Microscope (SEM) | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Elaborate the Working principle of Magnetic Resonance Microscope. | CO5 | E | 10 |
|  | b. | Explain forensic application of Magnetic Resonance Microscope. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain in Detail about Infra-red microscope. | CO3 | An | 10 |
|  | b. | Explain about theory and principle of Oil immersion Microscope | CO3 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | List out and explain about the evidences which are used in microscopy for analysis | CO1 | An | 10 |
|  | b. | Draw and list out the parts of Phase contrast microscope. | CO1 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain about Principles and applications of Ultrasonic Microscope | CO6 | R | 10 |
|  | b. | Discuss the role of scanning electron microscopy (SEM) in forensic evidence analysis. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | A Forensic expert receives trace evidence from a hit-and-run case. Predict how different microscopes (light, polarizing, SEM, and TEM) can be applied to analyze glass fragments, paint, and fibers from the suspect vehicle and victim. | CO6 | A | 10 |
|  | b. | List out the forensic evidence that can be analyzed using microscopy and explain about them. | CO6 | A | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Recall the properties of |
| CO2 | Distinguish different |
| CO3 | Identify the parts of various light microscopes |
| CO4 | Infer the working of SEM 5 |
| CO5 | Evaluate the importance of TEM. |
| CO6 | Predict microscope applications across forensic evidence analysis |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS3001** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC SCIENCE AND CRIMINAL JUSTICE SYSTEM** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | Discuss the history and development of Forensic Science in India and abroad, highlighting the contributions of major pioneers in the field. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the organizational setup and functions of major forensic institutions in India such as CFSL, SFSL, FPB, and NICFS. | CO2 | U | 10 |
|  | b. | **i)** Describe the qualifications**,** roles**,** andresponsibilitiesofaforensicscientist. ii) Integrity and professional competence essential in forensic practice – Argue. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain Locard’s Exchange Principle and discuss its importance in the identification and linkage of physical evidence during a criminal investigation. | CO3 | A | 10 |
|  | b. | Describe the classification of physical evidence and illustrate how different types of evidence assist in solving criminal cases. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Discuss the roleofforensicscienceincrimeinvestigation with suitable examples highlighting its contribution to evidence analysis and justice delivery. | CO4 | An | 20 |
|  |  |  |  |  |  |
| 5. | a. | **Elaborate on the types of crime scenes and the procedures involved in documenting the crime scene, emphasizing the preservation of evidence.** | CO5 | E | 10 |
|  | b. | i) Discuss the admissibility and importance of ‘expert testimony’ in the court.  ii) Differentiate between expert witness and lay witnesses. | CO5 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | **Explain the sociological causes of crime and analyze how social environment, culture, and economic conditions influence criminal behavior.** | CO1 | U | 10 |
|  | b. | Examine the penology theories and types of punishment and evaluate the relevance of capitalpunishment in the modern criminal justice system. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | **i) Describe the powers, and functions of the police in India.**  **ii) Interpret the police authorities’ powers of search, seizure, and arrest without violating human rights.** | CO2 | A | 10 |
|  | b. | **Illustrate the effective criminal investigation and prosecution laws such as the BNS, BNSS, and BSA support the criminal investigation in rendering justice.** | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Define Environmental Forensics and explain its legal significance and role in identifying sources of environmental contamination. | CO6 | R | 10 |
|  | b. | Describe the principles and applications of Geo-forensics and Global Positioning System (GPS) in criminal investigation and forensic casework. | CO6 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | i) Discuss the concepts and techniques of biometric authentication used in personal identification.  ii) Explain the forensic importance of fingerprint, facial recognition, iris, and voice-based systems. | CO5 | E | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Know the structure and functions of Indian police and related establishments. |
| CO2 | Understand the concepts of police administration and crime prevention |
| CO3 | Learn the basic duties of police. |
| CO4 | Understand the process of recruitment and training in Police Department |
| CO5 | Understand the operation and powers of special units of the Tamil Nadu Police. |
| CO6 | Apply theoretical knowledge to practical issues in the Police department. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS3002** | **Duration** | **3hrs** |
| **Course Title** | **CRIME SCENE INVESTIGATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the legal definition of crime and its essential elements. | CO1 | R | 10 |
|  | b. | Evaluate how social, economic, and psychological factors contribute to criminal behavior. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define a crime scene and discuss its significance in forensic investigation. | CO2 | R | 10 |
|  | b. | Compare indoor, outdoor, and conveyance crime scenes and explain the specific challenges in each type. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the importance of sketching in crime scene documentation. | CO3 | U | 10 |
|  | b. | Explain the various types of crime scene sketches and the information each must include. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the different types of search methods used at a crime scene and their applications. | CO3 | U | 10 |
|  | b. | Evaluate the importance of photography, videography, and notes in supporting evidence integrity. | CO3 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the forensic importance of trace, biological, and impression evidence. | CO4 | U | 10 |
|  | b. | List and explain the fundamental principles of Forensic Science. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define crime scene reconstruction and explain its stages. | CO5 | R | 10 |
|  | b. | Discuss the various methods used for reconstruction in forensic investigation. | CO5 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the steps involved in hanging scene reconstruction. | CO5 | U | 10 |
|  | b. | Describe the steps involved in facial reconstruction and its forensic applications. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Define criminalistics and explain its scope in modern forensic science. | CO6 | R | 10 |
|  | b. | Analyze how forensic journalism influences public perception and criminal justice outcomes. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe the duties and responsibilities of the first responding officer at a crime scene. | CO3 | U | 10 |
|  | b. | Explain the concept of chain of custody and its significance in maintaining evidence integrity. | CO3 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Categorize relevant evidences at the crime scene. |
| CO2 | Predict the forensic techniques for detecting smuggled goods. |
| CO3 | Develop proficiency in crime scene management and documentation. |
| CO4 | Classify evidences using proper techniques. |
| CO5 | Assess crime scene reconstruction. |
| CO6 | Report the crime scene. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS3003** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC BIOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the collection procedure for the biological fluids. | CO1 | U | 10 |
|  | b. | Recall any 5 toxic plants and its characteristics in detail. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the preliminary and confirmatory test for blood. | CO2 | U | 10 |
|  | b. | Write a detailed note on identification and examination of different bodily fluids. | CO2 | AP | 10 |
|  |  |  |  |  |  |
| 3. | a. | Apply the knowledge of skull to determine age and sex of the person with diagram. | CO3 | AP | 10 |
|  | b. | Analyze the role of Forensic odontology in mass disaster victim identification. | CO3 | AN | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe in detail about structure, growth and forensic significance of human hair. | CO4 | R | 10 |
|  | b. | Classify fibers and their identification methods. | CO4 | AN | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe in detail about different types of wildlife crimes. | CO5 | R | 10 |
|  | b. | Recommend some safety protocols to protect our wildlife. | CO5 | AN | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Enumerate various forensic methods of detection and identification of semen and seminal stain examination. | CO2 | R | 10 |
|  | b. | Explain the composition and the crystal test for blood. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the structure, collection and detection methods of diatoms. | CO1 | U | 10 |
|  | b. | Interpret the importance of diatoms in death investigation. | CO1 | AP | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain CITES. | CO6 | AP | 10 |
|  | b. | Illustrate the significance of microbial forensics. | CO6 | AN | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Summarize all the concepts of Forensic Microbiology. | CO6 | U | 10 |
|  | b. | Develop a detailed report on the Anthrax Incident. | CO6 | AP | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Explore the basics of Forensic Botany |
| CO2 | Collect and preserve bodily fluids and stains |
| CO3 | Assess the significance of Forensic Anthropology |
| CO4 | Perform hair analysis |
| CO5 | Know the importance of wildlife forensics |
| CO6 | Determine the significance of microbial forensics |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS3004** | **Duration** | **3hrs** |
| **Course Title** | **ADVANCED QUESTIONED DOCUMENT** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the concept of a document and classify the different types with suitable forensic examples. | CO1 | R | 10 |
|  | b. | Describe the procedures involved in the collection, handling, and preservation of document evidence from a crime scene. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define specimen writing and explain its significance in handwriting comparison | CO2 | R | 10 |
|  | b. | Discuss the principles of handwriting individuality and natural variation used in forensic identification. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the various types of seals used in documents and discuss their significance in forensic document examination. | CO3 | U | 10 |
|  | b. | Explain the methods of examination of rubber and metallic seals with reference to their forensic characteristics. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Elaborate the components and working principle of a photocopy machine with a labeled diagram. | CO4 | U | 10 |
|  | b. | Discuss the principle, components, and working of the VSC. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe the decipherment methods used for burnt or charred documents with suitable examples. | CO5 | U | 10 |
|  | b. | Analyze the UV-visible security features present in Indian Passports. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Evaluate the anti-counterfeiting features incorporated in Indian currency notes. | CO5 | U | 10 |
|  | b. | Enumerate the different types of Indian Passports with their significance. | CO5 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the classification of printers and differentiate between dot matrix and inkjet printers. | CO4 | R | 10 |
|  | b. | Explain master plan in document examination. Describe in detail the relevance of proper master plan in questioned document examination. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Enumerate the essential components of a forensic document examination report. | CO6 | U | 10 |
|  | b. | Discuss the common errors that may occur while preparing forensic reports and suggest preventive measures. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the working principle and procedure of ESDA. | CO5 | R | 10 |
|  | b. | Discuss the significance of questioned document examination in the field of forensic investigation. | CO1 | An | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Understand the various types of documents |
| CO2 | Compare the questioned documents with standards |
| CO3 | Distinguish the different types of forgery in the documents |
| CO4 | Apply various method to analyze questioned documents |
| CO5 | Realize the decipherment of security documents |
| CO6 | Prepare the forensic report |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS3008** | **Duration** | **3hrs** |
| **Course Title** | **CYBER CRIMES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define cybercrime and articulate the investigation procedure in detail. | CO1 | R | 10 |
|  | b. | Recognize the types of cybercrime and provide examples. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Distinguish the steps involved in cyber forensic investigation. | CO2 | U | 10 |
|  | b. | Explain the Qualities and skills of a computer forensic expert, the goal of the investigation. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain techniques for countering anti-forensics attacks. | CO3 | U | 10 |
|  | b. | Discuss data hiding on NTFS with Alternate Data Streams. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe steganography and reversing steganographic processes. | CO3 | A | 10 |
|  | b. | Discuss the theft of information and violation of security policies or procedures. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Discuss information from volatile memory and explain its importance. | CO4 | U | 10 |
|  | b. | Explain live forensics, focusing on memory analysis and volatile data. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the use of email inappropriately and the impact of using a PC in a work-related manner. | CO2 | R | 10 |
|  | b. | Perform a critical analysis of the Information Technology Act on cybercrimes. | CO6 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Analyze the impact of incident auditing in cyber forensic investigations. | CO2 | U | 10 |
|  | b. | Distinguish various tools used in cyber forensics and their applications. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the roles of adjudicating officers and authorities. | CO6 | U | 10 |
|  | b. | Discuss outline the provisions in Indian laws dealing with cybercrimes. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Design a strategy to determine the impact of a cyber incident using forensic tools. | CO5 | R | 10 |
|  | b. | Distinguish various tools used in cyber forensics and their applications. | CO5 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Recognize the types of cybercrime. |
| CO2 | Distinguish the steps involved in cyber forensic investigation. |
| CO3 | Administer different concealment techniques. |
| CO4 | Assess information from volatile memory. |
| CO5 | Distinguish the various tools in cyber forensics |
| CO6 | Combine different laws related to cyber crimes. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS3009** | **Duration** | **3hrs** |
| **Course Title** | **MEDICAL JURISPRUDENCE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the different types of inquests and discuss their medico-legal significance. | CO1 | U | 10 |
|  | b. | Discuss the kinds of witnesses in court proceedings and the rules governing their examination and cross-examination. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Discuss the various physical and biological parameters contributing to personal identity with suitable forensic examples. | CO2 | A | 10 |
|  | b. | Compare and contrast the medico-legal importance of tattoo marks, scars, and occupational marks in identifying individuals. | CO2 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | Examine how viscera collection and preservation helps in establishing the cause of death in suspected poisoning cases. | CO3 | An | 10 |
|  | b. | Illustrate the structure and format of a post-mortem report and its importance in medico-legal cases. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Discuss the medico-legal importance of burns, scalds, and electrical injuries. | CO4 | U | 10 |
|  | b. | Classify wounds based on their medico-legal aspects. Discuss how ante-mortem and post-mortem wounds are differentiated. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Discuss the early and late postmortem changes that help estimate time since death. | CO5 | U | 10 |
|  | b. | Distinguish between somatic and molecular death, giving the medico-legal importance of each. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the different types of evidence presented in court with reference to oral and documentary evidence. | CO1 | U | 10 |
|  | b. | Define arrest and warrant. Explain the different types of warrants and their medico-legal importance. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Enumerate the parameters used for determining sex, age, and stature from skeletal remains. | CO2 | R | 10 |
|  | b. | Explain the contribution of voice and speech analysis in forensic personal identification. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Define post-mortem examination and explain its objectives and how its finding help to estimate time since death. | CO6 | U | 10 |
|  | b. | Define exhumation and describe the legal procedure and reasons for which it may be ordered. | CO6 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | A 25-year-old woman is brought dead with 80% burns. Outline the medico-legal steps from inquest to post-mortem and explain how findings help estimate time since death. | CO6 | An | 10 |
|  | b. | Classify mechanical injuries and explain how their features help determine time of death. | CO6 | R | 10 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Enumerate various legal procedures. |
| CO2 | Identify the parameters contributing to personal identification. |
| CO3 | Examine the importance of post-mortem examination. |
| CO4 | Differentiate the type of wounds. |
| CO5 | Predict the modes of death. |
| CO6 | Combine knowledge to estimate time since death. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23FS3020** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC BOTANY, ENTOMOLOGY AND MICROBIAL FORENSICS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Define forensic botany and explain its major subdivisions with suitable examples. | CO1 | R | 10 |
|  | b. | Describe the forensic significance of pollen grains in solving criminal cases. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the forensic significance of wood identification in forensic investigations. | CO2 | U | 10 |
|  | b. | Explain how diatoms assist in differentiating between ante-mortem and post-mortem drowning. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain different types of plant evidence and their relevance in forensic casework. | CO2 | An | 10 |
|  | b. | Describe the steps in diatom testing for drowning cases. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Define forensic entomology and its significance in solving criminal cases. | CO3 | R | 10 |
|  | b. | Describe the duties and responsibilities of a forensic entomologist at a crime scene. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe the various stages of decomposition along with their respective timeframes. | CO3 | U | 10 |
|  | b. | Analyze the life cycle of a blow fly and its use in estimating the postmortem interval (PMI). | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define microbial forensics and explain its scope and relation to epidemiology. | CO4 | R | 10 |
|  | b. | Explain the dynamics of disease transmission and the steps in outbreak investigation. | CO5 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the forensic relevance of biological agents used in bioterrorism. | CO5 | U | 10 |
|  | b. | Differentiate between *Brucella spp.*, *Burkholderia pseudomallei*, and *Clostridium botulinum* in terms of forensic importance. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Compare the pathogenic features and forensic significance of *Bacillus anthracis*, *Yersinia pestis*, and *Francisella tularensis*. | CO5 | R | 10 |
|  | b. | Propose a methodology for collecting, preserving, and analyzing biological warfare agents. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Define ADH and ADD. Explain their importance in estimating the postmortem interval PMI in forensic entomology. | CO3 | R | 10 |
|  | b. | Required ADH for an insect to reach its Pupal stage is 8400. The temperature recorded for past full days are as follows:  Day 1- 12° C  Day 2- 14° C  Day 3- 10° C  Day 4- 16° C  Day 5- 18° C  Day 6- 20° C  Day 7- 21° C  Development threshold is 6° C. Calculate the time required. | CO3 | A | 10 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Acquire knowledge about the essentials of forensic plant science. |
| CO2 | Explore alternative kinds of botanical evidence. |
| CO3 | Illustrate the basics of forensic entomology. |
| CO4 | Summarize the basics of microbial forensics. |
| CO5 | Anticipate importance of microbial forensics in health care. |
| CO6 | Preserve various biological evidences. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **23FS3023** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC SEROLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain the composition and function of saliva. | CO1 | U | 10 |
|  | b. | Summarize the composition and function of synovial fluid. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the immune mediated transfusion reactions in brief. | CO2 | U | 10 |
|  | b. | Explain Coombs test. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the common hemoglobin variants found in humans. | CO3 | U | 10 |
|  | b. | Explain the genetic basis of the Kell and Duffy blood group systems. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Summarize the body’s immune response to microbial infections (bacteria, fungi, protozoa, helminths, and viruses). | CO4 | R | 10 |
|  | b. | Discuss the concept of MHC restriction in immune responses. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Define electrophoresis and mention its basic principle. | CO5 | R | 10 |
|  | b. | State the differences between low-voltage and high-voltage electrophoresis. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Differentiate between menstrual and peripheral blood based on biochemical and cellular characteristics. | CO2 | An | 10 |
|  | b. | Explain the significance of hemoglobin variants in the diagnosis of genetic disorders such as sickle-cell anemia. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain non-immune mediated transfusion reactions. | CO1 | R | 10 |
|  | b. | Give test for Urine identification. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the secondary antigen-antibody reaction. | CO6 | U | 10 |
|  | b. | Explain different types of vaccines. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain how an antigen-antibody reaction can be detected using techniques like agglutination or ELISA. | CO6 | A | 10 |
|  | b. | Interpret the role of cytokines in immune communication. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Define and categorize the diverse range of bodily fluids. |
| CO2 | Differentiate the contents of blood, blood variations and blood grouping. |
| CO3 | Establish the fundamental principles underlying antigen-antibody interactions. |
| CO4 | Illustrate the theory of techniques involved in examination of serological evidences. |
| CO5 | Realize the antigen-antibody interaction. |
| CO6 | Report on various diseases related to immune-deficiencies. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **24PH2002** | **Duration** | **3hrs** |
| **Course Title** | **Introduction to Astronomy and Space Science** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define the term ‘planet’. | | CO1 | R | 1 |
| 2. | Infer a key character of Asteroid Belt situated between the orbits of Mars and Jupiter. | | CO1 | U | 1 |
| 3. | Define the term ‘absolute magnitude’. | | CO2 | R | 1 |
| 4. | Explain the spectral type of the sun. | | CO2 | U | 1 |
| 5. | Identify a key property of an elliptical galaxy. | | CO3 | R | 1 |
| 6. | Give an example of a spiral galaxy. | | CO3 | U | 1 |
| 7. | List two types of star clusters. | | CO4 | R | 1 |
| 8. | Define the term ‘isotropic’ in the cosmological principle. | | CO4 | U | 1 |
| 9. | State the significance of x-ray astronomy. | | CO5 | R | 1 |
| 10. | Infer two key contributions of Chandrayan 2. | | CO5 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Infer the characteristics of Kuiper Belt situated in the orbit of Pluto, the dwarf planet. | | CO1 | U | 3 |
| 12. | Explain the term ‘parsec’. | | CO2 | A | 3 |
| 13. | Describe the properties of a grand design spiral galaxy. | | CO3 | U | 3 |
| 14. | Interpret the significance of dark energy. | | CO4 | A | 3 |
| 15. | Discuss the key contributions of the Hubble Space Telescope. | | CO5 | U | 3 |
| 16. | Explain the importance of Aditya L1 mission | | 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 Kepler’s Laws of Planetary Motion in detail with necessary diagrams. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. |  | Analyze the evolution of life cycle of a star having one solar mass with a neat sketch. | CO2 | An | 12 |
|  |  |  |  |  |  |
| 19. |  | Illustrate with a tuning fork diagram, the Hubble Classification Scheme of classification of galaxies. | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Analyze the birth of the universe as given by the standard big bang model. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. |  | Deduce the role played by the powers of a telescope in capturing the images of the night sky. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. | a. | State the Nebular Hypothesis for the birth of our solar system. | CO1 | R | 6 |
|  | b. | List the differences between a neutron star and a black hole. | CO2 | R | 6 |
|  |  |  |  |  |  |
| 23. | a. | Differentiate a spiral galaxy from an elliptical galaxy. | CO3 | U | 6 |
|  | b. | Infer the key differences between the Big Bounce Theory and the Big Crunch Theory. | CO4 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Justify the role played by the Indian Space Research Organization in the nation building process of Indian sub-continent. | CO6 | E | 12 |

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

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|  | **COURSE OUTCOMES** |
| **CO1** | Understand the various constituents of the solar system like comets and asteroids. |
| **CO2** | Articulate the details of the Sun, and evolution of different stars. |
| **CO3** | Analyze the shape and size of the Milky Way galaxy and other types of galaxies. |
| **CO4** | Appraise the big bang theory, and theories related to death of the universe. |
| **CO5** | Demonstrate the modern-day telescope technology. |
| **CO6** | Appreciate the modern day space technologies to solve human problems. |

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**END SEMESTER EXAMINATION – NOV /DEC 2025**

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| **Course Code** | **25CR703** | **Duration** | **3hrs** |
| **Course Title** | **RITUALISTIC CRIMES AND CRIMINAL JUSTICE SYSTEM** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Critically analyse the psychological and socio-cultural factors that contribute to the persistence of ritualistic crimes in India. | CO1 | R | 20 |
|  | b. | Evaluate the role of superstition, folklore, and traditional belief systems in shaping ritual-based criminal behaviour. |
|  |  | **(OR)** | | | |
| 2. | a. | Examine the psychological mechanisms and group dynamics that drive individuals to participate in ritualistic crimes under the influence of cults or charismatic leaders. | CO2 | U | 20 |
|  | b. | Assess the role of social institutions and community practices in either preventing or perpetuating ritualistic violence. |
|  |  |  |  |  |  |
| 3. | a. | Analyse the typologies of ritualistic offenders, highlighting differences between psychopathic, religiously motivated, and profit-driven offenders. | CO1 | An | 20 |
|  | b. | Evaluate the investigative challenges faced by law enforcement agencies while dealing with ritualistic homicides and occult-related offences. |
|  |  | **(OR)** | | | |
| 4. | a. | Critically evaluate major case studies of ritual murders in India and abroad. Discuss their implications for criminal profiling and prevention. | CO3 | U | 20 |
|  | b. | Examine the evidentiary and forensic limitations encountered during the prosecution of ritual-based crimes. |
|  |  |  |  |  |  |
| 5. | a. | Analyse the ethical and legal dilemmas faced by investigators while handling sensitive ritual crime cases involving cultural or religious sentiments. | CO5 | An | 20 |
|  | b. | Evaluate the effectiveness of existing laws and policy measures in addressing ritualistic crimes in India. |
|  |  | **(OR)** | | | |
| 6. | a. | Assess the significance of forensic psychology and behavioural analysis in understanding ritualistic offenders. | CO3 | A | 20 |
|  | b. | Critically examine the role of media representation and public perception in sensationalizing ritualistic crimes. |
|  |  |  |  |  |  |
| 7. | a. | Examine the psychological factors that make communities susceptible to participating in ritualistic practices. | CO4 | E | 20 |
|  | b. | Analyse the role of local governance and community institutions in reducing ritualistic crimes. |
|  |  | **(OR)** | | | |
| 8. | a. | Discuss the significance of behavioural profiling in identifying repeat ritualistic offenders. | CO6 | E | 20 |
|  | b. | Evaluate the impact of media awareness campaigns in changing public perception of ritualistic crimes. |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Develop a comprehensive multidisciplinary framework for investigating and preventing ritualistic crimes in India. Include psychological profiling, legal reforms, community awareness, and inter-agency coordination strategies. | CO6 | C | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Appraise the socio-cultural, psychological, and religious underpinnings of ritualistic crimes. |
| CO2 | Examine socio-psychological and group dynamics influencing ritual crime behaviour. |
| CO3 | Analyse offender typologies and investigative challenges in ritual-based offences. |
| CO4 | Evaluate national and international case studies on ritualistic killings and their implications. |
| CO5 | Deconstruct ethical, legal, and societal issues surrounding ritualistic crimes. |
| CO6 | Propose integrative strategies for prevention, investigation, and policy development in ritualistic crimes. |

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**END SEMESTER EXAMINATION – NOV/DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **25CR704** | **Duration** | **3hrs** |
| **Course Title** | **ANTHROPOLOGY OF RITUALS, SACRIFICE, AND DEVIANCE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Explain Émile Durkheim’s views on ritual and social cohesion. | CO1 | R | 20 |
|  | b. | Discuss Victor Turner’s concept of communitas and its significance in understanding ritual behavior. |
|  |  | **(OR)** | | | |
| 2. | a. | Evaluate Mary Douglas’s theory of purity and pollution in relation to cultural order. | CO2 | U | 20 |
|  | b. | Explain Levi-Strauss’s idea of binary oppositions and its application to ritual analysis. |
|  |  |  |  |  |  |
| 3. | a. | Describe the role of symbolism in rituals of blood, body, and belief across cultures. | CO4 | R | 20 |
|  | b. | Examine how transgression and taboo are expressed through ritual performances. |
|  |  | **(OR)** | | | |
| 4. | a. | Discuss anthropological perspectives on deviance and sacred transgression. | CO2 | A | 20 |
|  | b. | Differentiate between ‘ritual deviance’ and ‘criminal deviance’ with suitable examples. |
|  |  |  |  |  |  |
| 5. | a. | Analyse the concept of moral panic in the context of social marginalization. | CO3 | An | 20 |
|  | b. | How do possession and trance states reflect the intersection of belief and power? |
|  |  | **(OR)** | | | |
| 6. | a. | Illustrate with examples how tribal rituals in India (e.g., Jharkhand or Kerala) reflect community identity and control. | CO5 | An | 20 |
|  | b. | Discuss the relationship between belief, power, and fear in ritualistic violence within Indian ethnographies. |
|  |  |  |  |  |  |
| 7. | a. | Explain the ritualized forms of gendered violence such as the Devadasi system and virgin sacrifice. | CO5 | E | 20 |
|  | b. | Critically analyse global practices like Female Genital Mutilation (FGM) through an anthropological lens. |
|  |  | **(OR)** | | | |
| 8. | a. | Discuss the role of social media and digital communication in reviving or reshaping neo-rituals in modern India. | CO6 | E | 20 |
|  | b. | Examine the ethical dilemmas and legislative challenges in addressing ritualistic crimes. |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Critically examine how anthropological theories of ritual, belief, and deviance contribute to understanding violence and moral order in contemporary society. Discuss with relevant examples from Indian and global contexts. | CO4 | A | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Explain key anthropological theories on rituals, sacrifice, and deviance. |
| CO2 | Interpret symbolic meanings of blood, body, and belief in ritual practices. |
| CO3 | Examine how taboo, transgression, and moral deviance are socially constructed. |
| CO4 | Analyse Indian ethnographic accounts of witchcraft, gendered rituals, and sacrifice. |
| CO5 | Evaluate the interplay of belief, power, and social control in ritual violence. |
| CO6 | Assess ethical, legal, and contemporary issues surrounding ritualistic crimes. |

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**END SEMESTER EXAMINATION – NOV/DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **25CR705** | **Duration** | **3hrs** |
| **Course Title** | **HATE CRIMES: LAW, SOCIETY, AND RESISTENCE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the concept, elements, and legal classification of hate crimes, distinguishing them from related acts. | CO1 | R | 20 |
|  | b. | Examine the challenges posed by data gaps and underreporting in formulating effective hate crime policies. |
|  |  | **(OR)** | | | |
| 2. | a. | Explain the difference between hate crimes, bias incidents, and hate speech using relevant legal and social examples. | CO2 | U | 20 |
|  | b. | Analyse how human rights frameworks influence hate crime legislation at the national and international levels. |
|  |  |  |  |  |  |
| 3. | a. | Critically analyse psychological theories such as moral disengagement and dehumanization in the context of hate crime motivations | CO1 | An | 20 |
|  | b. | Evaluate the role of media and technology in amplifying or normalizing hate narratives. |
|  |  | **(OR)** | | | |
| 4. | a. | Discuss how sociological theories like strain theory and conflict theory explain the origins of hate crimes in India. | CO3 | U | 20 |
|  | b. | Assess how group dynamics and in-group/out-group behaviour contribute to prejudice and radicalization. |
|  |  |  |  |  |  |
| 5. | a. | Examine the legal frameworks addressing hate crimes in India, focusing on IPC provisions and SC/ST Act. | CO5 | An | 20 |
|  | b. | Evaluate the effectiveness of institutional mechanisms like police, judiciary, and NHRC in responding to hate crimes. |
|  |  | **(OR)** | | | |
| 6. | a. | Compare the Indian legal response to hate crimes with that of the US or UK, highlighting key differences and lessons. | CO3 | A | 20 |
|  | b. | Analyse the prosecutorial and evidentiary challenges in hate crime cases. |
|  |  |  |  |  |  |
| 7. | a. | Analyse offender typologies (thrill-seekers, reactive, ideologically driven) and their implications for criminal justice interventions. | CO4 | E | 20 |
|  | b. | Evaluate victim profiling approaches and the role of intersectionality in understanding vulnerability. |
|  |  | **(OR)** | | | |
| 8. | a. | Examine the mental health impacts of hate crimes on victims and communities. | CO6 | E | 20 |
|  | b. | Assess community-based advocacy and preventive strategies aimed at countering hate crimes. |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Propose a comprehensive, multi-stakeholder framework for hate crime prevention and response in India, integrating legal, psychological, and community-based strategies. | CO6 | C | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Describe the concept, elements, and legal classification of hate crimes, distinguishing them from related acts. |
| CO2 | Analyse psychological and sociological theories explaining the origins and dynamics of hate crimes. |
| CO3 | Evaluate national and international legal frameworks and institutional mechanisms addressing hate crimes. |
| CO4 | Examine offender and victim profiles using intersectional, psychological, and criminological perspectives. |
| CO5 | Propose advocacy, reform, and preventive strategies using community engagement, education, and media. |
| CO6 | Develop integrative, interdisciplinary frameworks for policy formulation, law enforcement training, and victim-centred interventions to counter hate crimes at national and regional levels. |

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**END SEMESTER EXAMINATION – NOV/DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **25CR706** | **Duration** | **3hrs** |
| **Course Title** | **RESTORTIVE JUSTICE IN THE CONTEXT OF HATE CRIME: GLOBAL AND REGIONAL PERSPECTIVES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Describe the origins and core principles of restorative justice, highlighting its distinctions from retributive justice. | CO1 | R | 20 |
|  | b. | Analyse the role of victims, offenders, and communities in restorative justice processes. |
|  |  | **(OR)** | | | |
| 2. | a. | Explain how restorative justice approaches can be applied to serious crimes, including hate crimes. | CO2 | U | 20 |
|  | b. | Evaluate the ethical considerations involved in applying RJ to hate-based violence. |
|  |  |  |  |  |  |
| 3. | a. | Examine hate crimes as identity-based violence and their impact on individuals and communities. | CO1 | An | 20 |
|  | b. | Analyse the need for acknowledgment and symbolic justice in restorative responses to hate crimes. |
|  |  | **(OR)** | | | |
| 4. | a. | Critically evaluate restorative justice as a human right–based response to collective harm caused by hate crimes. | CO3 | U | 20 |
|  | b. | Assess the effectiveness of RJ in addressing trauma, fear, and community fragmentation. |
|  |  |  |  |  |  |
| 5. | a. | Compare truth and reconciliation models from South Africa and Canada, focusing on their relevance for hate crimes | CO5 | An | 20 |
|  | b. | Evaluate the limitations and critiques of restorative justice in contexts of hate and conflict. |
|  |  | **(OR)** | | | |
| 6. | a. | Discuss the role of community-based restorative practices (e.g., circles, victim-offender conferencing) in different global contexts. | CO3 | A | 20 |
|  | b. | Analyse how culture, history, and politics shape RJ outcomes across different countries. |
|  |  |  |  |  |  |
| 7. | a. | Examine community justice traditions in India (e.g., panchayats, maitri groups) and their relevance to hate crime contexts. | CO4 | E | 20 |
|  | b. | Critically evaluate legal and policy gaps in integrating RJ within the Indian criminal justice system. |
|  |  | **(OR)** | | | |
| 8. | a. | Assess the role of civil society interventions in restorative responses to communal violence (e.g., Gujarat 2002, Manipur) | CO6 | E | 20 |
|  | b. | Analyse hybrid justice models that combine RJ with formal legal frameworks in India. |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Design a restorative justice intervention framework for a caste- or religion-based hate crime in India, integrating harm mapping, facilitation strategies, ethics, and community engagement. | CO6 | C | 20 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Describe the origins, principles, and distinctions of restorative justice, including its relevance to hate crimes |
| CO2 | Analyse hate crimes as identity-based violence and explore restorative justice as a human rights-based response. |
| CO3 | Examine global restorative practices and evaluate their applicability and limitations in contexts of hate and conflict. |
| CO4 | Interpret regional and Indian community justice models and assess the scope for integrating RJ in the Indian legal framework. |
| CO5 | Design restorative responses considering harm mapping, facilitation, and community needs. |
| CO6 | Propose integrative frameworks for policy, education, and legal reform to institutionalize restorative justice in hate crime response. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **25CR707** | **Duration** | **3hrs** |
| **Course Title** | **VICTIMOLOGY: CONCEPTS, THEORIES, PATTERNS AND CRIMINAL JUSTICE RESPONSES** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | **i)** Elaborate on the origin and development of victimology, its types, and causes of victimization.  Analyze the extent of victimization along with societal and individual reactions. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Evaluate the nature and patterns of violent crimes in India and assess their social, psychological, and economic impacts on victims. | CO2 | U | 20 |
|  | b. | Analyze the financial and psychological effects of crime on victims in India, incorporating recent statistical trends to highlight the scope and impact. |  |  |  |
|  |  |  |  |  |  |
| 3. | a. | Explain the role and responsibilities of the police within the Criminal Justice System in providing support and protection to victims. | CO3 | A | 20 |
|  | b. | Highlight the key concepts of Social Learning Theories and explain how Feminist Theory approaches contribute to understanding victimization and crime. |  |  |  |
|  |  | OR |  |  |  |
| 4. |  | Elaborate on the existing theories of victimology and provide a comparative analysis of their perspectives and approaches.Top of Form  Bottom of Form | CO4 | An | 20 |
|  |  |  |  |  |  |
| 5. | a. | Describe the current trends in victimization in India and highlight the findings derived from recent victimization surveys. | CO5 | E | 20 |
|  | b. | Critically analyze the major perspectives of Positive, Radical, Postmodern, and Critical Victimology, highlighting their core principles and contemporary relevance. |  |  |  |
|  |  | **OR** |  |  |  |
| 6. | a. | Elaborate on the key concepts and assumptions of the Lifestyle Exposure Theory, Deviant Place Theory, and Routine Activity Theory in understanding the impact of victimization. | CO1 | U | 20 |
|  | b. | Explain the various rights and support services available to victims, emphasizing the role of legal aid mechanisms in ensuring justice and rehabilitation. |  |  |  |
|  |  |  |  |  |  |
| 7. | a. | **i) Explain** the functions and responsibilities of the Criminal Justice System in ensuring effective victim support and protection. | CO2 | A | 20 |
|  |  | **ii) Evaluate** the effectiveness of various components of the Criminal Justice System in addressing victims’ needs and promoting restorative justice. |  |  |  |
|  |  | **OR** |  |  |  |
| 8. |  | Elaborate on the various special topics in victimology, including child victimization, women victimization, marginalized group victimization, and the bystander effect, highlighting their causes and implications. | CO3 | C | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Critically analyze the Structural Entitlement Approach, applying real-world case studies to illustrate its relevance and implications. | CO5 | E | 20 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Comprehend the concept of victimology and its relevance in the Indian context. |
| CO2 | Analyze various theories of victimization and their application to different types of victimization. |
| CO3 | Evaluate the impact of victimization on individuals and society, and the role of the criminal justice system in supporting victims. |
| CO4 | Develop critical thinking skills to address victimization and promote victim rights. |
| CO5 | Evaluate the victimization patterns of vulnerable groups and advocacy initiatives. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **25CR708** | **Duration** | **3hrs** |
| **Course Title** | **INTERSECTIONAL PERSPECTIVE ON VICTIM BLAMING** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. |  | **Analyse how the** factors such as gender, race, class, and sexuality influence the patterns and perception of victim blaming in the society. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the power dynamics and privilege in understanding the victim blaming | CO2 | U | 20 |
|  | b. | Narrate how multiple forms of oppression contribute to victim blaming and analyze their relevance from an intersectional perspective. |  |  |  |
|  |  |  |  |  |  |
| 3. | a. | Analyze how social structures shape attitudes and practices of victim blaming, emphasizing the influence of societal norms and power dynamics. | CO3 | A | 20 |
|  | b. | **Discuss the various roles of legal frameworks and legislations in preventing and addressing victim blaming.** |  |  |  |
|  |  | **(OR)** |  |  |  |
| 4. |  | i)Examine how victim blaming impacts marginalized communities in different social contexts.  ii) Identify how victim blaming contributes to the continued social exclusion of marginalized groups. Top of Form  Bottom of Form | CO4 | An | 20 |
|  |  |  |  |  |  |
| 5. | a. | Describe how power dynamics and social privileges influence the development and application of Structural Entitlement Theory. | CO5 | E | 20 |
|  | b. | Define the various societal factors involved in the development of the Structural Entitlement Model. |  |  |  |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Elaborate on the strategies that challenge and transform existing social structures. | CO1 | U | 20 |
|  | b. | Develop a revised Structural Entitlement Theory by integrating insights from the victim-blaming perspective of Victim Precipitation Theory. |  |  |  |
|  |  |  |  |  |  |
| 7. |  | **i.) Elucidate the concept of intersectionality and its significance within feminist theory.**  **ii) Analyze how intersectionality is applied in Critical Race Theory and Queer Theory to understand overlapping systems of oppression.** | CO2 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | i) Enlighten how sociological structures influence attitudes and practices related to victim blaming.  Discuss the role of social institutions in perpetuating or challenging victim blaming in society. | CO3 | An | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Critically analyze the Structural Entitlement Approach, applying real-world case studies to illustrate its relevance and implications. | CO5 | E | 20 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Recognize the concept of intersectionality and its relevance to victim blaming. |
| CO2 | Analyze the different forms of oppression that intersect to shape experiences of victim blaming. |
| CO3 | Examine the ways in which societal structures and institutions perpetuate victim blaming and reinforce systems of oppression. |
| CO4 | Develop critical thinking skills to evaluate the complex relationships between victim blaming and intersectionality. |
| CO5 | Develop an appropriate form of theorical measure in intersectional perspective. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **25FS301** | **Duration** | **3hrs** |
| **Course Title** | **INORGANIC CHEMISTRY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | Identify at least two similarities of the following pictorial representation of group ‘A’ and ‘B’ based on periodical table.  **A**  **B**  C:\Users\Admin\Downloads\ChatGPT Image Nov 5, 2025, 11_10_12 AM.png | 1a | R | 1 |
| 2. | List out two applications of uranium elements in Scientific field. | 1b | R | 1 |
| 3. | Name out one of the lightest stability nuclei in the periodic table. | 2a | U | 2 |
| 4. | What is Isotone? Give an example. - Sarthaks eConnect | Largest Online  Education CommunityLabel the following nuclei with mass number. | 2b | U | 2 |
| 5. | Sketch the geometry of any of the octahedral complex. | 3a | R | 3 |
| 6. | http://employees.csbsju.edu/cschaller/principles%20chem/appendix/PTligandtable.pngIdentify at least two similarities in the following structure based types of ligands. | 3b | R | 3 |
| 7. | Name out the color of the complex of the following equation.  Fe3+ + nCNS**-** 🡨🡪[Fe(CNS)n](3-n)- | 4a | U | 4 |
| 8. | Label the missing elements and functional groups in the following heme unit. | 4b | U | 4 |
| 9. | Find the case study and associated heavy metal of the following geographical location.  32°11'27.6"N 130°22'40.2"E - 59RH+C44 Minamata, Kumamoto, Japan | 5a | A | 5 |
| 10. | Find the answer of the following equation based heavy metal detection.  BaCl2 + \_\_\_\_\_\_\_\_\_ 🡪 BaSO4 + \_\_\_\_\_\_\_\_ | 5b | A | 5 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | Determine the significance of the discovery of gallium in confirming the reliability of Mendeleev’s periodic table based on the following case study.  “Dmitri Mendeleev, a Russian chemist, developed the first widely accepted periodic table in 1869. Instead of arranging elements only by atomic mass, he also grouped them according to repeating chemical properties. While organizing the table, he noticed that some positions were empty because no known element fit the pattern. Mendeleev boldly left these spaces vacant and predicted the existence and approximate properties of the unknown elements. One such prediction was for an element he called “eka-aluminum.” Several years later, in 1875, the French scientist Paul-Émile Lecoq de Boisbaudran discovered gallium, an element whose characteristics closely matched Mendeleev’s predicted values. This success greatly strengthened scientific confidence in the periodic table.” | 1a | A | 1 |
| 12. | Find out the similarities of the following elements in the periodical table.  Diagonal Relationship Between Boron and Silicon | 1b | An | 2 |
| 13. | Calculate the binding energy of 24He (Helium Nuclei). | 2a | A | 3 |
| 14. | Find Hybridization, Orbital complex (Inner / Outer), Magnetic characters of the following complex. **[Co(F6]3-** | 2b | An | 4 |
| 15. | Apply any four heavy metal detection techniques to analyze real-world case studies where these methods were effectively used." | 2c | A | 5 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16 | Determine the advantages and disadvantages of the Modern Periodic Table in explaining the properties of elements. | 1c | A | 1 |
| **(OR)** | | | | |
| 17 | Solve the following case study using Mendeleev’s periodic table and give one report based on the case study.  Crime Scene Case Study : "The Missing Element"  Place: St. Petersburg, 1869. Victim: Scientific Integrity. Suspect: Rival chemist who disapproved of Mendeleev’s periodic table. Crime: Just before Mendeleev’s presentation of the periodic table, one of the predicted cards with an unknown element is stolen. Mendeleev is accused of fraud.  Evidence: Scraps of paper with partial atomic masses.  A broken flask labeled “Eka-Aluminum.”  Fingerprints on Mendeleev’s desk. | 1e | An | 1 |
| 18 | Compare Alpha, Beta and gamma radiation with suitable examples. | 2b | A | 2 |
| **(OR)** | | | | |
| 19 | Determine and analyze how the calculation of binding energy contributes to understanding the stability and energy release of atomic nuclei.” | 2c | An | 2 |
| 20 | Justify that tetracyanonickelate(II) ion is square planar complex. | 3d | E | 3 |
| **(OR)** | | | | |
| 21 | Evaluate the effectiveness of Crystal Field Theory in predicting the stability of octahedral complexes with different ligands. | 3f | E | 3 |
| 22 | Analyze the role of iron in oxygen transport and electron transfer processes within biological systems. | 4c | An | 4 |
| **(OR)** | | | | |
| 23 | Determine the role of zinc in biochemical processes with relevant examples. | 4e | An | 4 |
| **Compulsory Question:** | | | | |
| 24 | A district located in the eastern region of India (not belonging to the Seven Sisters states and not surrounded by the Arabian Sea or the Indian Ocean) is facing severe water contamination issues. The water requires purification to remove an unknown heavy metal (‘X’) that has caused widespread skin allergies and related diseases due to nearby industrial activities. Analyze and identify the possible state and the heavy metal involved. Suggest suitable detection methods, outline the reaction steps, and describe the expected observations.” | 5d | An | 5 |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **25FS302** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC SCIENCE AND CRIMINAL JUSTICE SYSTEM** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | Define the term ‘Forensic Science’ | 1a | R | 1 |
| 2. | Define the ‘Principle of Exchange’. | 1b | R | 1 |
| 3. | State the year of establishment of the first fingerprint Bureau in the world. | 2a | U | 2 |
| 4. | State the role of National Crime Records Bureau. | 2b | U | 2 |
| 5. | Name the head of the state of the police organization. | 3a | R | 3 |
| 6. | List the major functions of police. | 3b | R | 3 |
| 7. | State any two adverse impacts of crime on society. | 4a | U | 4 |
| 8. | List any four types of crimes. | 4b | U | 4 |
| 9. | List various types of crime scenes. | 5a | R | 5 |
| 10. | State the importance of protecting a crime scene. | 5b | U | 5 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | Using the Daubert Standard, decide whether a novel scientific test can be presented in a criminal trial. | 1d | A | 1 |
| 12. | Compare mobile crime laboratories and stationary forensic labs in terms of effectiveness and speed. | 2e | An | 2 |
| 13. | Examine the differences in roles and responsibilities between the BSF and CRPF. | 3d | A | 3 |
| 14. | Compare the ‘Property Crimes’ with ‘Public Order crimes’. | 4b | An | 4 |
| 15. | Compare and contrast a primary crime scene with a secondary crime scene with suitable examples. | 5a | A | 5 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16 | Apply the Frye Case principles to determine whether a new forensic technique should be admissible in court. | 1c | A | 1 |
| **(OR)** | | | | |
| 17 | Analyze the role of Police and Detective Training Schools in improving law enforcement efficiency. | 2c | An | 2 |
|  |  |  |  |  |
| 18 | Explain coordination between a mobile crime lab and local police in evidence collection. | 2e | A | 2 |
| **(OR)** | | | | |
| 19 | Analyze the relationship between police and forensic scientists during criminal investigations. | 3c | An | 3 |
|  |  |  |  |  |
| 20 | Explain how the CISF ensures security in industrial and critical infrastructure facilities. | 3d | A | 3 |
| **(OR)** | | | | |
| 21 | Compare the social impact of ‘cyber-crimes’ with ‘traditional crimes’. | 4a | An | 4 |
|  |  |  |  |  |
| 22 | Use legal and procedural knowledge to explain the steps from filing a criminal charge to investigation. | 4d | A | 4 |
| **(OR)** | | | | |
| 23 | Interpret the role of human rights in protecting accused individuals within the criminal justice system. | 4e | An | 5 |
| **Compulsory Question:** | | | | |
| 24 | Analyze the impact of improper chain of custody on the admissibility of evidence in court. | 5g | An | 5 |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **25FS303** | **Duration** | **3hrs** |
| **Course Title** | **BIOLOGY FOR FORENSIC SCIENCE** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | **Define** the cell theory and **state** its key postulates. | 1a | R | 1 |
| 2. | **List** any four organelles found in eukaryotic cells and **mention** one function of each. | 1b | R | 1 |
| 3. | **List all the parts of leaf.** | 2a | U | 2 |
| 4. | **Differentiate** between prokaryotic and eukaryotic cell walls with suitable examples. | 2b | U | 2 |
| 5. | **Explain Croton.** | 3a | R | 3 |
| 6. | **Identify** the clinical features of Castor. | 3b | R | 3 |
| 7. | Define plant poison. | 4a | U | 4 |
| 8. | **Define Blood.** | 4b | U | 4 |
| 9. | **Illustrate** morphology of Abrus precatorius. | 5a | A | 5 |
| 10. | **Give the name of alkaloid present in Poppy Plant.** | 5b | A | 5 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | **Apply** your understanding of cell structures to **compare and interpret** how prokaryotic and eukaryotic cells differ in organization and function. | 1a | A | 1 |
| 12. | Explain Papaver Seminiferous. | 1b | An | 2 |
| 13. | Describe composition of Blood. | 2a | U | 3 |
| 14. | **Differentiate angiosperm and gymnosperm.** | 2b | U | 2 |
| 15. | **Analyze** the interrelationship between the nervous and circulatory system. | 2c | A | 3 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16 | Examine the given image to determine the leaf morphology and explain the structure and function of each labeled part.  Leaf - Wikipedia | 1c | R | 2 |
| **(OR)** | | | | |
| 17 | Analyze the structure and function of the human respiratory system and illustrate how its organs work together to facilitate gaseous exchange. | 1e | U | 3 |
|  |  |  |  |  |
| 18 | **Describe** the structural differences between the castor and poppy plant. | 2b | A | 2 |
| **(OR)** | | | | |
| 19 | Evaluate the principles of antigen–antibody interaction. | 2c | An | 4 |
|  |  |  |  |  |
| 20 | Explain the working principle of a compound microscope and describe the structure and function of its various parts. | 3d | U | 5 |
| **(OR)** | | | | |
| 21 | Explain different plant poison. | 3f | U | 2 |
|  |  |  |  |  |
| 22 | Describe the process of agglutination. | 4c | U | 5 |
| **(OR)** | | | | |
| 23 | Describe the process of precipitation. | 4e | R | 5 |
| **Compulsory Question:** | | | | |
| 24 | Differentiate between human and plant cells based on their structure and function. | 5d | U | 1 |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **25FS701** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC TOXICOLOGY AND PHARMACOLOGY** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | **Classify** poisons based on source, action and chemical nature, and support the classification with suitable forensic examples. | CO1 | R | 10 |
|  | b. | **Explain** the concept of dose–response relationship (LD₅₀, ED₅₀, NOAEL, LOAEL) and its toxicological significance. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | **Examine** the types of toxicity (acute, sub-acute, chronic, cumulative, local and systemic) using relevant case illustrations. | CO1 | An | 10 |
|  | b. | **Evaluate** the DFSS protocols in toxicology with reference to objectives of forensic toxicology and food-borne toxic chemical risks. | CO1 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | **Discuss** ADME processes in toxicokinetics and assess their implications in forensic interpretation. | CO2 | U | 10 |
|  | b. | **Interpret** the role of Phase I & Phase II biotransformation reactions and major enzyme systems (CYP450) in drug metabolism. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | **Assess** the concepts of drug–receptor interactions and classify drug actions with examples. | CO2 | An | 10 |
|  | b. | **Evaluate** genetic variation in metabolism and its significance in individual variability and medicolegal outcomes. | CO2 | E | 10 |
|  |  |  |  |  |  |
| 5. | a. | **Classify** metallic poisons and explain the clinical and forensic aspects of at least two major metals. | CO3 | R | 10 |
|  | b. | **Discuss** the nature of chemical injury caused by corrosives (acids and alkalis) and its forensic interpretation. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | **Examine** the biochemical mechanisms of metal toxicity and justify the use of chelating agents in treatment. | CO3 | An | 10 |
|  | b. | **Evaluate** the toxicological profile of non-metallic poisons cyanide and iodine with mechanism and outcome. | CO3 | E | 10 |
|  |  |  |  |  |  |
| 7. | a. | **Evaluate** household poisons with respect to exposure route, lethal dose, management and medico-legal considerations. | CO4 | E | 10 |
|  | b. | **Examine** synergistic and cumulative toxicity in industrial food toxins with illustrative examples. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | **Discuss** the toxicological significance of foodborne poisons including metal contamination, pesticide residues and adulterants. | CO4 | U | 10 |
|  | b. | **Prepare** a report on the sources, mechanisms and clinical manifestations of phosgene and H₂S as major gaseous poisons. | CO4 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | **Explain** the importance of analytical toxicology in forensic practice and outline the types of samples analysed. | CO5 | U | 10 |
|  | b. | **Evaluate** the procedures of collection, preservation and transport of toxicological evidence with reference to admissibility standards. | CO5 | E | 10 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | ***Categorize*** poisons according to their type, dose, and exposure route |
| CO2 | ***Interpret*** the significance of drug metabolism and elimination pathways |
| CO3 | ***Identify*** clinical manifestations of metallic, non-metallic, and corrosive poisonings. |
| CO4 | ***Evaluate*** the toxic effects of gases, household agents, and contaminated food. |
| CO5 | ***Use*** analytical techniques in toxicological investigations following DFSS standards |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **25FS702** | **Duration** | **3hrs** |
| **Course Title** | **POISONS, PESTICIDES AND PSYCHOTROPIC SUBSTANCES** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | **Classify** natural poisons of plant, animal and microbial origin with examples. | CO1 | R | 10 |
|  | b. | **Discuss** animal toxins with reference to mechanism and diagnostic indicators. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | **Interpret** medicolegal implications of deaths due to natural poisons with support from case examples. | CO1 | An | 10 |
|  | b. | **Evaluate** the challenges in detection, attribution and legal proof of poisoning by plant/animal toxins in forensic practice. | CO1 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | **Classify** pesticides with examples. | CO2 | R | 10 |
|  | b. | **Evaluate** environmental persistence and bioaccumulation of pesticides and its public health implications. | CO2 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | **Examine** instrumental and regulatory approaches for pesticide detection with reference to DFSS / FSSAI guidelines. | CO2 | A | 10 |
|  | b. | **Assess** antidotes and prevention strategies in large-scale agro-toxic incidents with real-world applicability. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | **Assess** toxicological aspects of herbicides, rodenticides and fumigants used in agricultural settings. | CO3 | An | 10 |
|  | b. | **Interpret** the environmental and forensic implications of industrial chemical spills with case documentation. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | **Assess** safety regulations and compliance gaps in industrial toxicology using suitable forensic precedents. | CO3 | An | 10 |
|  | b. | **Evaluate** the systemic toxicity of benzene, toluene and formaldehyde with emphasis on exposure route and target organ injury. | CO3 | E | 10 |
|  |  |  |  |  |  |
| 7. | a. | **Classify** drugs of abuse and explain dependence, tolerance and withdrawal in the context of NDPS scheduling. | CO4 | R | 10 |
|  | b. | **Examine** narcotics, stimulants, depressants, hallucinogens and cannabinoids with attention to forensic relevance. | CO4 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | **Assess** synthetic psychoactive substances and their challenges in detection and legal enforcement. | CO4 | An | 10 |
|  | b. | **Interpret** workplace drug misuse and its consequences under legal, occupational and forensic domains. | CO4 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | **Discuss** the legal framework governing toxic and controlled substances in India with emphasis on NDPS provisions. | CO5 | U | 10 |
|  | b. | **Examine** the procedures for seizure, documentation and expert opinion submission in toxic substance cases. | CO5 | A | 10 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | ***Identify*** the toxic effects of natural and biological poisons. |
| CO2 | ***Evaluate*** the health implications of pesticide exposure |
| CO3 | ***Identify*** the toxicity and exposure risks of agrochemicals and industrial poisons. |
| CO4 | ***Evaluate*** common drugs of abuse and their forensic relevance. |
| CO5 | ***Use*** the legal frameworks related to toxic and controlled substances. |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| --- | --- | --- | --- |
| **Course Code** | **25FS303** | **Duration** | **3hrs** |
| **Course Title** | **INSTRUMENTAL METHODS OF ANALYSIS** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Discuss the instrumentation of Atomic Absorption Spectrometry (AAS) with a neat diagram, explaining the function of each component. | CO1 | U | 10 |
|  | b. | Explain applications and instrumentation of atomic fluorescence spectrometry with neat diagram. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Enumerate the principle and instrumentation of atomic emission spectrometry with neat diagram | CO1 | A | 10 |
|  | b. | Explain the principle of Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES) and describe its main components. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the principle of UV-Visible Spectroscopy and how it is used to determine the concentration of a substance in a solution. | CO2 | U | 10 |
|  | b. | Explain the theory of fluorescence and phosphorescence, highlighting the differences between the two phenomena in terms of electronic transitions and lifetimes. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Compare and contrast the instrumentation used in fluorescence and phosphorescence spectroscopy. | CO2 | A | 10 |
|  | b. | Explain the theory and instrumentation of UV-Visible Spectroscopy | CO2 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Enumerate the theory and instrumentation of Infrared Spectroscopy with an example. | CO3 | R | 10 |
|  | b. | Explain the principle behind Photoacoustic IR Spectroscopy and how it detects sample information. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Analyze the role of IR Spectroscopic methods in forensic science and evaluate their effectiveness in the identification and analysis of evidence. | CO3 | An | 10 |
|  | b. | Evaluate the advantages and limitations of using Raman Spectroscopy for material analysis compared to other spectroscopic techniques. | CO3 | E | 10 |
|  |  |  |  |  |  |
| 7. |  | Enumerate the principles and components of Nuclear Magnetic Resonance (NMR) Spectrometry. | CO4 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Discuss working and applications of Nuclear Magnetic Resonance Spectrometry. | CO5 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain Isotope Dilution Methods with examples | CO6 | U | 10 |
|  | b. | Enumerate thermo gravimetric analysis (TGA) with neat diagram. | CO6 | R | 10 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Memorize the principles of atomic spectroscopy |
| CO2 | Differentiate between IR and Raman Spectroscopy |
| CO3 | Apply the principles of electronic spectroscopy |
| CO4 | Infer the principles of NMR spectroscopy |
| CO5 | Evaluate the importance of radiochemical methods in forensic science |
| CO6 | Adapt electrochemical methods in forensic science |

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**END SEMESTER EXAMINATION – NOV / DEC 2025**

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| **Course Code** | **25FS704** | **Duration** | **3hrs** |
| **Course Title** | **FORENSIC TOXICOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (4 X 20 = 80 MARKS)**  **(Answer all the Questions)** | | | | | |
| 1. | a. | Classify barbiturates. Explain the mechanism of action of barbiturates and give its medico-legal significance. | CO1 | R | 10 |
|  | b. | Describe the clinical features, treatment and medico-legal aspects of Phencyclidine. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define doping. Explain the procedure for conducting dope tests. | CO2 | U | 10 |
|  | b. | Classify prohibited substances in sports. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Define absolute alcohol. Explain the absorption, metabolism and excretion of alcohol in detail. | CO3 | U | 10 |
|  | b. | Differentiate between illicit liquor and country made liquor. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe active principles present in strychnine. Explain its post mortem findings and medico-legal significance. | CO4 | U | 10 |
|  | b. | Write a note on copper poisoning. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Define distillation. Explain different types of distillation used for extraction of poisons. | CO5 | R | 10 |
|  | b. | Give color test used for detection of opium. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the relationship between drug abuse and crime. | CO1 | An | 10 |
|  | b. | Describe the tolerance, addiction and withdrawal symptoms of narcotic drugs and psychotropic substances. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Define proof spirit. Explain the estimation of ethyl alcohol from blood. | CO3 | A | 10 |
|  | b. | Write a note on consequences of drunken driving. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe color test for diacetyl morphine. | CO5 | U | 10 |
|  | b. | Describe spot tests for detection of cocaine and nicotine. | CO6 | R | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe different instrumental methods used for the identification of drugs used in sports. | CO6 | U | 10 |
|  | b. | Describe color test used for detection of Barbiturates. | CO6 | R | 10 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Enumerate the chemical composition and properties of narcotics, drugs, and psychotropic substances |
| CO2 | Describe the Issue of Substance Abuse in Sports. |
| CO3 | Compute the various contaminants present in alcoholic beverages. |
| CO4 | Infer the analysis of toxicological aspects and poisons. |
| CO5 | Choose an assessment on the extraction process of drugs from diverse matrices. |
| CO6 | Speculation of drugs using various methods. |