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

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| **Course Code** | **19CA3002** | **Duration** | **3hrs** |
| **Course Title** | **MACHINE LEARNING FOR IMAGE PROCESSING** | **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 how tree models can be extended beyond classification to perform ranking and probability estimation | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain how Support Vector Machines work, including the concepts of maximum margin, support vectors, and kernel functions. Discuss their advantages and limitations compared to other classifiers. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | List and describe common types of feature transformation used in machine learning. State their purposes and give examples of where each is applied. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Describe lossless and lossy compression. List their advantages and disadvantages, and give examples of where each is used. | CO4 | R | 20 |
|  |  |  |  |  |  |
| 5. |  | Identify the process of histogram equalization in image processing. List its advantages, limitations, and examples of where it is used. | CO5 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Describe the processes of rotating, shifting, and scaling images in image processing. | CO4 | R | 20 |
|  |  |  |  |  |  |
| 7. |  | Explain how distance based clustering and hierarchical clustering work. List their main advantages and disadvantages. | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | List different types of thresholding techniques, their advantages, and common applications. | CO5 | R | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | State the key components of a Convolutional Neural Network (CNN) used for image classification and their roles. | CO6 | R | 20 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Recall the concepts used in Machine Learning |
| CO2 | Identify the problems that can be solved using Machine Learning Techniques |
| CO3 | Identify the appropriate algorithms for solving problems |
| CO4 | Explore the fundamentals of images and their processing |
| CO5 | Apply Machine Learning Techniques for problem solving |
| CO6 | Apply Machine Learning for processing images |

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

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| --- | --- | --- | --- |
| **Course Code** | **20CA3026** | **Duration** | **3hrs** |
| **Course Title** | **MACHINE LEARNING AND DATA ANALYTICS** | **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. |  | List the types of Machine Learning. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain Linear Regression with its types, equations, steps and applications using suitable examples and diagrams. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | Describe the Nearest Neighbor Algorithm with suitable example. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Describe the Random Forest Algorithm with its working, features, advantages and applications. | CO4 | R | 20 |
|  |  |  |  |  |  |
| 5. |  | Illustrate the concept of Advanced Data Exploration, its techniques, purpose and applications with suitable examples. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Explain K-Means algorithm with suitable example. | CO4 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | Explain the Backpropagation algorithm in Neural Networks. | CO2 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain how Support Vector Machines work, including the concepts of maximum margin, support vectors, and kernel functions. Discuss their advantages and limitations compared to other classifiers. | CO4 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Apply Descriptive Statistics and Data Visualization to a dataset to summarize it using measures like mean, median and standard deviation. | CO6 | A | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Summarize the concepts of Machine Learning. |
| CO2 | Apply Dimensionality Reduction. |
| CO3 | Summarize the concepts of Neural Networks. |
| CO4 | Elaborate Supervised and Unsupervised Algorithms. |
| CO5 | Apply Machine Learning for Predictive Analytics. |
| CO6 | Analyze the processed data. |

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

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| **Course Code** | **22CA2010** | **Duration** | **3hrs** |
| **Course Title** | **EMERGING TECHNOLOGIES IN COMPUTING** | **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. |  | Explain the benefits and challenges of implementing domain-specific IoT solutions. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain the security risks and privacy concerns associated with Bitcoin transactions. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | List the characteristics of a robot and explain each in detail. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Explain the concept of qubits in detail, including their representation, properties, and role in quantum computing, with suitable examples. | CO4 | U | 20 |
|  |  |  |  |  |  |
| 5. |  | Describe different e-commerce business models and their key characteristics and use cases. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Describe the IoT logical design principles used to develop an IoT system. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | List the classifications of robots based on their functionality. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain the common security risks in e-commerce transactions and ways to mitigate them. | CO6 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | List electronic payment systems according to their technology and application. | CO6 | R | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Identify the key components of IoT and the possible future IoT trends. |
| CO2 | Summarize cryptography, crypto currencies and their framework. |
| CO3 | Recognize the concepts of robotics and the component characteristics. |
| CO4 | Apply the knowledge on quantum computing concepts and algorithms. |
| CO5 | Summarize the fundamentals of e-commerce, EDI, digital payment methods, mobile commerce and safe e-commerce transactions. |
| CO6 | Examine and evaluate the role of state-of-the-art digital technology on changing society. |

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

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| **Course Code** | **23CA2009** | **Duration** | **3hrs** |
| **Course Title** | **FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING** | **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. | List and explain the buzzwords of Java in detail. | CO1 | R | 10 |
|  | b. | Classify the different data types available in Java and illustrate each with examples. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain how method overriding supports runtime polymorphism in Java with a suitable example program. | CO2 | U | 10 |
|  | b. | Apply the concept of the ‘Super’ keyword in Java by demonstrating its use with a suitable example. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 3. |  | Apply the concept of Packages in Java by demonstrating how to create and import packages and explain their purpose with suitable examples. | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe how Console Input and Output operations are performed in Java with suitable examples. | CO4 | R | 10 |
|  | b. | Analyze the process of file reading and writing in Java using streams, supporting your answer with examples. | CO4 | An | 10 |
|  |  |  |  |  |  |
| 5. |  | Explain how mouse events are handled in Java programs with suitable examples. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Analyze the types of operators in Java and explain their functions with examples. | CO1 | An | 10 |
|  | b. | List the different control statements in Java with suitable examples. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 7. |  | Identify the different types of exceptions in Java with suitable examples. | CO3 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Apply the KeyEvent class in Java to demonstrate its purpose with an example. | CO6 | A | 10 |
|  | b. | Examine the methods of the MouseEvent class in Java and explain their functionalities. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Describe how menus are created and used in Java GUI applications with suitable example. | CO6 | R | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Describe the Principles of Object-Oriented Programming. |
| CO2 | Develop Programs using Constructors, Inheritance and Polymorphism. |
| CO3 | Construct Java Programs using Packages and Exception Handling. |
| CO4 | Examine Multithreading Concepts |
| CO5 | Apply I/O Methods in Applications. |
| CO6 | Develop Graphical User Interface Applications |

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

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| **Course Code** | **23CA2011** | **Duration** | **3hrs** |
| **Course Title** | **DATA STRUCTURES AND APPLICATIONS** | **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 common operations performed on data structures such as insertion, deletion, traversal, searching, and sorting. | CO1 | U | 10 |
|  | b. | Describe the concept of recursion and mention its advantages and disadvantages. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the working of insertion sort algorithms with suitable examples. | CO2 | U | 10 |
|  | b. | Examine the concept, algorithm, and working principle of Binary Search, and illustrate each step with a clear example. | CO2 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | Develop a program to implement a stack using arrays. | CO3 | A | 10 |
|  | b. | Explain the memory representation of a queue using an array. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain how a Linked List differs from an Array. | CO4 | U | 10 |
|  | b. | Explain the process of deleting a node at the beginning of a singly linked list with an algorithm and diagram. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe the deletion operations in a Binary Search Tree. | CO5 | U | 10 |
|  | b. | Illustrate the inorder, preorder, and postorder traversal techniques on a given binary tree and show the result. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Articulate the different types of data types used in programming and explain their significance with examples. | CO1 | A | 10 |
|  | b. | Discuss the concept of arithmetic expressions and explain how stacks are used in expression evaluation and conversion (infix to postfix). | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Develop an algorithm for inserting an element at a specified position in an array. | CO2 | A | 10 |
|  | b. | Differentiate between Singly Linked List and Doubly Linked List. Also, specify their advantages and disadvantages. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Examine the concept of Depth-First Search (DFS) in graphs with a suitable algorithm and a step-by-step example. | CO6 | E | 10 |
|  | b. | Differentiate Breadth-First Search (BFS) and Depth-First Search (DFS), and specify the advantages and disadvantages of a graph. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the various types of graphs and illustrate each type with suitable examples. | CO6 | A | 10 |
|  | b. | Classify the different types of binary trees with a diagram for each type and specify its properties. | CO5 | An | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Illustrate the features of data structures and algorithms. |
| CO2 | Organize data in arrays and perform operations. |
| CO3 | Simulate stacks and queue concepts. |
| CO4 | Develop applications using linked lists. |
| CO5 | Experiment the usage of trees in developing programs. |
| CO6 | Organize and visualize data in graphs. |

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

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| **Course Code** | **23CA2013** | **Duration** | **3hrs** |
| **Course Title** | **FUNDAMENTALS OF GENERAL FORENSICS 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. | Define forensic science and describe its interdisciplinary nature with examples from at least three scientific domains. | CO1 | U | 10 |
|  | b. | Classify different types of physical evidence (biological, chemical, trace, digital, etc.) and explain their significance in forensic investigation. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Illustrate the different methods of crime scene documentation (notes, photography, sketching, videography) and discuss their significance. | CO2 | A | 10 |
|  | b. | Analyze the challenges investigators face in preserving the integrity of a crime scene. Provide examples of how contamination can affect evidence admissibility. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Analyze how bloodstain pattern analysis and ballistic evidence contribute to reconstructing the sequence of events at a crime scene. | CO3 | An | 10 |
|  | b. | Define a step-by-step reconstruction plan for a simulated homicide case, integrating physical evidence, witness statements, and forensic analysis. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Define cybercrime and explain its major categories with suitable examples. | CO4 | U | 10 |
|  | b. | Illustrate the role of digital evidence in cybercrime investigations. Provide examples of at least three types of digital evidence. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Define emerging cybercrimes and explain how they differ from traditional cyber offences, with suitable examples. | CO5 | U | 10 |
|  | b. | Illustrate the role of analytical techniques such as log analysis, malware reverse engineering, and network forensics in investigating modern cybercrimes. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Determine, with suitable examples, how the historical foundations of forensic science (e.g., Locard’s Exchange Principle, early fingerprint classification) shaped the modern principles of evidence collection and interpretation. | CO1 | U | 10 |
|  | b. | Design a concept diagram that illustrates the relationship between the foundational principles of forensic science (scientific method, objectivity, chain of custody) and the different categories of forensic evidence (physical, biological, digital, documentary). Provide a brief explanation of your diagram. | CO1 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Define the roles of at least four key professionals (e.g., crime scene investigator, forensic pathologist, forensic photographer, and law enforcement officer) in the evaluation of a crime scene. Explain how their responsibilities complement one another in ensuring accurate evidence collection. | CO2 | U | 10 |
|  | b. | Analyze a crime scene scenario where multiple professionals are involved (e.g., forensic serologist, fingerprint expert, digital forensic analyst, and first responder). Discuss how miscommunication or overlap in their roles could affect the integrity of evidence collection and suggest strategies to prevent such issues. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | List and briefly describe the essential components of a professional courtroom record when presenting forensic evidence. | CO6 | R | 10 |
|  | b. | Explain the importance of maintaining accuracy and neutrality while recording forensic evidence in a courtroom setting. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Demonstrate, with an example, how a forensic expert should document chain-of-custody details during courtroom testimony. | CO6 | A | 10 |
|  | b. | Differentiate between oral testimony, written reports, and demonstrative evidence in terms of their role in courtroom record-keeping. | CO6 | An | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Illustrate the foundation of the forensic sciences and evidence. |
| CO2 | Define the roles of different types of professionals involved in evaluating a crime scene and collecting the evidence. |
| CO3 | Describe the components of the justice system. |
| CO4 | Tabulate the methodology used in collecting & interpreting data |
| CO5 | Define the importance pertaining to forensic examination. |
| CO6 | Record the evidence in a professional court room setting |

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

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| **Course Code** | **23CA2014** | **Duration** | **3hrs** |
| **Course Title** | **INFORMATION SECURITY** | **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 Taxonomy of Cryptography and Cryptanalysis. | CO1 | R | 10 |
|  | b. | Explain Symmetric Ciphers and how extended security principles such as Authentication, Authorization, Non-repudiation, and Accountability enhance the traditional CIA Triad. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain how **encryption and decryption** are performed in RSA with an example. | CO2 | U | 10 |
|  | b. | Describe the main differences between **cryptographic** and **non-cryptographic** hashes with suitable examples | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Describe the evolution of Authorization models. Include a brief history and discuss how Multi-level Security Models maintain data confidentiality. | CO3 | A | 10 |
|  | b. | Explain the principles behind **multi-level security models** (for example Bell-LaPadula and Biba) and their differing focus on confidentiality vs. integrity. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the concept of Cross-Site Scripting (XSS) attacks. Describe how they occur and their potential impact on web applications. | CO4 | U | 10 |
|  | b. | Explain the purpose of Firewalls and Intrusion Detection Systems (IDS) in network security. Give examples of each. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Describe how malware spreads and provide examples of real-world attacks caused by malware. | CO5 | A | 10 |
|  | b. | Explain Software Reverse Engineering and its purpose in security analysis. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Define an **Intrusion Detection System (IDS)** and mention its purpose in network protection. | CO4 | R | 10 |
|  | b. | List and briefly describe the types of Cross-site Scripting (XSS) attacks. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Compare SSH, SSL, and IPSec, explaining their main purposes and providing examples of their use in secure communications. | CO2 | A | 10 |
|  | b. | Explain Covert Channels and CAPTCHA mechanisms. Explain how they influence security in authorization and authentication systems. | CO3 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Identify the basic stages of Software Development and how security can be integrated. | CO6 | R | 10 |
|  | b. | Analyze insecurity in software and describe methods to detect vulnerabilities during development. | CO6 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | **Explain methods to reduce software flaws during development and illustrate their effectiveness.** | CO6 | A | 10 |
|  | b. | Evaluate the importance of integrating security measures throughout the Software Development Life Cycle (SDLC). | CO6 | E | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Illustrate the principles and concepts of information security. |
| CO2 | Categorize various cryptographic algorithms. |
| CO3 | Illustrate the principles and practices of access control. |
| CO4 | Summarize the basics of network security protocols. |
| CO5 | Analyze software flaws and malware. |
| CO6 | Implement security measures through tools and technology |

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

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| **Course Code** | **23CA2015** | **Duration** | **3hrs** |
| **Course Title** | **CYBER CRIMES AND CYBER SECURITY** | **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 denial of service attacks, phishing, hacking, instant messaging abuse, and cyberstalking in terms of intent, execution method, targets, and typical impact; provide brief real-world examples for each. | CO1 | U | 10 |
|  | b. | Contrast email-related crimes, online shopping fraud, credit card fraud, and call/SMS forging; identify indicators, common social engineering hooks, and victim response steps. | CO1 | AN | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Interpret the significance of cyber security for organizations using the CIA triad; explain how confidentiality, integrity, and availability mitigate damage to operations and reputation. | CO2 | U | 10 |
|  | b. | Apply CIA principles to a campus network: propose controls for protecting student records (C), preventing grade manipulation (I), and maintaining exam portal uptime (A). | CO2 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Identify occurrences of cyber-attacks across OSI layers: map typical threats (e.g., spoofing, MITM, SQL injection, DNS poisoning) to layers and state observable symptoms in logs or system behavior. | CO3 | R | 10 |
|  | b. | Identify zero-day attacks and drive-by downloads: describe how they manifest in endpoints and browsers; list at least five indicators of compromise for each scenario. | CO3 | AN | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Examine core components of cyber security: application security, endpoint security, identity and access management, mobile security, data security, infrastructure security, disaster recovery, and end-user education; explain their interdependencies. | CO4 | U | 10 |
|  | b. | Examine types of network attacks (e.g., DDoS, ARP spoofing, BGP hijack) and relate them to appropriate defensive components (e.g., firewalls, IPS, IAM, DR). | CO4 | E | 10 |
|  |  |  |  |  |  |
| 5. | a. | Choose suitable cyber security measures for an e-commerce platform facing phishing, payment fraud, and account takeover; justify the selection of MFA, anti-phishing gateways, DLP, WAF, and backup strategy. | CO5 | A | 10 |
|  | b. | For mobile banking, select controls to mitigate SMS forging, malware, and man-in-the-middle; evaluate the trade-offs among device attestation, secure keyboards, VPN, and app hardening. | CO5 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Examine zero-day attack exposure across the application stack; analyze patch management, virtual patching (WAF/IPS), and sandboxing as layered mitigations. | CO4 | AN | 10 |
|  | b. | Examine identity and access management with role-based access control, least privilege, and conditional access; analyze risks of misconfiguration and overprivileged accounts. | CO4 | AN | 10 |
|  |  |  |  |  |  |
| 7. | a. | Interpret current perspectives on cyber security as an ongoing process; contrast “good guy” security lifecycle with adversary adaptation; include examples from technical, social science, and legal literature. | CO2 | U | 10 |
|  | b. | Apply security control thinking: map typical cybercriminal controls (e.g., botnet C2, bulletproof hosting, exploits) to defensive gaps and propose iterative improvements. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Employ a defense-in-depth strategy for a mid-size enterprise: design layered controls across network, application, endpoint, identity, data, and user education to protect against phishing, hacking, and DDoS. | CO6 | C | 10 |
|  | b. | Employ browser and endpoint protections to reduce drive-by download risks: configure safe browsing, script restrictions, application whitelisting, and sandboxing; provide a deployable checklist. | CO6 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Create a comprehensive protection plan for a university: integrate authentication, cryptography, firewalling, VPN, antivirus, DLP, backups, and incident response; include measurable controls and recovery objectives (RTO/RPO). | CO6 | E | 10 |
|  | b. | Employ strategies to protect individuals from cyberstalking and phishing: design awareness content, reporting workflows, and technical safeguards (spam filters, DMARC, privacy settings); justify choices. | CO6 | A | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Differentiate between the nature of cybercrimes. |
| CO2 | Interpret the significance of cyber security. |
| CO3 | Identify the occurrence of cyber-attacks. |
| CO4 | Examine the components of cyber security. |
| CO5 | Choose the suitable cyber security measures. |
| CO6 | Employ strategies for protecting against the cybercrimes. |

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

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| **Course Code** | **23CA2016** | **Duration** | **3hrs** |
| **Course Title** | **FUNDAMENTALS OF CYBER 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. | Analyze the various types of cybercrimes, providing suitable examples, and explain their impact. | CO1 | An | 15 |
|  | b. | Explain the compliance risks of electronic communication | CO1 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | List the various file systems that aid forensic investigators. | CO1 | R | 5 |
|  | b. | Given a scenario of a data breach in an organization that involves compromised workstations, servers, and network devices, analyze how the different phases of the digital forensics investigation process would be implemented to effectively investigate the incident. | CO1 | C | 15 |
|  |  |  |  |  |  |
| 3. | a. | Write short notes on a) Tracks, b) Sector, c) Clusters, d) Slack Space, and e) Bad sector | CO2 | U | 15 |
|  | b. | List the basic principles of Cyber Forensics. | CO2 | R | 5 |
|  |  | (**OR)** |  |  |  |
| 4. | a. | Develop a detailed procedure for the extraction and analysis of forensic artifacts in two distinct operating system environments commonly encountered in digital investigations. | CO2 | An | 15 |
|  | b. | List and explain various stages of cyber kill chain. | CO3 | U | 5 |
|  |  |  |  |  |  |
| 5. | a. | Outline the procedure for creating a forensic copy of a digital storage device using a forensic toolkit imager. Describe the steps involved in the process and explain the importance of each step. List the steps that should be carried out to prevent tampering. | CO3 | E | 15 |
|  | b. | Identify the software needed for cyber forensics operations. | CO3 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe the importance of various components involved in Email Communication. | CO4 | U | 10 |
|  | b. | Analyze the challenges faced when acquiring digital evidence from an Apple Macintosh computer. What precautions would you take to ensure that no data is altered during the acquisition process? | CO4 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | List and describe the key fields in a TCP header. Provide a brief explanation of the purpose of each field. | CO5 | U | 10 |
|  | b. | Evaluate the usefulness of various operating system utilities in windows with suitable examples. | CO5 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Summarize how analyzing the registry can reveal user activity. How does this contribute to an investigation? | CO5 | R | 10 |
|  | b. | List the role of a forensic data analyst. List the techniques used for data analysis. Discuss a few real-world applications of forensic data analysis. | C06 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Assess the importance of RAM analysis using Volatility in a digital forensic investigation. What types of information can be extracted, and how does this contribute to the overall analysis? | CO6 | E | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Summarize the basic knowledge about cybercrime, cyber forensics and its associated concepts. |
| CO2 | Illustrate the digital evidence collection procedure and the obstacles to this process. |
| CO3 | Apply the tools used for forensic investigation, namely free and open-source. |
| CO4 | Discusses the preliminaries of electronic evidence collection and handling. |
| CO5 | apply how to analyze and document the collected evidence and present it in the court of law. |
| CO6 | Write the cyber forensics analysis report. |

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

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| **Course Code** | **23CA2026** | **Duration** | **3hrs** |
| **Course Title** | **INFORMATION SECURITY ETHICS** | **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. | Assess how the Hippocratic Oath’s underlying principles can be applied to cybersecurity professionals today. | CO1 | E | 10 |
|  | b. | Predict long-term consequences for organizations that ignore corporate social responsibility. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Justify the need for professional accountability in managing digital forensics evidence. | CO1 | An | 10 |
|  | b. | Evaluate how professional roles and responsibilities enhance the image of a profession. | CO1 | E | 10 |
|  |  |  |  |  |  |
| 3. | a. | Examine the ethical dimensions of different professional-client relationships in the cybersecurity domain. | CO2 | E | 10 |
|  | b. | Justify why client relationships are central to professional ethics. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Justify the importance of balancing personal values with professional duties in information security careers. | CO2 | An | 10 |
|  | b. | Compare paternalistic and fiduciary professional relationships using appropriate examples. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Illustrate the difference between relativism and absolutism using appropriate examples from the information security field. | CO3 | A | 10 |
|  | b. | Evaluate Ross’s model for resolving conflicting duties in organizations. | CO4 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Justify the use of pluralistic deontology in handling conflicting moral principles at work. | CO3 | An | 10 |
|  | b. | Predict ethical challenges if Artificial Intelligence systems ignore moral principles. | CO5 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Evaluate real-world cases of breaches in confidentiality and their ethical consequences. | CO4 | E | 10 |
|  | b. | Predict how privacy breaches in a digital workplace can influence employee morale and organizational ethics. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Examine the failures of privacy protection mechanisms in major cybersecurity incidents. | CO4 | E | 10 |
|  | b. | Test the relevance of beneficence and non-maleficence in Artificial Intelligence-based healthcare decision-making systems. | CO5 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Justify ethical actions in cases involving omission versus commission in system security breaches. | CO6 | An | 10 |
|  | b. | Evaluate the importance of intellectual property rights for software developers. | CO6 | E | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Represent the role of professional ethics in education. |
| CO2 | Administer ethical reasoning in professional environments. |
| CO3 | Apply the principles of ethics in real-life scenarios. |
| CO4 | Solve the conflicts of interest in a professional environment. |
| CO5 | Focus on the moral principles within an organization. |
| CO6 | Prioritize the roles and responsibilities in an organization. |

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

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| **Course Code** | **23CA2027** | **Duration** | **3hrs** |
| **Course Title** | **CYBER SECURITY GOVERNANCE** | **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. | Illustrate how different types of Cyber Security threats can affect a business organization such as a commercial bank. | CO1 | | U | 20 |
|  | **(OR)** |  | |  |  |
| 2. | Apply the governance objective of ‘ensuring objectives are achieved’ to a hospital’s cybersecurity plan. | CO2 | | A | 20 |
|  |  |  | |  |  |
| 3. | Analyze the interrelationship between the Board of Directors, Executive Management, and the Security Steering Committee in achieving governance goals. | CO2 | | An | 20 |
|  | **(OR)** |  | |  |  |
| 4. | Illustrate how Capability Maturity Model (CMM) can be used to assess the current state of security. | CO4 | | U | 20 |
|  |  |  | |  |  |
| 5. | Summarize the key foundations of cyber security governance and explain their importance in modern organizations. | CO1 | | U | 20 |
|  | **(OR)** |  | |  |  |
| 6 | Illustrate the process of determining risk management objectives and their relevance in cyber governance. | CO3 | | A | 20 |
|  |  |  | |  |  |
| 7. | Compare COBIT, ISO/IEC 27001/27002, and CMM in the context of cyber security governance. | CO5 | | An | 20 |
|  | **(OR)** |  | |  |  |
| 8. | Discuss the objectives of the Gramm–Leach–Bliley Act and its role in protecting consumer data. | CO5 | | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | Explain the key provisions and implications of the Computer Security Act. | CO6 | | U | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Summarize the foundations of cyber security governance. |
| CO2 | Develop an information security strategy. |
| CO3 | State the need for risk management. |
| CO4 | Compare existing with emerging security strategy. |
| CO5 | Select a governing control or standards framework. |
| CO6 | Tabulate various compliance laws. |

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

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| **Course Code** | **23CA2028** | **Duration** | **3hrs** |
| **Course Title** | **SECURITY OF WEB APPLICATIONS** | **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 company wants to launch a health tracking app. As a security engineer, outline how you would integrate security in each phase of its SDL. | CO1 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Illustrate the working of a web application in responding to a user request with a neat architecture diagram highlighting the role of each component. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Categorize the types of cross-site scripting attacks and explain their working. | CO2 | An | 10 |
|  | b. | Explain the concept of logic attacks with suitable examples, and critically analyze the techniques used to detect and prevent such attacks. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Evaluate the potential consequences of different types of SQL injection attacks on web applications. Support your evaluation with specific examples for each type, and justify which mitigation strategies are most effective in each case. | CO2 | E | 20 |
|  |  |  |  |  |  |
| 5. |  | Assess how the changing browser threat landscape influences web application security architecture. | CO3 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Discuss the reasons web browsers are frequently targeted by cybercriminals and analyze the major categories of browser-based attacks. | CO3 | U | 20 |
|  |  |  |  |  |  |
| 7. | a. | Analyze the role of cookies, web bugs, and password selection in influencing the security of web applications against cyberattacks. | CO4 | An | 10 |
|  | b. | Analyze the different types of identity theft, explaining how each occurs and its impact. Illustrate your answer using any two relevant case studies. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Analyze how techniques such as ad-blocking, clearing cookies, and anonymous browsing can enhance user privacy and web application security. Discuss the benefits and potential limitations of each technique. | CO4 | An | 10 |
|  | b. | Evaluate the different mechanisms used for securing emails. | CO5 | E | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the process of attacking a web application through Cross-Site Request Forging attack. | CO6 | U | 10 |
|  | b. | A banking website allows users to transfer funds after logging in. The site does not implement CSRF tokens in its forms. An attacker creates a malicious website that automatically submits a fund transfer request to the bank’s site using a logged-in user’s credentials when they visit the attacker’s site. Identify the type of attack in this scenario. Explain how it works and why the bank’s web application is vulnerable. Recommend appropriate security mechanisms that could prevent such attacks. | CO6 | A | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Identify the vulnerabilities in the web applications. |
| CO2 | Identify the types of threats and mitigation measures of web applications. |
| CO3 | Identify the web application attacks. |
| CO4 | State the importance of authentication and authorization. |
| CO5 | Exhibit the skills in protecting the end user from attacks. |
| CO6 | Summarize the principles of securities. |

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

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| **Course Code** | **23CA2029** | **Duration** | **3hrs** |
| **Course Title** | **FUNDAMENTALS OF CLOUD COMPUTING** | **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 cloud computing and explain how it evolved from traditional distributed and grid computing models. | CO1 | R | 10 |
|  | b. | Illustrate with examples how virtualization and utility computing contributed to the emergence of modern cloud services. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Analyze the differences between traditional on-premises networking and cloud-based networking in terms of scalability, flexibility, and security. | CO2 | An | 10 |
|  | b. | Visualize a cloud network architecture for a start-up deploying a multi-tier web application, integrating load balancers, firewalls, and monitoring tools. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain, with examples, how hypervisors (Type I and Type II) are used in virtualization labs to manage virtual machines. | CO3 | A | 10 |
|  | b. | Analyze the advantages and limitations of server consolidation through virtualization in terms of performance, cost, and security. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Define cloud security and explain why it is a critical component of cloud service delivery. | CO4 | R | 10 |
|  | b. | Illustrate with examples how encryption, firewalls, and intrusion detection systems are applied to secure cloud environments. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Define end-user access in cloud computing and explain its importance in delivering cloud services. | CO5 | R | 10 |
|  | b. | Describe an access management strategy for a university adopting cloud-based learning platforms, integrating single sign-on, multi-factor authentication, and role-based access control. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the key characteristics of cloud computing such as on-demand self-service, broad network access, resource pooling, rapid elasticity, and measured service. How do these characteristics contribute to the effectiveness of cloud computing? | CO1 | U | 10 |
|  | b. | Analyze the core service models of cloud computing—Infrastructure as a Service, Platform as a Service, and Software as a Service. How do these models differ in terms of user control, flexibility, and use cases? | CO1 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the fundamental components of cloud networks such as data centers, virtualization, network infrastructure, and cloud service models. How do these components interact to deliver cloud services? | CO2 | U | 10 |
|  | b. | Analyze the role of virtualization and software-defined networking in building scalable and efficient cloud networks. How do these technologies enhance resource management and service delivery? | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | List the major mobile operating systems and describe their basic functionalities that support cloud computing. | CO6 | R | 10 |
|  | b. | Explain how mobile operating systems enable access to cloud-based applications and services. Include examples of cloud integration features. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Illustrate how Android or iOS can be configured to use cloud storage and backup services. Provide practical steps and examples. | CO6 | A | 10 |
|  | b. | Analyze the differences between Android and iOS in terms of cloud service compatibility, user interface, and security features. | CO6 | An | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Summarize the key concepts associated with cloud computing. |
| CO2 | Describe the building blocks of cloud networks. |
| CO3 | Apply the open-source tools used for virtualization. |
| CO4 | Discuss the preliminaries of cloud security. |
| CO5 | Describe how the cloud computing is used and managed by end users. |
| CO6 | Summarize about mobile operating system. |

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

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| **Course Code** | **23CA2030** | **Duration** | **3hrs** |
| **Course Title** | **LINUX ADMINISTRATION AND PROGRAMMING** | **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 and analyze the Linux file system hierarchy architecture. Describe the functions of the key directories within this hierarchy and explain their roles in system organization and management. | CO1 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Describe the structure of Linux file permissions and ownership. Analyze how permissions are assigned to different users and groups. Demonstrate with examples how to interpret and modify these permissions using relevant commands. | CO1 | A | 20 |
|  |  |  |  |  |  |
| 3. | a. | Identify and categorize the five major types of files used in Linux. Explain the characteristics and functions of each type, providing specific examples to illustrate their real-world use. | CO2 | U | 15 |
|  | b. | List and explain commonly used shell commands with examples. | CO2 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the architecture and working principles of the RPM Package Manager in Linux. Compare and contrast RPM with other package management systems such as YUM, APT, and DPKG in terms of functionality, dependency handling, and usage across distributions. | CO3 | An | 15 |
|  | b. | Write down the three Linux File Access Privilege permissions available for a user. | CO3 | An | 5 |
|  |  |  |  |  |  |
| 5. | a. | Explain how to use systemctl to manage services in Linux, including starting, stopping, and enabling services. | CO3 | U | 12 |
|  | b. | Define system. Justify how systemd uses a target unit to define specific states of the system. | CO4 | R | 8 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Describe in detail the sequential stages involved in the Linux boot process from power-on to the login prompt. Analyze the different run levels used during boot, and explain how each run level contributes to system functionality and resource management. | CO4 | An | 20 |
|  |  |  |  |  |  |
| 7. | a. | Evaluate how crontab command can be used for system maintenance tasks and improve task automation efficiency in Linux environments. | CO5 | E | 12 |
|  | b. | Describe the process of creating, modifying, and deleting user accounts in Linux using commands like useradd, usermod, userdel, and passwd. Provide examples for each. | CO5 | A | 8 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the fundamental concepts of Logical Volume Management (LVM) and describe the roles of Physical Volumes (PV), Volume Groups (VG), and Logical Volumes (LV) in the LVM architecture. | CO5 | U | 12 |
|  | b. | Explain the concept of Access Control Lists (ACLs) in Linux and describe the ACL check algorithm. | CO6 | R | 8 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Analyze the different RAID levels (RAID 0, RAID 1, RAID 5, RAID 6, RAID 10) in terms of performance, redundancy, and data protection. | CO6 | An | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | List various Linux commands and its flavours |
| CO2 | Examine the remote administration and secure system boot up process. |
| CO3 | Relate process management, identity and security. |
| CO4 | Apply network security policies. |
| CO5 | Create and manage storage devices. |
| CO6 | Examine the file system and storage management. |

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

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| **Course Code** | **23CA2032** | **Duration** | **3hrs** |
| **Course Title** | **BIOMETRIC SECURITY** | **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 principles of biometric identification and verification. Explain the difference between verification vs. identification with suitable examples. | CO1 | U | 10 |
|  | b. | Explain the metrics used in biometric systems such as False Match Rate (FMR), False Non-Match Rate, Failure-to-Enroll Rate, and Derived Metrics. | CO1 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the finger scan technology, its components, how it works, and analyze its strengths and weaknesses. | CO2 | R | 10 |
|  | b. | Compare facial scan and iris scan technologies in terms of working principles, accuracy, and vulnerabilities. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Assess the voice scan modality: explain how it works, and critically evaluate its strengths and weaknesses in real-world applications. | CO3 | E | 10 |
|  | b. | Analyze the keystroke dynamics modality: describe its process, strengths, and weaknesses. Suggest contexts where it is most effective. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Analyze the use of biometric systems in law enforcement for criminal identification. Discuss benefits and challenges with real-world examples. | CO4 | An | 10 |
|  | b. | Analyze the application of biometrics in employee-facing systems such as PC/network access and time & attendance. Discuss accuracy and usability trade-offs. | CO4 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Examine the security threats to biometric systems such as adversary attacks, spoofing, and template database attacks. Propose safeguards to mitigate these risks. | CO5 | A | 10 |
|  | b. | Examine the privacy concerns in biometric data collection and storage. Suggest safeguards to ensure compliance with data protection regulations. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Analyze the use of biometrics in customer-facing applications such as e-commerce, telephony, and retail/ATM/point of sale. Discuss benefits and risks. | CO4 | An | 10 |
|  | b. | Assess the role of biometric surveillance systems in public safety. Discuss ethical and legal implications. | CO4 | E | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe about the retina scan: explain how it works, its strengths, and weaknesses. Compare it briefly with iris scanning. | CO2 | R | 10 |
|  | b. | Evaluate the role of Automated Fingerprint Identification Systems in large-scale identification. Discuss accuracy and scalability. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Discuss the societal impact of biometric technologies in areas such as surveillance, healthcare, and immigration. | CO6 | U | 10 |
|  | b. | Explain the importance of responsible use of biometrics. Suggest guidelines for balancing innovation with ethical and privacy concerns. | CO6 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Propose a framework for responsible deployment of biometric systems in the financial sector. Include technical, legal, and ethical safeguards. | CO6 | C | 10 |
|  | b. | Discuss the long-term societal implications of widespread biometric adoption. Suggest strategies to ensure inclusivity, fairness, and trust. | CO6 | U | 10 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Describe the key concepts and principles of biometric identification and verification. |
| CO2 | Evaluate different physiological biometric modalities and their characteristics. |
| CO3 | Assess different behavioural biometric modalities and their characteristics. |
| CO4 | Analyze real-world case studies to understand the practical applications of biometric security. |
| CO5 | Examine the security and privacy implications of biometric systems and propose appropriate safeguards. |
| CO6 | Discuss the societal impact of biometric technologies and the importance of responsible use. |

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

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| **Course Code** | **23CA3001** | **Duration** | **3hrs** |
| **Course Title** | **CYBER CRIMINOLOGY AND CRIMINAL JUSTICE ADMINISTRATION** | **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 Cyber Space, its main components, and its impact on individuals and organizations. | CO1 | R | 10 |
|  | b. | Determine the concepts of Techno-criminology and Cyber Psychology theory. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Infer the methods, motivations, challenges, and prevention strategies associated with data-diddling. | CO2 | An | 10 |
|  | b. | Classify the types of fraud in criminology. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discriminate the key elements and challenges of profiling cybercriminals. | CO3 | An | 10 |
|  | b. | Explain any five aspects of the Social Learning Theory. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Examine the Indian Evidence Act, 1872 and its application in cybercrime cases. | CO4 | R | 10 |
|  | b. | Determine the process of investigating cybercrimes and the methods for collecting digital evidence. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Articulate the concept of anomaly detection and its applications. | CO5 | A | 10 |
|  | b. | Explain the different types of anomalies in cybercrime. | CO6 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discuss in detail the major types of crimes such as crimes property, Person, and Nation. | CO1 | U | 10 |
|  | b. | Explain the concept of the Differential Opportunity Theory. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Express the common acts, motivations, challenges, and prevention strategies of cyber vandalism. | CO2 | U | 10 |
|  | b. | Describe the offenses and punishments under the Indian Penal Code (IPC). | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the categories of anomalies in anomaly detection with suitable examples. | CO5 | R | 10 |
|  | b. | Explain the work, challenges, and advantages of the One-Class SVM algorithm. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain how cybercriminals can be categorized based on their skills, motivations, and targets. | CO3 | A | 10 |
|  | b. | Explain the various types of cybercrimes covered under the Indian Penal Code (IPC) and discuss the relevant sections and penalties for each. | CO4 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Examine the concept of crimes and cyber criminology. |
| CO2 | Classify the forms of cybercrime. |
| CO3 | Identify the psychological aspects of cyber criminals. |
| CO4 | State the significance of Information Technology Act and Indian Penal Code. |
| CO5 | Describe the function of the criminal justice system in relation to cybercrime. |
| CO6 | Analyze the legal restrictions on the applicability of the Information Technology Act and related laws. |

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

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| **Course Code** | **23CA3002** | **Duration** | **3hrs** |
| **Course Title** | **WEB APPLICATION SECURITY** | **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. | List the key components of a modern web application. Explain the role of each component. | CO1 | U | 10 |
|  | b. | Explain the role of the frontend, backend, and database in a web application. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain how to classify and prioritize threats in cybersecurity. | CO2 | U | 10 |
|  | b. | Explain the importance of ranking threats based on severity and impact. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the importance of the OWASP Top Ten for web security. | CO3 | U | 10 |
|  | b. | Describe Denial of Service (DoS) attacks and give 2 examples. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the concept of Application Server attacks and illustrate with two detailed examples. | CO4 | A | 10 |
|  | b. | Determine Invalidated Redirects and Forwards in web applications and provide two elaborated examples | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain why web browser security is important for user protection. | CO5 | U | 10 |
|  | b. | Examine how input validation and output encoding can be used to prevent XSS attacks. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Discriminate the steps to reproduce a cross-site scripting vulnerability in a test environment. | CO1 | An | 10 |
|  | b. | Explain the difference between low, medium, and high severity vulnerabilities. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Explain the role of IIMF in identifying potential security flaws. | CO2 | U | 10 |
|  | b. | Compare CVSS with DREAD scoring for the same vulnerability scenario. | CO2 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain how browser sandboxing and secure cookie handling can be applied to protect user data. | CO6 | A | 10 |
|  | b. | Explain how encryption and prepared statements can be used to secure database interactions in a web application. | CO6 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Define input sanitization and list its role in preventing malicious file uploads. | CO6 | R | 10 |
|  | b. | State any two reasons why browser security is important for protecting user data and privacy.. | CO6 | R | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Identify the vulnerabilities in web applications. |
| CO2 | Examine the security aspect of web applications. |
| CO3 | Enumerate the top ten OWASP vulnerabilities. |
| CO4 | Compare web authentication with authorization. |
| CO5 | List the types of attacks in web applications. |
| CO6 | Apply the security principles in developing a reliable web application. |

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

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| **Course Code** | **23CA3004** | **Duration** | **3hrs** |
| **Course Title** | **INFORMATION SECURITY MANAGEMENT** | **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. |  | State the major phases involved in a life cycle process. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | List the key components of IRM (Information Rights Management) technology. | CO2 | R | 10 |
|  | b. | Illustrate the essential measures used to ensure storage security. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 3. |  | Describe centralized and decentralized access control mechanisms. | CO3 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | List the various types of control used in risk management. | CO4 | R | 20 |
|  |  |  |  |  |  |
| 5. |  | Explain the significance of compliance in maintaining security administration. | CO5 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Identify the standards used to ensure SDLC compliance. | CO1 | R | 10 |
|  | b. | List the common types of cybersecurity incidents encountered in organizations. | CO1 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Identify the key elements of authorization policies. | CO3 | R | 10 |
|  | b. | List the methods and guidelines used for identification in information systems. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Describe the process steps involved in configuration management and their importance. | CO6 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Explain how infrastructure supports the implementation of an effective IT security policy. | CO6 | A | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Classify the fundamental concepts of Information Security. |
| CO2 | Sketch the Life Cycle Process |
| CO3 | Focus on how the organization has to equip itself for effective implementation of Information Security. |
| CO4 | Relate the importance of privacy in Information Security. |
| CO5 | State the purposes and significance of Access Controls. |
| CO6 | Recommend suitable controls and procedures for ensuring security. |

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

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| **Course Code** | **23CA3005** | **Duration** | **3hrs** |
| **Course Title** | **PYTHON AND SCRIPTING** | **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. | Compare and contrast a list with a tuple in Python. Mention two advantages of using tuples over lists. | CO1 | An | 10 |
|  | b. | Explain how to install third-party packages using pip. Write the steps to create and activate a virtual environment in Python. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define a Linux shell script. Write a simple script that displays your system date and current working directory. | CO2 | R | 10 |
|  | b. | Compare for with while loops in BASH. Give one short example for each. | CO2 | An | 10 |
|  | | | | | |
| 3. | a. | Write a short Python program using the socket library to find whether a particular port is open on localhost. | CO3 | A | 10 |
|  | b. | Define OSINT and list any four public sources from which information can be collected. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the term active scanning. Describe one simple tool or script that can be used for it. | CO4 | U | 10 |
|  | b. | Illustrate how removable media such as a USB drive could spread malware and give two ways to prevent it. | CO4 | A | 10 |
|  | | | | | |
| 5. | a. | Distinguish between text files and binary files in Python. Write a small example showing how to read a text file line by line. | CO5 | E | 10 |
|  | b. | Define a CSV file and explain how to read data from a CSV file using Python’s csv module. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the steps to create a Python module and how to import it into another program. | CO1 | A | 10 |
|  | b. | List and describe any three features of the BASH shell that make scripting easier for system administrators. | CO2 | R | 10 |
|  | | | | | |
| 7. | a. | Illustrate how to use dns.resolver from dnspython to find the IP address of a domain name. Write a few lines of code. | CO3 | A | 10 |
|  | b. | Compare the advantages and disadvantages of using automated scanning tools versus manual scanning in cybersecurity testing. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Create a Python program that reads all .txt files in a folder and prints the total number of lines in each file. | CO6 | C | 10 |
|  | b. | Design a simple Python script that sends an email using smtplib. Include sender, receiver, subject, and message body. | CO6 | C | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Develop a Python script that sends an email via SMTP which includes both plain-text and HTML alternatives, an inline image, and an attached multimedia file. | CO6 | C | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Administer the technical environment of Python. |
| CO2 | Create interactive scripts using Linux Shell Scripting. |
| CO3 | Simulate port scanning with Python. |
| CO4 | Experiment Python in cyber space. |
| CO5 | Expertise in working with files. |
| CO6 | Create secured applications using Python. |

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

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| **Course Code** | **23CA3007** | **Duration** | **3hrs** |
| **Course Title** | **DIGITAL 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 digital forensics and explain its importance in modern crime investigation. | CO1 | R | 10 |
|  | b. | Discuss Locard’s Exchange Principle and its relevance to digital forensic investigations. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the stages involved in the digital forensic process with a neat diagram. | CO1 | A | 10 |
|  | b. | Describe the different types of incident investigation analysis in digital forensics. | CO1 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the procedure for evidence acquisition and the importance of chain of custody. | CO2 | U | 10 |
|  | b. | Explain the order of volatility and its significance during evidence acquisition. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the working of tools such as FTK Imager and Autopsy for data acquisition. | CO2 | U | 10 |
|  | b. | Write brief notes on remote evidence collection using Velociraptor. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the concept of forensic imaging. Distinguish between image vs. copy. | CO3 | U | 10 |
|  | b. | Describe the role of write blockers in forensic imaging. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the process of image acquisition in virtual machines. | CO3 | U | 10 |
|  | b. | Illustrate the challenges of imaging cloud-based evidence. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Cite what is evidence analysis? Explain the process of analyzing network evidence using Wireshark and NetFlow. | CO4 | U | 10 |
|  | b. | Discuss the steps involved in analyzing system storage using Autopsy. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Articulate the steps involved in generating a forensic report. | CO6 | A | 10 |
|  | b. | Explain the key components of an incident report and the importance of report documentation. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Discuss the history and evolution of ransomware attacks. Explain with examples such as WannaCry and CryptoLocker. | CO5 | R | 10 |
|  | b. | Explain the phases of ransomware detection, isolation, and data recovery. | CO5 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Analyze the technical aspects related to Digital Forensics. |
| CO2 | Visualize the evidence acquisition system and its functions. |
| CO3 | Apply forensic imaging in crime scene investigation. |
| CO4 | Apply the art of evidence analysis and incident reporting. |
| CO5 | Choose and apply ransomware incident preparation and response tools. |
| CO6 | Create an incident report. |

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

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| **Course Code** | **23CA3010** | **Duration** | **3hrs** |
| **Course Title** | **NETWORK 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. |  | List the different types of guided transmission media used in computer networks. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain the Network Forensics Investigation Methodology in detail. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | Discuss how packet analysis on TCP, UDP, and ICMP is carried out. | CO3 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Describe the process of investigating Command-and-Control (C2) servers. | CO4 | R | 20 |
|  |  |  |  |  |  |
| 5. |  | Apply suitable network forensic techniques to identify and classify different types of attacks. | CO5 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Discuss the importance of log-based evidence in detecting and analyzing network incidents. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | Explain the role of communication satellites in supporting network and forensic operations. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | List and explain various sensor deployment types used in network monitoring. | CO3 | R | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Describe the methods used to identify rogue access points in a wireless network. | CO6 | R | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Apply the key concepts of network anomalies and behaviour. |
| CO2 | Analyze the requirement of deep packet inspection. |
| CO3 | Examine the need for investigating network behaviour and patterns in malware. |
| CO4 | Classify various logs to aid network forensics. |
| CO5 | Focus on developing methodologies to automate processing of large evidence set. |
| CO6 | Examine the log files for investigations. |

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

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| **Course Code** | **23CA3015** | **Duration** | **3hrs** |
| **Course Title** | **ARTIFICIAL INTELLIGENCE SECURITY** | **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. |  | List the advantages and limitations of AI | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Explain the different types of Machine Learning in detail. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | Describe the architecture and working principle of Convolutional Neural Networks (CNN). | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Discuss the concept of user authentication using keystroke dynamics. | CO4 | U | 20 |
|  |  |  |  |  |  |
| 5. |  | Identify the key concepts related to Intrusion Detection Ontology. List and describe its main components, and state its significance in cybersecurity systems. | CO5 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Describe the role of testing and validation sets in machine learning. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | List the applications of Artificial Intelligence (AI) in cybersecurity. Identify key AI techniques used and state their roles in cyber threat detection and prevention. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | List various network anomaly detection techniques and identify the main characteristics of each technique. | CO4 | R | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | List different types of malware and how they are classified. Recall the main components of malware behavior ontology and mention its importance in malware analysis. | CO6 | R | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Acquire the fundamental concepts of Artificial Intelligence. |
| CO2 | Categorize the different approaches of automated learning in the field of cyber security. |
| CO3 | Compare the current level of interconnection with different devices. |
| CO4 | State the important role in terms of the protection of sensitive user related information. |
| CO5 | Identify the security attacks and data breaches. |

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

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| **Course Code** | **23CA3018** | **Duration** | **3hrs** |
| **Course Title** | **MODERN CRYPTOGRAPHY AND STEGANOGRAPHY** | **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. |  | Identify various historical ciphers and the methods used to break them. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Analyze the differences and similarities between symmetric and asymmetric encryption with suitable examples. | CO2 | An | 20 |
|  |  |  |  |  |  |
| 3. |  | Demonstrate how Bitcoin can be implemented in day-to-day financial activities to make transactions easier. | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Explain the different types of cryptanalysis systems by classifying and distinguishing them with suitable examples. | CO4 | U | 20 |
|  |  |  |  |  |  |
| 5. |  | Explain the concept of perfectly secret encryption and its significance in private-key systems. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Explain the concept of steganography and differentiate it from cryptography. | CO5 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | Illustrate how distributed steganography techniques can be applied to enhance the security and confidentiality of digital communication systems. | CO5 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Analyze the recent trends and techniques in image steganography. | CO6 | An | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Discuss the significance of quantum steganography and its future potential. | CO6 | U | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | review the principles of modern cryptography. |
| CO2 | Illustrate the different types of encryption. |
| CO3 | select the security standards for modern cryptography. |
| CO4 | distinguish between the cryptanalysis system. |
| CO5 | deploy the suitable tools and methods of steganography. |
| CO6 | represent the types of Steganography in modern day scenario. |

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

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| **Course Code** | **23CA3019** | **Duration** | **3hrs** |
| **Course Title** | **ETHICAL HACKING** | **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. |  | Analyze different hacker types and outline the five phases of hacking, discussing the main activities performed by hackers during each stage. | CO1 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Explain the following terms with respect to Ethical Hacking  a) Hack Value b) Exploit c) Vulnerability d) Daisy Chaining  e) Zero-day attack | CO1 | R | 15 |
|  | b. | List common tools and techniques for active versus passive reconnaissance | CO1 | U | 5 |
|  |  |  |  |  |  |
| 3. | a. | Design a step-by-step reconnaissance plan for an ethical hacking engagement. Include both passive and active reconnaissance tools and justify the selection of each tool for specific tasks. | CO2 | C | 15 |
|  | b. | Illustrate how Nmap can be used to identify open ports, services, and operating systems on a target network. | CO2 | U | 5 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Analyze the different techniques of password cracking, such as brute force, dictionary attack, rainbow table, and hybrid attack. Discuss the advantages and limitations of each method. | CO3 | An | 15 |
|  | b. | Critically assess the ethical and legal implications of remote password cracking using tools. | CO3 | E | 5 |
|  |  |  |  |  |  |
| 5. |  | Identify the primary components of the Metasploit framework, including key terms and commands frequently utilized during exploitation. | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Summarize how to use Wireshark to analyze the traffic generated during an EternalBlue exploitation attempt. | CO4 | U | 10 |
|  | b. | Explain the concept of SQL Injection and describe the various types of SQL Injection attacks with examples. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Evaluate the implications of employing advanced techniques to cover traces from an ethical hacking perspective. | CO5 | E | 15 |
|  | b. | Eloquently describe different types of wireless attacks, such as the Evil Twin attack and the Honey Pot attack. | CO5 | R | 5 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Describe the key elements that make up a firewall architecture. Compare and contrast the different firewall technologies. | CO6 | An | 15 |
|  | b. | List the key components of anti-virus software. | CO6 | R | 5 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Describe how the Maltego, Social Engineering Toolkit (SET) and Wifiphisher can be used for penetration testing through social engineering. | CO5 | U | 10 |
|  | b. | Compare the key features and differences between WPA, WPA2, and WPA3 Wi-Fi security protocols. | CO6 | E | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Summarize about ethical hacking and penetration testing. |
| CO2 | identify various types of attacks, attackers and security threats and vulnerabilities present in the computer system. |
| CO3 | examine different vulnerabilities, threats and attacks to information systems and recommend the countermeasures. |
| CO4 | analyze the techniques and ethical issues likely to face the domain of ethical hacking and ethical responsibilities. |
| CO5 | examine how social engineering can be done by attacker to gain access of useful & sensitive information about the confidential data. |
| CO6 | illustrate the basics of web application attacks and Wi-Fi attacks. |

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

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| **Course Code** | **23CA3021** | **Duration** | **3hrs** |
| **Course Title** | **SOCIAL MEDIA 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. | Evaluate the impact of social networking sites on digital identity formation. | CO1 | E | 10 |
|  | b. | Justify the relevance of understanding social media’s dark side in cybersecurity education. | CO1 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Evaluate how Web 2.0 principles differ from Web 3.0 concerning user control and privacy. | CO1 | E | 10 |
|  | b. | Analyze the types of social media, discussing their features, benefits, and challenges through relevant examples. | CO1 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Evaluate the impact of memes and viral content on brand promotion strategies. | CO2 | E | 10 |
|  | b. | Test the effectiveness of different types of promotions on social media platforms. | CO2 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Justify the use of social networking sites by small businesses for market expansion. | CO2 | E | 10 |
|  | b. | Predict the evolution of advertisement platforms within social media ecosystems. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 5. |  | Analyze the causes and patterns of cyberbullying, cyberstalking, and online harassment targeting women and children. | CO3 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Justify the need for comprehensive countermeasures, including legal, technical, and educational approaches, to combat social media crimes against women and children. | CO3 | E | 20 |
|  |  |  |  |  |  |
| 7. | a. | Evaluate the impact of fake news and fake memes on public opinion and social stability. | CO4 | E | 10 |
|  | b. | Analyze the challenges faced by law enforcement in investigating online challenges, viral trends, and morphing-related crimes targeting vulnerable groups. | CO6 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Justify the categorization of identity theft and digital cloning as distinct types of social media crimes. | CO4 | E | 10 |
|  | b. | Evaluate the adequacy of current legal frameworks in addressing fake news, fake memes, and online defamation, considering both free speech and accountability. | CO6 | E | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Justify the need for granular authorization controls on social networking platforms. | CO5 | E | 10 |
|  | b. | Evaluate the importance of user education in maintaining privacy and security on social media. | CO5 | E | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Acquire social media knowledge and differentiate between social networking sites. |
| CO2 | Analyze the usage of social media on different platforms. |
| CO3 | Identify the causes, consequences, and countermeasures of Social Media Crimes against Women and Children. |
| CO4 | Categorize the other forms of social media crimes. |
| CO5 | Design best practices for privacy on social networking sites. |
| CO6 | Examine the role of the criminal justice system in social media crimes. |

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

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| **Course Code** | **23CA3022** | **Duration** | **3hrs** |
| **Course Title** | **SECURITY IN THE CLOUD** | **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 cloud computing and explain the shared responsibility model in cloud security. | CO1 | R | 10 |
|  | b. | Illustrate the differences between IaaS, PaaS, and SaaS security requirements with suitable examples. | CO1 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define cloud privacy and explain why data confidentiality is a critical concern in cloud environments. | CO2 | U | 10 |
|  | b. | Illustrate with examples how regulatory frameworks (e.g., GDPR, HIPAA) influence cloud security and privacy practices. | CO2 | A | 10 |
|  |  |  |  |  |  |
| 3. | a. | Define Intrusion Detection System (IDS) and explain its role in securing cloud environments. | CO3 | U | 10 |
|  | b. | Illustrate the differences between signature-based, anomaly-based, and hybrid IDS techniques with suitable cloud security examples. | CO3 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Analyze the risks associated with poor asset visibility in multi-cloud or hybrid environments. How can these risks impact data protection and regulatory compliance? | CO4 | An | 10 |
|  | b. | State a cloud asset protection strategy for a medium-sized enterprise, integrating identity and access management (IAM), encryption, and continuous monitoring. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Analyze the challenges of managing identities in multi-cloud and hybrid environments. How do issues like privilege escalation and shadow IT affect IAM? | CO5 | An | 10 |
|  | b. | State a role-based access control (RBAC) framework for a cloud-based financial services company, integrating least privilege, multi-factor authentication, and compliance requirements. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Demonstrate how a cloud-based intrusion detection system (IDS) can be deployed in a multi-tenant environment. Include key steps such as configuration, traffic monitoring, and alert generation. | CO3 | A | 10 |
|  | b. | Analyze the effectiveness of signature-based versus anomaly-based intrusion detection techniques in cloud environments. Discuss their strengths, limitations, and suitability for detecting advanced persistent threats (APTs). | CO3 | An | 10 |
|  |  |  |  |  |  |
| 7. | a. | Demonstrate how cloud administrators can secure virtual machines and data storage using access controls, encryption, and backup strategies. Provide a step-by-step approach for implementing these measures in a public cloud environment. | CO4 | A | 10 |
|  | b. | Explain the effectiveness of different cloud asset protection strategies (e.g., network segmentation, role-based access control, data redundancy) in preventing unauthorized access and data loss. Support your evaluation with examples from real-world cloud deployments. | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | List and briefly describe five key components of a cloud security posture management (CSPM) framework. | CO6 | R | 10 |
|  | b. | Explain the significance of continuous monitoring in assessing cloud security posture. How does it differ from traditional periodic assessments? | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Demonstrate how a security analyst can use a CSPM tool to identify and remediate misconfigured cloud storage buckets in a multi-cloud environment. | CO6 | A | 10 |
|  | b. | Analyze a case study where a cloud breach occurred due to poor security posture. Identify the gaps and suggest how CSPM could have mitigated the risk. | CO6 | An | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Demonstrate a solid understanding of the concepts and principles of cloud computing. |
| CO2 | Identify and address cloud security and privacy issues. |
| CO3 | Implement intrusion detection systems and techniques in the cloud. |
| CO4 | Develop the ability to manage and protect cloud assets, including virtual machines, data storage  and network resources. |
| CO5 | Implement identity and access management in the cloud. |
| CO6 | Assess and enhance cloud security posture. |

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

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| **Course Code** | **23CA3024** | **Duration** | **3hrs** |
| **Course Title** | **CYBER SECURITY** | **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. | Compare and contrast the features of NumPy and pandas libraries in Python. How do they support efficient data analysis in cybersecurity? | CO1 | An | 10 |
|  | b. | Explain the concept of NumPy arrays and array operations. Discuss how they can be used for data preprocessing in network log analysis. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define penetration testing. What are its objectives and phases in ensuring network security? | CO2 | R | 10 |
|  | b. | Compare the use of server and client socket programming in Python. Provide examples of how each can be applied in penetration testing. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Write a Python script using the scapy library to capture and display the source and destination IP addresses of packets. Explain each step in the code. | CO3 | A | 10 |
|  | b. | Define ARP spoofing. How can it be simulated safely in a controlled lab environment using Python? | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the concept of packet crafting and its importance in penetration testing. Discuss one example using Python libraries. | CO4 | U | 10 |
|  | b. | Illustrate a scenario in which a DoS or DDoS attack might occur. Explain how Python can be used to detect or simulate this in a test environment. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Distinguish between different types of SQL injection attacks. Explain with examples how each one compromises a web application. | CO5 | E | 10 |
|  | b. | Define Cross-Site Scripting (XSS). Discuss how client-side input validation can prevent this type of attack. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the process of tampering with client parameters in a web form using Python. What are its possible impacts on a business application? | CO1 | A | 10 |
|  | b. | List and describe any three methods to defend against SQL injection vulnerabilities in web applications. | CO2 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Illustrate the steps to implement a simple IP and port scanner in Python using the socket module. Show example output for open and closed ports. | CO3 | A | 10 |
|  | b. | Compare active and passive network sniffing techniques. Discuss their applications and ethical considerations in penetration testing. | CO4 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Create a simple machine learning model using Python to classify network traffic as “normal” or “malicious”. Explain the basic steps of training and prediction. | CO6 | C | 10 |
|  | b. | Design a text-classification model using Natural Language Processing (NLP) to detect phishing emails. Describe the major components and workflow. | CO6 | C | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Develop a Python script that performs a basic penetration testing task—such as scanning multiple hosts for open ports—and stores the results in a CSV file. Outline the algorithm, tools, and libraries used, and describe how exceptions and network errors are handled gracefully. | CO6 | C | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Administer the technical environment of Python. |
| CO2 | Create interactive scripts using Linux Shell Scripting. |
| CO3 | Simulate port scanning with Python. |
| CO4 | Experiment Python in cyber space. |
| CO5 | Expertise in working with files. |
| CO6 | Create secured applications using Python. |

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

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| **Course Code** | **23CA3027** | **Duration** | **3hrs** |
| **Course Title** | **ARTIFICIAL INTELLIGENCE TECHNIQUES** | **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 Artificial Intelligence and discuss the different approaches to AI. | CO1 | R | 10 |
|  | b. | Describe the historical evolution of Artificial Intelligence and its major milestones. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Define the term agent and explain the types of environments in which agents operate. | CO2 | R | 10 |
|  | b. | Discuss the characteristics of rational agents and how rationality affects agent performance. | CO2 | U | 10 |
|  | | | | | |
| 3. |  | Distinguish ‘Depth First Search (DFS)’ from ‘Breadth First Search (BFS)’. | CO3 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Discuss Propositional Calculus and list its components. | CO4 | U | 20 |
|  | | | | | |
| 5. |  | Explain agent architecture and list the different types of agent architectures. | CO5 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | List the components of an intelligent agent with a neat diagram. | CO2 | R | 10 |
|  | b. | Explain the working principles of model-based and goal-based agents with examples. | CO2 | U | 10 |
|  | | | | | |
| 7. |  | Illustrate Predicate Calculus and explain the use of quantifiers with their syntax and semantics. | CO4 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Discuss the working principle of the triple-tower architecture in AI. | CO6 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Define knowledge representation and explain its importance in AI. | CO6 | 10 | 10 |
|  | b. | Explain how knowledge can be represented using semantic networks with a suitable example. | CO6 | 10 | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Differentiate various approaches and thinking capabilities of AI. |
| CO2 | Interpret different agents and its behaviour. |
| CO3 | Solve different kinds of problems using searching methods. |
| CO4 | Apply logical thinking in implementing AI. |
| CO5 | Examine various architectures and knowledge base. |
| CO6 | Compare different mechanisms in implementing the concepts of AI. |

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

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| **Course Code** | **23CA3029** | **Duration** | **3hrs** |
| **Course Title** | **PYTHON FOR DATA 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. | List Python's primary features and briefly describe how each feature contributes to high-level programming. | CO1 | R | 10 |
|  | b. | Illustrate the differences between positional arguments, keyword arguments, and default arguments in Python functions with examples. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Write a Python function that receives a list of words and returns a dictionary where keys are words and values are their lengths. Use list and dictionary methods. | CO2 | A | 10 |
|  | b. | Define and differentiate between lists, tuples, and dictionaries in Python. Provide examples to illustrate your answer. | CO2 | An | 10 |
|  |  |  |  |  |  |
| 3. | a. | Write a Python script to create a NumPy array of random numbers and calculate its mean, median, and standard deviation. | CO3 | A | 10 |
|  | b. | Explain how pandas data structures like Series and DataFrames work. Illustrate with examples showing data creation and manipulation. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain how to handle outliers in a dataset. Write a Python function that removes outliers from a list of numeric values based on a specified threshold. | CO4 | An | 10 |
|  | b. | List the key steps involved in building a machine learning model. Describe the purpose of each step briefly. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Identify and describe any five types of plots available in Matplotlib for data visualization. | CO5 | R | 10 |
|  | b. | Write a Python script using Matplotlib to create a pie chart for a given dataset. Label each section and add a legend. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Apply the stages of building machine learning models, from data collection to model evaluation, to a practical scenario. Show how each stage is executed and how decisions made at each stage contribute to the overall performance of the model. | CO4 | A | 20 |
|  |  |  |  |  |  |
| 7. |  | Evaluate the effectiveness of different methods for creating bar plots in Matplotlib, comparing their advantages and limitations. Use a specific use case and code example to support your evaluation. | CO5 | E | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Analyze the differences and similarities between box plots and violin plots. Examine how each plot visualizes data distribution and variability, and assess their suitability for various types of data analysis. Provide examples in Seaborn to demonstrate when one plot may be preferred over the other. | CO6 | An | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Construct a Python project that integrates Matplotlib and Seaborn to visualize the main trends in a provided dataset. Describe the types of plots chosen and their significance. | CO6 | A | 10 |
|  | b. | Construct a Python function that generates and customizes a bar plot using Seaborn. Demonstrate its use with a sample dataset. | CO6 | A | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Develop programs to solve computational problems. |
| CO2 | Apply various data structures to effectively manage data. |
| CO3 | Perform data transformation to convert data to machine readable form. |
| CO4 | Evaluate the performance measures of a machine learning model. |
| CO5 | Visualize data to solve real-time problems. |
| CO6 | Create data visualization for effective interpretations and insights of data. |

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

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| **Course Code** | **23CA3031** | **Duration** | **3hrs** |
| **Course Title** | **CLOUD COMPUTING** | **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. | Analyze the differences between cloud service models. Discuss how each model affects user control, security responsibilities, and application deployment. | CO1 | An | 10 |
|  | b. | Discuss the impact of cloud-native paradigms on modern application development. What are the advantages and challenges of adopting these paradigms in enterprise cloud environments? | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Analyze the role of micro services architecture in building scalable cloud applications. How does it compare to monolithic architecture in terms of deployment and resource management? | CO2 | An | 10 |
|  | b. | Explain the effectiveness of serverless computing for developing scalable applications. Discuss its advantages and limitations in real-world scenarios. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Analyze the impact of shared responsibility models on cloud security. Differentiate between cloud service providers and customers, and list the implications for privacy protection. | CO3 | An | 10 |
|  | b. | Identify and evaluate the effectiveness of regulatory frameworks such as GDPR, HIPAA, and ISO 27001 in addressing cloud privacy concerns. What are the limitations of these frameworks in dynamic cloud environments? | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Analyze the impact of auto-scaling and resource provisioning strategies on application performance during peak usage periods. Use a real-world example to support your analysis. | CO4 | An | 10 |
|  | b. | Apply the effectiveness of performance monitoring tools in identifying and resolving bottlenecks in cloud-based applications. Discuss their strengths and limitations. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Illustrate the pricing strategies of major cloud providers. Compare how their pricing structures affect decision-making for small vs. large enterprises. | CO5 | U | 10 |
|  | b. | Apply the effectiveness of cloud cost management tools in tracking and optimizing cloud spending. What are the limitations of these tools in dynamic cloud environments? | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Analyze the major security and privacy risks in cloud computing, such as data breaches, insider threats, and in secure APIs. How do these risks affect trust and compliance in cloud environments? | CO3 | An | 10 |
|  | b. | Describe and evaluate the effectiveness of encryption, identity management, and regulatory compliance in mitigating cloud privacy challenges. What are the limitations of these approaches in dynamic cloud infrastructures? | CO3 | R | 10 |
|  |  |  |  |  |  |
| 7. | a. | Analyze the contribution of auto-scaling and load balancing towards performance optimization in cloud-based applications. Illustrate using AWS or Azure. | CO4 | A | 10 |
|  | b. | Summarize the effectiveness of performance monitoring tools (e.g., AWS CloudWatch, Azure Monitor) in identifying and resolving bottlenecks in cloud applications. What are the limitations of these tools in dynamic environments? | CO4 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Summarize the effectiveness of performance monitoring tools (e.g., AWS CloudWatch, Azure Monitor) in identifying and resolving bottlenecks in cloud applications. What are the limitations of these tools in dynamic environments? | CO6 | U | 10 |
|  | b. | Demonstrate how serverless computing can be used to address scalability and cost-efficiency challenges in cloud-native application development. | CO6 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Analyze the impact of artificial intelligence and machine learning on cloud security and performance optimization. What trends are emerging in intelligent cloud platforms? | CO6 | A | 10 |
|  | b. | Compare the benefits and limitations of using containerization versus virtual machines in cloud deployment. How do these technologies influence portability and resource utilization? | CO6 | A | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Summarize the fundamental concepts and paradigms of cloud computing. |
| CO2 | Develop scalable applications using cloud computing technologies and tools |
| CO3 | Evaluate security and privacy challenges in cloud computing critically |
| CO4 | Analyze performance optimization techniques for cloud-based applications |
| CO5 | Assess the economic aspects of cloud computing, including cost models, pricing strategies, and cost optimization techniques |
| CO6 | Exhibit solutions for emerging challenges and trends in cloud computing |

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

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| **Course Code** | **23CA3032** | **Duration** | **3hrs** |
| **Course Title** | **BIG DATA TECHNOLOGIES** | **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. | Examine the non-definitional traits of Big Data and their Coexistences. | CO1 | R | 10 |
|  | b. | Discriminate among the various categories of Big Data Analytics with suitable examples and applications. | CO1 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Differentiate between RDBMS and Hadoop. | CO2 | An | 10 |
|  | b. | Explain the works, uses, types, and advantages of compression in MapReduce programming. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain the concept of Time to Live (TTL) and alter command in Cassandra with an example. | CO3 | A | 10 |
|  | b. | Paraphrase the Query Language of MongoDB with an example. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Describe the Hive Query Language (HQL) and its significance in data analysis. | CO4 | U | 10 |
|  | b. | Explain the execution modes of Apache Pig with examples. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain Spark Architecture and its components in detail. | CO5 | U | 10 |
|  | b. | Illustrate the important characteristics of Apache Spark. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Differentiate between Business Intelligence and Big Data Analytics with relevant examples. | CO1 | U | 10 |
|  | b. | Explain the concept of indexes in MongoDB. | CO3 | A | 10 |
|  |  |  |  |  |  |
| 7. | a. | Illustrate how MapReduce works with a suitable example. | CO2 | A | 10 |
|  | b. | Explain the concept of cursor in detail. | CO3 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain the concept of ‘Data-Frames’ in Apache Spark and their key features. | CO6 | R | 10 |
|  | b. | Discuss the applications of Apache Spark with examples. | CO6 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Classify the different types and 3 V’s of big data analytics with suitable examples. | CO1 | U | 10 |
|  | b. | Explain the purpose of commonly used HDFS commands in Hadoop with examples. | CO4 | U | 10 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| CO1 | Summarize the fundamental of Big Data. |
| CO2 | Expertise in big data techniques/tools. |
| CO3 | Acquire knowledge in Hadoop. |
| CO4 | Illustrate the role of MapReduce programming in various scenarios. |
| CO5 | Develop solutions to problems using Big Data. |
| CO6 | Expertise in Big data and Spark. |

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

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| **Course Code** | **23CA3039** | **Duration** | **3hrs** |
| **Course Title** | **HUMAN CENTERED COMPUTING** | **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 Norman’s model of interaction with real-time examples. | CO1 | A | 10 |
|  | b. | Describe the aspects of ergonomics with examples. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Compare participatory design with navigation design. | CO2 | An | 10 |
|  | b. | Describe the characteristics of Interaction design. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Apply the principles of windowing systems to design a user-friendly desktop interface for a productivity application. | CO3 | A | 10 |
|  | b. | Classify between user-centered design and system-centered design. | CO3 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Illustrate the concept of cognitive models with real-time examples. | CO4 | A | 10 |
|  | b. | Analyze the advantages and limitations of face-to-face communication compared to digital communication in HCI. | CO4 | An | 10 |
|  |  |  |  |  |  |
| 5. | a. | Examine the characteristics, advantages and disadvantages of Groupware systems. | CO5 | R | 10 |
|  | b. | Analyze the key frameworks for groupware with real-world examples. | CO5 | An | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Describe the ethical implications of AI in Human-Centered Computing. | CO3 | R | 10 |
|  | b. | Explain the concept of client server architecture. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Describe the common interface styles with examples. | CO1 | R | 10 |
|  | b. | Illustrate the four basic activities in interaction design with real-time applications. | CO2 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Apply the concept of ubiquitous computing in real-time applications. | CO6 | A | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Illustrate a case study on augmented reality technology related to a real-world problem in the construction industry. | CO6 | An | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Interpret necessity of human computer interaction. |
| CO2 | Identify the suitable design process for developing an interaction model. |
| CO3 | Classify types of design models. |
| CO4 | Devise strategies for deployment of interaction models. |
| CO5 | Choose the right type of interaction model. |
| O6 | Compare different kinds of human computer interaction models. |

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

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| **Course Code** | **23CA3043** | **Duration** | **3hrs** |
| **Course Title** | **IMAGE PROCESSING AND COMPUTER VISION** | **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 of image filtering. List the differences between low-pass and high-pass filters. | CO1 | R | 10 |
|  | b. | Define edge detection. Name any two edge detection techniques and briefly describe them. | CO1 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Describe the effects of geometric mean filter on images affected by both Gaussian and salt-and-pepper noise. | CO2 | U | 10 |
|  | b. | Discuss the steps involved in reducing periodic noise using frequency domain filtering. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Discuss the advantages and limitations of depth estimation by using both normal camera and depth camera. | CO3 | U | 10 |
|  | b. | Define depth camera. Specify the devices that capture depth information. | CO3 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the detection of moving objects using background subtraction. | CO4 | U | 10 |
|  | b. | Define Non-Maximum Suppression (NMS) and why is it needed in object detection. | CO4 | R | 10 |
|  |  |  |  |  |  |
| 5. | a. | Define OpenCV. Mention two applications of OpenCV in image processing. | CO5 | R | 10 |
|  | b. | Explain the procedure to read and display an image using OpenCV. | CO5 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain step by step procedure of using inverse filtering method to restore the grayscale image corrupted by Gaussian noise and linear blur. | CO2 | A | 10 |
|  | b. | Describe how edge enhancement can be achieved using high-pass filters. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Discuss the role of Kalman Filter in predicting the motion of objects. | CO4 | U | 10 |
|  | b. | Define custom object detector. Write an example of detecting bicycles on a road. | CO4 | R | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Compare the handling of video capture between a camera and a video file reading in OpenCV. | CO6 | U | 10 |
|  | b. | Explain GUI event handling with image processing tasks for interactive applications. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Design a small application that captures frames, processes them, and saves only frames with detected motion. | CO6 | C | 10 |
|  | b. | Explain the conversion process of an image from RGB to grayscale in OpenCV. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Summarize the fundamental concepts of image processing. |
| CO2 | Utilize OpenCV for processing images. |
| CO3 | Apply image processing techniques in real life situations. |
| CO4 | Apply image search techniques using OpenCV. |
| CO5 | Demonstrate object detection and tracking techniques. |
| CO6 | Summarize the importance of neural networks and Augmented Reality in image processing. |

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

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| **Course Code** | **23CA3044** | **Duration** | **3hrs** |
| **Course Title** | **MACHINE LEARNING OPERATIONS** | **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. |  | Identify the stakeholders in the Machine Learning model life cycle with a neat diagram. | CO1 | R | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Illustrate with an example of applying a Machine Learning model to solve a problem in an educational institution. | CO2 | A | 20 |
|  |  |  |  |  |  |
| 3. |  | Apply drift detection techniques to identify when a deployed model’s performance begins to degrade in practice. | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Implement model risk evaluation and quality assurance strategies in the context of a Machine Learning case study. | CO3 | A | 20 |
|  |  |  |  |  |  |
| 5. |  | Explain in detail the scaling deployment used in Machine Learning. | CO4 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Explain the concept of model governance and its importance in managing machine learning systems within the organizations. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 7. |  | Discuss the implementation of risk-based governance in an AI system for autonomous vehicles. | CO4 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Explain the factors that influence the selection of a suitable machine learning model for solving real-world business problems such as credit risk prediction. | CO5 | U | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Compare the MLOps pipeline structure used in recommendation engines with consumption forecasting systems. | CO6 | An | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Interpret the MLOps and the role of ML experts. |
| CO2 | Identify and mitigate common challenges when training, evaluating and deploying ML models. |
| CO3 | Discover the risks associated with ML model and provide security solutions. |
| CO4 | Devise strategies for deployment and monitoring of ML models. |
| CO5 | Choose the right model type for specific problems. |
| CO6 | Deploy scalable ML systems that you can retrain and update to reflect new data. |

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

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| **Course Code** | **23CA3046** | **Duration** | **3hrs** |
| **Course Title** | **DEEP LEARNING TECHNIQUES** | **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 architecture and working of a neural network and the best practices for improving the training phase in deep learning, including methods to prevent overfitting, and explain how backpropagation contributes to enhancing the performance of neural networks. | CO1 | U | 20 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Discuss the different types of machine learning. For each type, explain its key principles, strengths, and limitations, and provide real-world applications where it would be the most suitable approach. Justify your choices of machine learning types for the selected applications. | CO1 | U | 20 |
|  |  |  |  |  |  |
| 3. | a. | Explain the architecture of convolutional neural networks and the working of its components. Implement a convolutional neural network for image classification using Python code. | CO2 | A | 10 |
|  | b. | Discuss the different approaches in classifying videos and their design options. | CO2 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Analyze the characteristics and working of different architectures of CNN that can be used for classification of audio and music. | CO2 | An | 20 |
|  |  |  |  |  |  |
| 5. |  | Explain the architecture and working principles of Generative Adversarial Networks (GANs) and their major variants. Analyze how the unique features of each variant make them suitable for specific real-world applications. | CO3 | An | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Evaluate critically the effectiveness of GANs in various real-world applications such as image synthesis, data augmentation, and anomaly detection. Suggest possible improvements or hybrid approaches that could enhance their performance and stability. | CO3 | E | 20 |
|  |  |  |  |  |  |
| 7. |  | Examine the suitability of Basic RNN, LSTM, and GRU architectures for different sequence learning tasks, highlighting their respective strengths and weaknesses. | CO4 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 8. |  | Analyze Transformer’s encoder–decoder architecture that leverages attention mechanisms to enhance performance in sequence-to-sequence tasks with appropriate examples. | CO6 | An | 20 |
| **COMPULSORY QUESTION** | | | | | |
| 9. |  | Illustrate the working of a reinforcement learning using a real-time analogy with the help of a standard algorithm. | CO5 | A | 20 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | summarize the fundamental concepts of neural networks. |
| CO2 | illustrate the concepts of convolutional neural networks. |
| CO3 | create generative adversarial networks. |
| CO4 | apply recurrent neural networks for solving applications. |
| CO5 | demonstrate the applications of reinforcement learning. |
| CO6 | application of deep learning in cloud and mobile applications |

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

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| **Course Code** | **23CA3048** | **Duration** | **3hrs** |
| **Course Title** | **ROBOTIC PROCESS AUTOMATION** | **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 in detail the concepts of Robot Kinematics and Dynamics. | CO1 | U | 10 |
|  | b. | Discuss the different types of drive systems such as electric, hydraulic, and pneumatic drives with neat diagrams. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. | a. | Examine the classification of robot programming languages with suitable examples. Explain the features, architecture and working of the VAL system. How does VAL support robot control and programming in industrial applications? | CO2 | R | 10 |
|  | b. | Explain the role of computer control in robotic systems. | CO2 | U | 10 |
|  |  |  |  |  |  |
| 3. | a. | Explain Topological Path Planning in mobile robotics. Describe how the environment is represented using topological maps and compare it with metric path planning in terms of advantages, limitations, and applications. | CO3 | A | 10 |
|  | b. | Prepare a case study on Topological Navigation using the Hybrid Architecture in robotics. | CO3 | C | 10 |
|  |  | **(OR)** |  |  |  |
| 4. | a. | Explain the key components of Robotic Process Automation (RPA) and discuss the major RPA platforms. Describe the roles of each component in automating business processes, highlighting their features and applications. | CO4 | U | 10 |
|  | b. | Explain the UIPath platform, including its stack and components. Describe the features of UIPath Studio and how it is used to design and implement automation workflows with suitable examples. | CO4 | A | 10 |
|  |  |  |  |  |  |
| 5. | a. | Explain the techniques used for implementing control synchronization such as waiting for a control, element vanish, image vanish and wait attribute in automation. Discuss how mouse and keyboard activities can be simulated and controlled programmatically with suitable examples. | CO5 | U | 10 |
|  | b. | Explain the techniques used in UIPath to find and attach windows. Discuss the steps to identify and interact with controls within applications, highlighting the methods, activities, and practical applications with suitable examples. | CO5 | A | 10 |
|  |  | **(OR)** |  |  |  |
| 6. | a. | Explain the sequences of workflows in UIPath. Discuss the types of activities used, their purposes, and how they are organized to automate business processes effectively, with suitable examples. | CO4 | A | 10 |
|  | b. | Explain control flow in programming. Discuss the various types of loops and decision-making statements, highlighting their syntax, usage, and applications with suitable examples. | CO4 | U | 10 |
|  |  |  |  |  |  |
| 7. | a. | Identify the techniques used to manage memory with variables in programming. Describe how data tables can be created, stored and manipulated in memory to enhance data processing and retrieval efficiency with suitable examples. | CO2 | R | 10 |
|  | b. | Explain the concept of Flexible Automation Technology and its significance in modern manufacturing systems. | CO2 | E | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Explain events handling in UIPath. Discuss the types of event-driven activities, their usage, and how they help in creating responsive and robust automation workflows with suitable examples. | CO6 | A | 10 |
|  | b. | Explain the Revisit Recorder feature in UIPath. Discuss its types, functionalities, and how it helps in automating tasks efficiently, supported with suitable examples. | CO6 | U | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Explain the concept of Screen Scraping in UIPath. Discuss the different methods, their applications, and how extracted data can be used in automation workflows with suitable examples. | CO6 | A | 10 |
|  | b. | Explain the common failure points in RPA workflows and discuss strategies to avoid them. Highlight best practices for designing robust and reliable automation processes with suitable examples. | CO6 | E | 10 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| CO1 | Summarize the techniques used in RPA. |
| CO2 | Understand the software’s that used to implement RPA. |
| CO3 | Acquire knowledge about different technology used in AI Robotics. |
| CO4 | Learn the methodology used in AI Robotics. |
| CO5 | Navigate and Manipulate data. |
| CO6 | Summarize data manipulation Techniques. |

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

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| **Course Code** | **23CA3050** | **Duration** | **3hrs** |
| **Course Title** | **NATURAL LANGUAGE PROCESSING** | **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 the various tasks of NLP with their respective functional areas. | CO1 | U | 10 |
|  | b. | Summarize the challenges and applications of NLP in the current scenario. | CO1 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 2. |  | Discuss the various approaches of NLP with suitable illustration. | CO2 | U | 20 |
|  |  |  |  |  |  |
| 3. |  | Simulate BoW approach of text classification for the following:  sentence = ['coronavirus is a highly infectious disease',  'coronavirus affects older people the most',  'older people are at high risk due to this disease'] | CO3 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 4. |  | Explain ‘Text Classification’ with a suitable illustration in detail. | CO3 | U | 20 |
|  |  |  |  |  |  |
| 5. |  | Apply the given CFG production rule for generating ten sentences in English.  **NP -> DT N | NP PP**  Tabulate the benefits and drawbacks of CFG. | CO4 | A | 20 |
|  |  | **(OR)** |  |  |  |
| 6. |  | Examine the various architectures of Encoder – Decoder model. | CO4 | U | 20 |
|  |  |  |  |  |  |
| 7. | a. | Construct a dependency structure for the following sentence.  “I prefer the morning flight through Denver”. | CO5 | C | 10 |
|  | b. | Discuss the advantages of Dependency Parsing. | CO5 | U | 10 |
|  |  | **(OR)** |  |  |  |
| 8. | a. | Assess the grammar of the following sentence using CKY parsing algorithm.  “We buy drinks with milk”. | CO5 | E | 10 |
|  | b. | Explain the role of CNG with a suitable illustration. | CO5 | A | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 9. | a. | Predict Synonymy, Antonymy, Meronymy and Derivationally related forms for the words “Happy” and “Natural” using a block diagram. | CO6 | A | 10 |
|  | b. | Differentiate between WordNet and Grammar. List any five application areas of WordNet. | CO6 | U | 10 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Understand about regular expressions. |
| CO2 | Develop N-gram Language Models. |
| CO3 | Acquire knowledge about vector semantics. |
| CO4 | Summarize about sequence Labeling, Machine Translation and Constituency Grammers. |
| CO5 | Demonstrate about parsing techniques. |
| CO6 | Illustrate about logical representation and word senses. |

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

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| **Course Code** | **25DS201** | **Duration** | **3hrs** |
| **Course Title** | **MATHEMATICS FOR INFORMATION SECURITY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | ***Determine* whether 156 and 12 are co-prime or not.** | 1c | A | 1 |
| 2. | ***Factorize*** 70 as product of prime numbers. | 1a | A | 1 |
| 3. | ***Compute* the equivalent binary number for the given decimal number 17810.** | 2a | A | 2 |
| 4. | ***Compute* binary addition of the strings 010101 and 011011.** | 2b | A | 2 |
| 5. | ***Calculate*** how many possible multi factor authentication combinations exist if a system supports **6 types of authentication factors** (password, fingerprint, OTP, token, facial recognition, smart card) and an organization wants to implement any **3 factors together**. | 3a | A | 3 |
| 6. | ***Calculate***the number of different 4 digits ATM pin, a person can generate from the set {1, …, 9}, if repetition of digit is not allowed. | 3b | A | 3 |
| 7. | ***Compute*** the hash code for the string 225 using the hash function H(x) = x mod 5. | 4a | A | 4 |
| 8. | ***Identify*** the type of function in the given scenario; (i) Database containing user ID and password (ii) Database containing password and its hash values. | 4b | U | 4 |
| 9. | ***Compute*** the degree centrality of the graph shown below.  3  4  5  1  2 | 5c | U | 5 |
| 10. | ***Identify*** the bridges of the network shown below. | 5a | U | 5 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | ***Apply***Caesar cipher method and convert the plain text “ARRIVED” into cipher text with a shift key of S = 5, given that the numerical value for the characters A to Z are assigned from 1 to 26. | 1e | A | 1 |
| 12. | ***Convert*** the given binary string, 10110101 into equivalent octal, decimal, and hexadecimal number system. | 2b | A | 2 |
| 13. | ***Apply*** permutation cipher method and convert the plain text “ PARCEL IS COMING BY SHIP” into cipher text by creating blocks of length 4, and using the permutation key (3 4 2 1). | 3c | A | 3 |
| 14. | ***Determine*** whether the function f (x) = x + 1, from {0,1,…,10} to {1,…,20} is a 1-1 and onto function. | 4a | An | 4 |
| 15. | ***Construct*** (i) all paths of length 2 and 3 from vertex *a* to *d*, (ii) all circuits from a to a, for the graph shown below.    a  b  d  e  c | 5a | U | 5 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16 | ***Determine* whether the credit card number 5459 6489 0485 9049 is valid or not by calculating its check sum and using modular arithmetic. Also, write the procedure for verifying the validity of credit card.** | 1d | A | 1 |
| **(OR)** | | | | |
| 17 | ***Determine* whether the ISBN of a book, 978-81-7700-230-0, is correct or not by calculating its check sum and using modular arithmetic. Also, write the procedure for verifying the correctness of ISBN.** | 1d | A | 1 |
| 18 | ***Convert*** the password “ADMIN” in to binary form, given that the ASCII code for A, D, M, I, N are 65, 68, 77, 73, and 78 respectively. **Apply** the binary key 11100111 to encrypt the binary form of the password using XOR operation. | 2b | A | 2 |
| **(OR)** | | | | |
| 19 | ***Determine*** the plain text from the given binary string, C =10110101 10101010 10001111 10000000 11000000 11100100 10100000, using the binary key K = 01010101, and transforming the string into equivalent decimal form (use the ASCII code, e-101-, h-104, n-110, o-111, s-1115, t-116, y-121). | 2c | A | 2 |
| 20 | ***Compute*** the number of different passwords of length 6 to 8, if the characters used are (i) upper case, lower case and digits only (ii) upper case, lower case, digits and special characters. | 3d | A | 3 |
| **(OR)** | | | | |
| 21 | ***Compute*** the number of times a computer has to attempt, to find the password of a user, if the password has been constructed with (i) upper & lower case characters of length 8 (ii) upper case characters and digits of length 9. | 3a | A | 3 |
| 22 | ***Compute*** the hash code for the strings (i) 876591 (ii) 942683 using the hash function H(S) = ca1 + c2a2 + ….+ cnan, where c = 2. Also, ***prove*** that hash function is irreversible. | 4e | A | 4 |
| **(OR)** | | | | |
| 23 | ***Compute*** the hash code for the strings (i) Good (ii) God using the hash function h(S) = (sum of ASCII code of the letters of S) mod 10, given that the ASCII code for G, o, d, are 71, 111, and 100 respectively. ***Explain*** how hash codes are used to check data integrity. | 4d | A | 4 |

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| --- | --- | --- | --- | --- |
| **Compulsory Question:** | | | | |
| 24 | The following graph shows a network of computers and the encryption link cost between the computers. ***Calculate*** the minimum total encryption cost and maximum encryption cost of the network.  v1  v2  v5  v4  v6  v3  19  21  18  14  11  6  5  10  16  33 | 5b | A | 5 |

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

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| --- | --- | --- | --- |
| **Course Code** | **25DS301** | **Duration** | **3hrs** |
| **Course Title** | **COMPUTING PROFICIENCY FOR CYBERSECURITY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | Define data in computing terms. | 1a | R | 1 |
| 2. | List any two characteristics of data. | 1b | R | 1 |
| 3. | State the base of decimal, binary, octal and hexadecimal number system. | 2c | U | 2 |
| 4. | Recall the full form of ASCII. | 2f | R | 2 |
| 5. | List any four input devices. | 3c | R | 3 |
| 6. | Name any four types of computers. | 3h | R | 3 |
| 7. | List any two web browsers. | 4c | R | 4 |
| 8. | List any four antiviruses commonly used in 2025. | 4g | R | 4 |
| 9. | Identify the shortcut keys used to cut, copy and paste the text. | 5b | R | 5 |
| 10. | Define a spreadsheet and its use. | 5c | R | 5 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | Classify the different types of data used in data and information systems. | 1a | U | 1 |
| 12. | Explain the process of converting a binary number into its decimal equivalent with an example. | 2b | U | 2 |
| 13. | Explain the main functions and components of a processing unit in a computer system. | 3a | U | 3 |
| 14. | Describe the features of at least two different web browsers with suitable examples. | 4b | R | 4 |
| 15. | Describe the steps to create a table in a Microsoft Word document. | 5c | R | 5 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16 | Explain the characteristics of Structured, Unstructured and Semi-structured data. | 1c | U | 1 |
| **(OR)** | | | | |
| 17 | Discuss the importance of data in computing. | 1g | U | 1 |
|  |  |  |  |  |
| 18 | Illustrate binary arithmetic addition and subtraction operations with examples. | 2e | U | 2 |
| **(OR)** | | | | |
| 19 | Explain various forms of character representation such as ASCII and Unicode. | 2f | U | 2 |
|  | | | | |
| 20 | List and describe the different types of computers based on their size, purpose and performance. | 3h | R | 3 |
| **(OR)** | | | | |
| 21 | Explain the major computer hardware components and their functions. | 3a | U | 3 |
|  |  |  |  |  |
| 22 | Discuss the importance of firewalls, antivirus software and password protection in securing systems. | 4g | U | 4 |
| **(OR)** | | | | |
| 23 | Describe the evolution of Internet from ARPANET to Web 3.0 era. | 4d | R | 4 |
| **Compulsory Question:** | | | | |
| 24 | Describe the steps involved in creating a chart and a graph using a spreadsheet application. | 5b | R | 5 |

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

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| **Course Code** | **25DS302** | **Duration** | **3hrs** |
| **Course Title** | **PYTHON PROGRAMMING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | Predict the output of the following:   1. print(25//3) 2. print(33%-2) | 1e | A | 1 |
| 2. | Identify the string function that would count the number of characters in a string and write the Python code that will display the number of characters in the string ‘dandelion’ | 1f | R | 1 |
| 3. | Define a function that accepts two numbers as input and returns their sum. | 2d | R | 2 |
| 4. | Define recursion. | 2f | R | 2 |
| 5. | Define list products with the following elements: pen, pencil, pouch, wallet, and shoe. | 3c | A | 3 |
| 6. | Identify the function that is used to count the number of elements in a tuple and write the code to display the number of elements in a sample tuple. | 3b | R | 3 |
| 7. | Define an object. | 4b | R | 4 |
| 8. | Compare and contrast instance methods with class level methods***.*** | 4e | An | 4 |
| 9. | Name a small graphic object that is usually symbolic of an operation or of a larger entity such as an application program or a file. Give an example for the same. | 5a | R | 5 |
| 10. | Name the object that is used to execute SQL commands in Python and write the code to execute a Selectquery. | 5g | R | 5 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | Develop an algorithm to calculate the area of a circle and represent it using a flowchart. | 1a | A | 1 |
| 12. | Write Python code to find the largest number among three numbers. | 2a | A | 2 |
| 13. | Write Python code to define a tuple ***fruits*** with the following elements ***apple, orange, plum, apple, cherry, plum, grapes, apple, blueberry*** and develop Python code to do the following operations:   1. Count the number of fruits in the tuple. 2. Count the occurrences of *‘****apple’*** in the tuple. 3. Find the position of ***‘cherry’*** in the tuple. 4. Check whether ***‘strawberry’*** is in the tuple. 5. Create a new tuple by adding ***‘mango’*** to the tuple. | 3b | An | 3 |
| 14. | Illustrate inheritance with a coding example. | 4f | U | 4 |
| 15. | Write the code to create a radio button set to select gender in a form. | 5d | A | 5 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16. | Write a program to calculate simple interest and maturity amount for a given principal amount *p* for a duration of *n* years with *r* as rate of interest. Explain the code and interpret how the code would work for an input of Rs. 10,000 for a period of 5 years with 7.8% rate of interest. Predict the output of your program for the given values. Analyze how the program would behave if the inputs are negative. | 1e | An | 1 |
| **(OR)** | | | | |
| 17. | Categorize the operators in Python and explain their functionality with appropriate example for each operator. | 1e | U | 1 |
|  | | | | |
| 18. | Develop Python code to find the factorial of a number. | 2c | A | 2 |
| **(OR)** | | | | |
| 19. | Write a program to calculate the BMI of a person by reading height and weight as input. Use it to identify the BMI category of the person based on the given table:   |  |  | | --- | --- | | BMI | BMI Category | | < 15 | Starvation | | 15.1 – 17.5 | Anorexic | | 17.6 – 18.5 | Underweight | | 18.6 – 24.9 | Ideal | | 25 – 29.9 | Overweight | | 30 – 39.9 | Obese | | 40 and Above | Morbidly obese | | 2a | A | 2 |
|  |  |  |  |  |
| 20. | Consider the following sets:   * healthy\_diet\_followers = {'Alice', 'Bob', ‘Rahul’, 'David', ‘Sheena’} * regular\_exercisers = {‘Rahul’, 'David', 'Preethi', 'Grace'}   Develop Python code to perform the following set operations and predict their output.   * Who follows both a healthy diet and exercises regularly? * Who follows only a healthy diet? * Who exercises regularly but doesn’t follow a healthy diet? * List all individuals who either follow a healthy diet or exercise. * List all individuals who do exactly one of these activities. | 3d | An | 3 |
|  | **(OR)** |  |  |  |
| 21. | Write Python code to do the following operations on tuples.   1. Create a tuple ***cars*** with the following elements: ***'Tesla', 'Ford', 'BMW', 'Audi', 'Tesla', 'Mercedes'*** 2. Retrieve the first element. 3. Slice the tuple to get the middle three elements. 4. Retrieve the last element using negative indexing. 5. Reverse the tuple. 6. Count the number of elements. 7. Count how many times 'Tesla' appears. 8. Find the index of 'Audi'. 9. Check if 'Toyota' is present in the tuple. 10. Create a new tuple by adding two more cars. | 3b | A | 3 |
|  | | | | |
| 22. | Create a class named **Car** with attributes **make**, **model**, **color**, and **fuel\_type**. Write Python code to perform the following operations:  a. Add an **\_\_init\_\_()** method for the above class.  b. Create **two objects** for the class.  c. Print the **id** of the objects.  d. Print the **memory address** of the objects.  e. Define **\_\_str\_\_()** for the class and print the **description** of the objects. | 4b | A | 4 |
| (**OR)** | | | | |
| 23. | Illustrate multiple inheritance with an example implemented in Python code. | 4f | U | 4 |
| **Compulsory Question:** | | | | |
| 24. | Develop a GUI window with a button that would greet the person with a ‘welcome message’ when the button is clicked. | 5e | A | 5 |

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

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| **Course Code** | **25DS303** | **Duration** | **3hrs** |
| **Course Title** | **INFORMATION SECURITY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | Define Infosec. | 1a | R | 1 |
| 2. | List the security model used for securing the information system. | 1b | R | 1 |
| 3. | List any two technical controls used for mitigating the security risks. | 2b | U | 2 |
| 4. | Name any two types of Disaster Recovery Sites. | 2d | U | 2 |
| 5. | Define authorization. | 3a | R | 3 |
| 6. | Represent symmetric encryption using a neat sketch. | 3c | U | 3 |
| 7. | Write the full form of IDS and IPS | 4a | A | 4 |
| 8. | Define VPN. | 4c | R | 4 |
| 9. | Write the full form of HIPAA. | 5a | A | 5 |
| 10. | Name any two digital evidences. | 5c | R | 5 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | Examine CIA and the importance of Information Security. | 1a | A | 1 |
| 12. | Write the advantages and disadvantages of any three types of risk assessment methodologies. | 2a | A | 2 |
| 13. | Identify the roles of RBAC, DAC and MAC in real time scenarios. | 3b | R | 3 |
| 14. | Describe the wireless threats and protocols that needs to address the security issues. | 4d | R | 4 |
| 15. | Explain the lifecycle of NIST Incident Response. | 5b | A | 5 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16 | Explain the rules and significance of Bell-LaPadula model with an example. | 1b | U | 1 |
| **(OR)** | | | | |
| 17 | Illustrate the effects of vulnerability in an information system. | 1e | A | 1 |
|  |  |  |  |  |
| 18 | Summarize the risk analysis steps and strategies for mitigating the risks. | 2b | E | 2 |
| **(OR)** | | | | |
| 19 | Compare and contrast BCP and DRP in an InfoSec. | 2d | E | 2 |
|  |  |  |  |  |
| 20 | Explain the importance of authentication and authorization factors. | 3a | U | 3 |
| **(OR)** | | | | |
| 21 | Discuss the role of Digital Certificates and Digital Signatures for data transmission in a secure manner. | 3d | U | 3 |
|  |  |  |  |  |
| 22 | Evaluate the key components of Network Security for an InfoSec. | 4b | A | 4 |
| **(OR)** | | | | |
| 23 | Determine the necessity of secure software development with an illustration. | 4e | A | 4 |
|  | | | | |
| **Compulsory Question:** | | | | |
| 24 | Prepare a report on social engineering and security awareness in providing security to an InfoSec. | 5d | A | 5 |

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

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| --- | --- | --- | --- |
| **Course Code** | **25LN101** | **Duration** | **3hrs** |
| **Course Title** | தமிழ் | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | அ. மாதவியின் ஆடல் கலையைப் பற்றி விளக்கும் காதை ----------ஆகும்.  ஆ. ஆடலரசியான மாதவிக்கு வழங்கிய பட்டம் ----------- | 3b | R | 3 |
| 2. | மேலைநாட்டுக் கிறித்தவ தமிழ் தொண்டர்கள் இருவர் பெயரைக் கூறுக. | 1e | U | 1 |
| 3. | ஐம்பெரும் காப்பியங்களில் இரண்டு புத்தக் காப்பியங்கள் யாவை? | 5a | A | 3 |
| 4. | 1. நாயக்கர் கால பாடுபொருள் ---------------- 2. உரைநடை நூல்கள் தோன்றிய காலம் ---------------- | 3b | An | 4 |
| 5. | இலக்கணம் - விடை வகை எத்தனை?  இலக்கணம் - வினா வகை எத்தனை? | 2c | R | 5 |
| 6. | தமிழ் ஒளி – ஆசிரியர் குறிப்பு வரைக. | 2a | R | 6 |
| 7. | காடு கவிதையில் வேடன் கூறும் இருமரங்கள் -------, ---------- | 2b | U | 2 |
| 8. | சங்ககாலத்தில் ---------, -------- நூல்கள் எழுதப்பட்டுள்ளது. | 3b | U | 3 |
| 9. | ஏதேனும் ஒரு திருக்குறளை எழுதுக. | 4b | R | 3 |
| 10. | ஐம்பெரும் காப்பியங்கள் யாவை? | 5a | U | 3 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | சிலப்பதிகாரம் – அரங்கேற்றுக்காதையை கட்டுரை வரைக. | 3c | C | 3 |
| 12. | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 1. பொருத்துக   |  |  |  | | --- | --- | --- | |  | அழகின் சிரிப்பு | வேடன் | |  | வருங்கால மனிதன் | தெய்வ மனிதன் | |  | விடை வகைகள் | நண்டு | |  | கடற் பரப்பு மணல் | பாரதிதாசன் | |  | சித்தம் மகிழ்விப்பவன் | தமிழ் ஒளி | |  | கொடுவாள் மீசை | எட்டு | | | 2b | R | 6 |
| 13. | இலக்கணம் - வினா வகையை எடுத்துக்காட்டு தந்து விவரி. | 1c | U | 5 |
| 14. | இலக்கணம் - வினைச்சொல் - எடுத்துக்காட்டு தந்து விவரிக்க. | 5c | U | 5 |
| 15. | மேலைநாட்டுக் கிறித்தவ தமிழ் தொண்டர்கள் இருவரைப் பற்றி விவரிக்க | 1b | E | 1 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16 | 1. தேம்பாவணியின் ஆசிரியர் ----------- 2. பாரதிதாசன் ------என்னும் ஒரு திங்களிதழை நடத்தி வந்தார். 3. விடை ------ வகைப்படும். 4. பதினெண்கீழ்க்கணக்கு நூல்கள் எத்தனை? 5. ஆடலரசியான மாதவிக்கு வழங்கிய பட்டம் ---------- 6. எங்கள் தாய் கவிதையின் ஆசிரியர் பற்றி குறிப்பு வரைக. | 1a | A | 3 |
| **(OR)** | | | | |
| 17 | வருங்கால மனிதன் கவிதையின் சாரத்தை கட்டுரை வரைக. | 2a | C | 2 |
|  |  |  |  |  |
| 18 | ஒழுக்கமுடைமையில் கூறப்பட்டுள்ள ஒழுக்கலாறுகளை வள்ளுவரின் வழி நின்று விளக்குக. | 4b | R | 3 |
| **(OR)** | | | | |
| 19 | பாரதியாரின் தமிழ்தாய் பற்றிய கருத்துகளை கட்டுரை வரைக. | 4a | U | 2 |
|  |  |  |  |  |
| 20 | தமிழ் இலக்கிய வரலாற்றின் ஏழு காலக்கட்டங்களைப் பற்றி கட்டுரை வரைக. | 3b | R | 4 |
| **(OR)** | | | | |
| 21 | கிறிஸ்தவர்கள் கிறிஸ்தவ சமயத்தை பரப்பும் நோக்கில் தமிழுக்குச் செய்த பணிகளை விளக்குக. | 1a | An | 1 |
|  |  |  |  |  |
| 22 | ஹைக்கூ கவிதை - கட்டுரை வரைக. | 5b | E | 6 |
| **(OR)** | | | | |
| 23 | பதினெண் கீழ்க்கணக்கு நீதி நூல்களை பகுப்பு வைப்பு முறையில் விளக்குக | 4c | R | 3 |
| **Compulsory Question:** | | | | |
| 24 | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  |  |  | | --- | --- | --- | | 1. | வீரமாமுனிவர் | இராபர்ட் தெ நோபிலி | | 2. | தமிழருக்கான மருத்துவ ஊழியர் | [திராவிட மொழிகளின் ஒப்பிலக்கணம்](https://ta.wikipedia.org/wiki/%E0%AE%A4%E0%AE%BF%E0%AE%B0%E0%AE%BE%E0%AE%B5%E0%AE%BF%E0%AE%9F_%E0%AE%AE%E0%AF%8A%E0%AE%B4%E0%AE%BF%E0%AE%95%E0%AE%B3%E0%AE%BF%E0%AE%A9%E0%AF%8D_%E0%AE%92%E0%AE%AA%E0%AF%8D%E0%AE%AA%E0%AE%BF%E0%AE%B2%E0%AE%95%E0%AF%8D%E0%AE%95%E0%AE%A3%E0%AE%AE%E0%AF%8D_(%E0%AE%A8%E0%AF%82%E0%AE%B2%E0%AF%8D)) | | 3. | பெஸ்கிப் பாதிரியார் | ஐய வினா | | 4. | தத்துவ போதக சுவாமிகள் | தேம்பாவணி | | 5. | இதுவோ? அதுவோ? | சாமுவேல் | | 6. | கால்டுவெல் | வாடாத பூமாலை | | 7. | தேம்பா + அணி | ராஜரிஷி |   2.நாலடியார் பற்றி குறிப்பு வரைக. | | 1a  3c | U  U | 1  3 |

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

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| **Course Code** | **25LN102** | **Duration** | **3hrs** |
| **Course Title** | **FRENCH** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | **LUO** | **RBT Level** | **Related CO** |
| **PART – A (10 X 2 = 20 MARKS)** | | | | |
| 1. | Comment vous appelez-vous. | 1.1 | A | 3 |
| 2. | Quel âge avez-vous | 1.2 | A | 3 |
| 3. | Où habitez-vous | 1.4 | A | 3 |
| 4. | Quelle est votre profession | 2.1 | A | 3 |
| 5. | Vous êtes étudiant(e) | 2.2 | A | 3 |
| 6. | Quelle heure est-il? | 2.3 | A | 3 |
| 7. | Quelle est la capitale de la France? | 3.1 | A | 3 |
| 8. | Où se trouve la Tour Eiffel? | 3.2 | A | 3 |
| 9. | TGV (expansion)= | 4.1 | A | 3 |
| 10. | Où se trouve la Manche? | 4.1 | A | 3 |
| **PART – B (5 X 6 = 30 MARKS)** | | | | |
| 11. | Choisissez le mot qui convient.  1. Je \_\_\_\_\_\_\_\_ (suis/ es/ est) français.?  2. Tu \_\_\_\_\_\_\_\_ (suis / es/ est) brésilien  3. Je \_\_\_\_\_\_\_\_ (suis/ es / est) étudiante.  4. Ma mère \_\_\_\_\_\_\_ (suis /es est) japonaise.  5. Fabio \_\_\_\_\_\_\_\_\_ (suis / est F êtes) italien ?  6. Vous \_\_\_\_\_\_\_\_ (es / est / êtes) de Madrid. | 1.2 | A | 3 |
| 12. | Complétez avec je, j', tu, il, elle ou vous  1. \_\_\_\_\_\_vous appelez comment ?  2. \_\_\_\_\_\_ est brésilienne  3. Et toi \_\_\_\_\_\_ es français?  4. Noura a 26 ans et moi,\_\_\_\_\_\_ ai 22 ans.  5. \_\_\_\_\_\_ habitez à Paris ou à Nice?  6. \_\_\_\_\_\_ suis directeur | 1.2 | A | 3 |
| 13. | Choisissez le mot qui convient.  1. Voici \_\_\_\_\_\_ (éditrice / Fabienne).  2. \_\_\_\_\_\_ (Il est / C"est) Philippe.  3. Là, cest \_\_\_\_\_\_ (Blandine / directeur).  4. Je vous présente \_\_\_\_\_\_ (Madrid / Isabelle).  5. \_\_\_\_\_\_ (Il est / C'est) le directeur.  6. Elle est \_\_\_\_\_\_ (directeur / directrice). | 2.1 | A | 3 |
| 14. | Conjuguez les verbes au présent.  1. On (diner) \_\_\_\_\_\_ ensemble ce soir ? Tu (être.) \_\_\_\_\_\_ libre?  2. On (avoir) \_\_\_\_\_\_ un nouveau professeur de français  3. Vous (aimer) \_\_\_\_\_\_ le tennis ? alors, on (jouer). \_\_\_\_\_\_ ?  4. Demain, on (aller) \_\_\_\_\_\_ . au château de Versailles !  5. Et oui, en avril, on (déménager) \_\_\_\_\_\_ à Grenoble.  6. Tu (aimer) \_\_\_\_\_\_ le tennis? | 3.1 | A | 3 |
| 15. | Choisissez le pronom qui convient.  1. Mon père ? \_\_\_\_\_\_ (Je / I1 / Elle / On) est né en 1942, à Poitiers.  2. Le samedi, Julien et moi, \_\_\_\_\_\_ (je / il / elle / on) déjeune au restaurant.  3. Moi, \_\_\_\_\_\_ ('/il / elle / on) adore marcher sous la pluie,  4. Les enfants, vos manteaux ! \_\_\_\_\_\_ (Je / Il / Elle / On) arrive à la gare dans cinq minutes  5. Chut ! Élise est dans sa chambre, \_\_\_\_\_\_ (je /il / elle / on) est malade.  6. Ma mère ? \_\_\_\_\_\_ (Je / I1 / Elle / On) est né en 1942, à Poitiers. | 3.2 | A | 5 |
| **PART – C (5 X 10 = 50 MARKS)** | | | | |
| 16 | Lisez la lettre et faites une liste de futur proche et présent pour les verbes donne au dessous.  Chere Aiko,  Je suis en stage toute la semaine. Ce soir, Je reste à la maison car je suis fatigué. Je vais lire ou... dormir! Carla est avec moi à Paris, ses cours à l'université sont finis le week-end prochain, on va visiter Paris.  Tu rentres quand à Paris? Samedi matin? On va manger au restaurant samedi soir avec toute la famille?  Je t'appelle demain, bonne Semaine.  Fabio  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_futur proche\_\_\_\_\_\_\_\_\_\_\_présent\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Etre  Rester  Lire  Visiter  Rentrer  manger | 3.3 | A | 3 |
| **(OR)** | | | | |
| 17 | Ecrivez une carte postale à votre ami. | 3.1 | A | 6 |
|  |  |  |  |  |
| 18 | Lisez. Puis dites vrai ou faux.  Mon ami s'appelle Bruno. Il habite à Tours et il travaille Paris.  Il est professeur d'espagnol. Il a36 ans. Son frère, Vincent, il a 24 ans. II adore le ski et il aime beaucoup Parler espagnol.  Il est étudiant en médecine Tours. Bruno n`aime pas le sport.  Il aime bien cuisiner. Il adore le cinéma et la musique classique.  Vrai ou Faux  1. Bruno a un frère.  2. Vincent habite à Paris.  3. Vincent est professeur d'espagnol.  4. Bruno aime beaucoup le ski.  5. Bruno adore cuisiner. | 4.1 | A | 3 |
| **(OR)** | | | | |
| 19 | Vous apprenez français à l'université, à Lyon. Vous avez commencé les cours depuis une semaine. Vous écrivez une carte postale à un ami français de Paris.  Vous parlez de vos cours, de vos camarades, de la nourriture et de vos impressions . Vous aimez ou non, etc.  (environ 50 mots) | 5.1 | A | 6 |
|  |  |  |  |  |
| 20 | **Remplacez les mots soulignés par lui, elle, eux ou elles.**  1. On va retrouver Julien au restaurant,  Non, non, on va chez Julien et apres on va au restaurant.  2. - Je voudrais bien voir tes amis Claire et Jean-Michel.  Ah, oui? Bah, on peut manger avec Claire et Jean-Michel samedi prochain?  3. Bon, tu pourrais étudier le problème avec Léa et Anne?  - Ah non, Je ne veux pas travailler avec Léa et Anne.  Je vais demander à Christophe.  4. Eh, tu sais ? La directrice va aller une semaine au Québec!  - Oui, Je sais \*\* je vais avec la directrice!  5.- Oh difficile! Julie et Ahmed ne connaissent pas la ville.   * Oui, mais Nader va aller avec Julie et Ahmed. | 4.1 | A | 4 |
| **(OR)** | | | | |
| 21 | Ecrivez cinq phrases avec le verbe AVOIR au présent. | 2.1 | A | 3 |
|  |  |  |  |  |
| 22 | Conjuguez les verbes au present.  Chanter, Ecouter, Aimer, Adorer, Detester. | 2.1 | A | 3 |
| **(OR)** | | | | |
| 23 | Ecrivez cinq phrases avec le verbe ETRE au présent. | 2.1 | A | 3 |
| **Compulsory Question:** | | | | |
| 24 | Vous Vous inscrivez a un organisme d'échanges internationaux.  Remplissez le formulaire.  Nom  prenom  Situation de famile  Date de naissance  Lieu de naissance  Nationallté  Adresse  Adresse électronique  Langues pariées  Etudes ou profession  Pays souhaités (3 dans l'ordre de préférence)   1. 2) 3) | 2.1 | A | 2 |