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

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| --- | --- | --- | --- |
| **Course Code** | **23DC1001** | **Duration** | **3hrs** |
| **Course Title** | **DIGITAL SYSTEM DESIGN** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Justify A + AB = A using K-map. | | CO1 | E | 1 |
| 2. | Write the complement expression for (AB’+C)D’+E. | | CO1 | A | 1 |
| 3. | State the truth table of 2:4 Decoder. | | CO2 | R | 1 |
| 4. | Indicate two advantages of Encoder. | | CO2 | U | 1 |
| 5. | Differentiate between Synchronous and Asynchronous counter. | | CO3 | An | 1 |
| 6. | Sketch a Moore machine state diagram. | | CO3 | A | 1 |
| 7. | State the acronym of CMOS. | | CO4 | R | 1 |
| 8. | Define Noise Margin. | | CO4 | R | 1 |
| 9. | Differentiate between PAL with PLA | | CO5 | An | 1 |
| 10. | Write the Verilog HDL code for NAND gate. | | CO6 | C | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Predict the equivalent simplified Boolean expression for  Y= (A+B) (A’+C) (B’+C’) | | CO1 | A | 3 |
| 12. | Sketch the Octal to Binary encoder logic circuit diagram. | | CO2 | A | 3 |
| 13. | Design a 2-bit asynchronous counter using JK-FF. | | CO3 | C | 3 |
| 14. | Construct the CMOS NOR gate. | | CO4 | A | 3 |
| 15. | Describe vertical and horizontal long lines in FPGA. | | CO5 | U | 3 |
| 16. | Write a data flow model description for the given expression using Verilog HDL. | | CO6 | C | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Predict the simplified Boolean expression of the given  F(w, x, y, z) = Σ(1, 3, 7, 11, 15) + d(0, 2, 5) using Karnaugh map. | CO1 | A | 8 |
|  | b. | Design OR gate using NOR Logic gates. | CO1 | C | 4 |
|  |  |  |  |  |  |
| 18. | a. | Construct a 2:1 Multiplexer and explain the working principle with its truth table. | CO2 | A | 6 |
|  | b. | Design a 1-bit Magnitude comparator circuit. | CO2 | C | 6 |
|  |  |  |  |  |  |
| 19. | a. | Design a 2-bit binary asynchronous counter using T flip flop. | CO3 | C | 6 |
|  | b. | Formulate Mux logic diagram for the given Boolean function.  F(x,y,z) = Σ (1,2,6,7) | CO3 | C | 6 |
|  |  |  |  |  |  |
| 20. |  | Sketch the TTL NAND gate circuit with Totem pole output and explain its operation. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Predict the simplified SOP for the following and implement using:  F(A, B, C, D) = ∑ (3, 4, 6, 7, 11, 12, 13, 14, 15)  a) PROM.  b) PAL. | CO5 | A | 12 |
|  |  |  |  |  |  |
| 22. | a. | Predict the simplified Boolean expression of the given F = ∑ (0, 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 13, 15) using Karnaugh map. | CO1 | A | 4 |
|  | b. | Sketch the PISO shift registers and explain its operation. | CO5 | A | 8 |
|  |  |  |  |  |  |
| 23. | a. | Construct T Flip flop using JK Flip flop. | CO4 | C | 4 |
|  | b. | Apply the following Boolean function in PLA circuit.  A= X’Y+XZ’  B=YZ’+X  C=X’Y+YZ’ | CO5 | A | 8 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Write the Verilog HDL code to design   1. 4 to 2 Encoder 2. 3 to 8 Decoder | CO6 | A | 12 |

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

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|  | **COURSE OUTCOMES** |
| **CO1** | Illustrate the basic postulates of Boolean algebra and demonstrate the operation of logic gates. |
| **CO2** | Choose an optimal method for simplification of Boolean expressions |
| **CO3** | Differentiate various combinational logic circuits. |
| **CO4** | Design and compare various types of sequential logic circuits. |
| **CO5** | Identify different logic families; classify memory devices, and identify methods for implementing logic circuits. |
| **CO6** | Design simple logic circuits using HDL code. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | - | - | 16 | - | 1 | 4 | 21 |
| **CO2** | 1 | 1 | 9 | - | - | 6 | 17 |
| **CO3** | - | - | 1 | 1 | - | 15 | 17 |
| **CO4** | 2 | - | 15 | - | - | 4 | 21 |
| **CO5** | - | 3 | 28 | 1 | - | - | 32 |
| **CO6** | - | - | 12 | - | - | 4 | 16 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23DC1003** | **Duration** | **3hrs** |
| **Course Title** | **DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Identify the number of cells in an n variable K map. | | CO1 | U | 1 |
| 2. | Define the primary purpose of binary adder. | | CO1 | R | 1 |
| 3. | List the two types of triggering. | | CO2 | R | 1 |
| 4. | Define the purpose of state minimization. | | CO2 | U | 1 |
| 5. | Name any two types of addressing mode. | | CO3 | R | 1 |
| 6. | State the function of an Instruction register. | | CO3 | R | 1 |
| 7. | Name two solutions to handle data hazards. | | CO4 | R | 1 |
| 8. | State the benefits of pipelining. | | CO4 | R | 1 |
| 9. | Define direct memory access (DMA). | | CO5 | R | 1 |
| 10. | Name any one advantage of multiprocessing. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Apply Boolean laws and simplify the following expression: AB+AB’+A’B. | | CO1 | A | 3 |
| 12. | Compare Synchronous with asynchronous counters. | | CO2 | U | 3 |
| 13. | Explain the R-type instruction encoding format with a neat diagram. | | CO3 | U | 3 |
| 14. | Illustrate the purpose of pipeline stalling with an example for Data hazard. | | CO4 | A | 3 |
| 15. | Describe the function of cache memory. | | CO5 | U | 3 |
| 16. | Compare VLIW with superscalar architectures. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Apply K map technique to minimize the given Boolean expression: F(A, B, C, D) = M(6, 7, 8, 9) + d(12, 13, 14, 15). | CO1 | A | 6 |
|  | b. | Construct a circuit to compare two 4-bit binary numbers. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Construct a mod-10 synchronous counter using T flip flop. | CO2 | A | 8 |
|  | b. | Explain the types of shift registers. | CO2 | U | 4 |
|  |  |  |  |  |  |
| 19. | a. | Explain the addressing modes of MIPS with suitable examples. | CO3 | A | 10 |
|  | b. | Explain the interaction between assembly language and high level language | CO3 | U | 2 |
|  |  |  |  |  |  |
| 20. |  | Describe the architecture of a hardwired control unit. Compare the advantages and limitations of using hardwired control over microprogrammed control in processors. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Analyze the benefits and challenges of using Direct Memory Access (DMA), particularly in high-speed data transfer applications, explaining the role of DMA in I/O operations. | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. |  | Describe how dynamic branch prediction algorithms work and analyze their impact on pipelined processor performance | CO6 | A | 12 |
|  |  |  |  |  |  |
| 23. | a. | Illustrate the design of a binary adder-subtractor circuit and provide a detailed explanation of its operation in both addition and subtraction modes. | CO2 | A | 8 |
|  | b. | Explain the pipeline process and the types of pipeline hazards. | CO2 | U | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Compare the Superscalar with Very Long Instruction Word (VLIW) architectures and analyze how each approach attempts to increase instruction-level parallelism (ILP). | CO6 | An | 12 |

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

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|  | **COURSE OUTCOMES** |
| **CO1** | Describe a variety of combinational circuits, such as binary adders, subtractors, encoders,decoders. |
| **CO2** | Illustrate the concepts of sequential logic, including flip-flops, clocked sequential circuits, and state machines. |
| **CO3** | Describe the fundamental principles of computer architecture and organization, following the Von Neumann architecture model. |
| **CO4** | Apply critical thinking to assess the impact of different architectural choices on system performance and functionality. |
| **CO5** | Acquire design skills by creating and optimizing digital circuits to meet specified design requirements and constraints. |
| **CO6** | Collaborate in teams to tackle complex design projects and assignments, fostering teamwork and peer learning |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 1 | 15 | - | - | - | 17 |
| **CO2** | 1 | 12 | 16 | - | - | - | 29 |
| **CO3** | 2 | 5 | 10 | - | - | - | 17 |
| **CO4** | 2 | 12 | 3 | - | - | - | 17 |
| **CO5** | 1 | 3 | - | 12 | - | - | 16 |
| **CO6** | 1 | 3 | 12 | 12 | - | - | 28 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23DC1005** | **Duration** | **3hrs** |
| **Course Title** | **PROGRAMMING FOR PROBLEM SOLVING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | List any four data types in C. | | CO1 | R | 1 |
| 2. | Name the input and output functions used in the C programs. | | CO1 | R | 1 |
| 3. | Predict the output of the following code:  #include <stdio.h>  int main()  {  printf("Size of char: %lu byte\n", sizeof(char));  return 0;  } | | CO2 | U | 1 |
| 4. | Identify the value of num[4] in the following line of code:  int num[ ] = {11, 34, 56, 67, 88, 94, 56}; | | CO2 | U | 1 |
| 5. | Predict the output of the following code:  #include <stdio.h>  int main() {  int number = 100;  if (number < 20) {  printf("The number is less than 20.\n");  } else if (number = = 20) {  printf("The number is exactly 20.\n");  } else {  printf("The number is greater than 20.\n");  }  return 0;  } | | CO3 | U | 1 |
| 6. | Predict the output of the following code:  #include <stdio.h>  int main() {  int x = 4;  switch (x) {  case 4:  x += 5;  printf("%d ", x);  case 5:  x += 2;  printf("%d ", x);  break;  default:  printf("Default ");  }  return 0;  } | | CO3 | U | 1 |
| 7. | How quicksort is different from selection sort? | | CO4 | U | 1 |
| 8. | List the steps involved in a linear search. | | CO4 | R | 1 |
| 9. | Predict the output of the following code:  #include <stdio.h>  #include <string.h>  int main() {  char str[ ] = "Hello, World!";  printf("Length of the string is: %lu\n", strlen(str));  return 0;  } | | CO5 | U | 1 |
| 10. | Identify the nature of the function call given in the example below.  10 + sum(9)  10 + ( 9 + sum(8) )  10 + ( 9 + ( 8 + sum(7) ) ) | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | List the different format specifiers in C and provide an example for each. | | CO1 | R | 3 |
| 12. | Write a C program to implement the following arithmetic expression:  x = (a+b)\*c. | | CO2 | A | 3 |
| 13. | State the use of a switch-case statement with an example. | | CO3 | R | 3 |
| 14. | List any three advantages of using binary search over linear search. | | CO4 | R | 3 |
| 15. | Write a simple program to determine whether a number is odd or even, using a function. | | CO5 | A | 3 |
| 16. | Differentiate between pointer and regular variable in C. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the functions of primary and secondary storage with an example. | CO1 | U | 6 |
|  | b. | Explain the basic structure of a C program, with an example. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Write a C program to find the smallest and largest of three given numbers. | CO2 | A | 6 |
|  | b. | Write a C program to find the sum and average of the elements in an array. Read the number of elements and the individual values in the array from the user. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 19. | a. | Write a C program to calculate the sum of first n odd integers (i.e.,) using looping statement. | CO3 | A | 6 |
|  | b. | Write a C program that generates the pattern below.  \*  \* \*  \* \* \*  \* \* \* \*  \* \* \* \* \* | CO3 | A | 6 |
|  |  |  |  |  |  |
| 20. |  | Illustrate a C program that implements the bubble sort algorithm. Analyze and demonstrate the steps required to sort the following dataset in ascending order: 10, 30, 5, 20, 9, 8. | CO4 | An | 12 |
|  |  |  |  |  |  |
| 21. | a. | Illustrate a C program that swaps two variables using both call by value and call by reference. Analyze the implications of each approach on the variable values, using  𝑎 = 5 and 𝑏 = 10 demonstrate the differences. | CO5 | An | 8 |
|  | b. | Write a C program that uses an inline function to perform the addition of two numbers. | CO5 | A | 4 |
|  |  |  |  |  |  |
| 22. | a. | Write a C program to print all numbers divisible by 3 between 1 and N. | CO3 | A | 6 |
|  | b. | Write a C program to find the length of two strings, compare them, and concatenate them using string functions. | CO5 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Sketch the flowchart steps and write an algorithm to convert a temperature from Celsius to Fahrenheit, based on user input, where F = (9/5)\*C + 32. | CO1 | U | 6 |
|  | b. | Write a C program to demonstrate the use of relational operators to compare two numbers and display the results. | CO2 | A | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Illustrate a C program that uses recursion to calculate the sum of natural numbers up to a given integer 𝑛. Analyze the recursive calls, explaining each call's contribution to the final result. | CO6 | An | 6 |
|  | b. | Write a recursive C program to generate the Fibonacci series up to a specified number of terms. | CO6 | A | 6 |

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

|  |  |
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|  | **COURSE OUTCOMES** |
| **CO1** | Demonstrate the components of computers and to prepare algorithms/flowcharts for programs. |
| **CO2** | Comprehend the concept of data types, variables, operators and expressions in programming language. |
| **CO3** | Illustrate the branching and iterative statement for solving problems. |
| **CO4** | Apply programming solutions for searching and sorting problems. |
| **CO5** | Demonstrate the concept of functions and its components. |
| **CO6** | Apply the concept of recursion and memory allocation. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 5 | 18 | - | - | - | - | 23 |
| **CO2** | 0 | 2 | 21 | - | - | - | 23 |
| **CO3** | 3 | 2 | 18 | - | - | - | 23 |
| **CO4** | 4 | 1 | - | 12 | - | - | 17 |
| **CO5** | 0 | 1 | 13 | 8 | - | - | 22 |
| **CO6** | - | 4 | 6 | 6 | - | - | 16 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23DC1010** | **Duration** | **3hrs** |
| **Course Title** | **ETHICS IN INFORMATION TECHNOLOGY** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define Morality. | | CO1 | U | 1 |
| 2. | Identify one organization involved in socially responsible initiatives. | | CO1 | R | 1 |
| 3. | Distinguish white box testing and black box testing. | | CO2 | U | 1 |
| 4. | Name any two perpetrators of computer crime. | | CO2 | R | 1 |
| 5. | Identify the problems associated with whistle blowing. | | CO3 | U | 1 |
| 6. | State the law that protects information vital to an organization’s success. | | CO3 | R | 1 |
| 7. | List any one impact of information technology on healthcare. | | CO4 | R | 1 |
| 8. | Give an example of the digital divide. | | CO4 | U | 1 |
| 9. | State the significance of the Electronic Product Environmental Assessment Tool. | | CO5 | R | 1 |
| 10. | List any four significant benefits of an information security management system. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Illustrate a fishbone diagram for the scenario: “Late for work.” | | CO1 | A | 3 |
| 12. | Distinguish between bribes and gifts. | | CO2 | U | 3 |
| 13. | List the types of work that are not eligible for copyright protection. | | CO3 | R | 3 |
| 14. | Represent the actions colleges can implement to address student plagiarism and list available plagiarism detection tools. | | CO4 | U | 3 |
| 15. | Differentiate Internal Audit and External Audit. | | CO5 | R | 3 |
| 16. | Identify the key components of a business continuity plan. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Describe the PDCA cycle and illustrate its use with a real-world example. | CO1 | U | 6 |
|  | b. | Explain four leadership styles, including their key characteristics, and provide real-world examples of each. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 18. | a. | Explain the steps involved in addressing an ethical problem. | CO1 | U | 6 |
|  | b. | Describe the three types of ethical inquiry and provide examples for each. | CO1 | U | 6 |
|  |  |  |  |  |  |
| 19. | a. | Define the CIA security triad and explain its significance. | CO2 | U | 6 |
|  | b. | List and explain five types of exploits with examples that showcase their effects. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 20. | a. | Identify five major intellectual property issues and explain their importance. | CO3 | U | 6 |
|  | b. | Describe the process of applying for a patent and illustrate the steps with a diagram. | CO3 | A | 6 |
|  |  |  |  |  |  |
| 21. | a. | Describe various strategies for engineering quality software. | CO4 | U | 6 |
|  | b. | Describe the use of social media in business, employment, and customer service, and give practical examples of each. | CO5 | U | 6 |
|  |  |  |  |  |  |
| 22. | a. | Explain five key challenges in the software product development process. | CO4 | U | 6 |
|  | b. | Compare the Waterfall model and Agile model in software development, including diagrams to illustrate key differences. | CO4 | An | 6 |
|  |  |  |  |  |  |
| 23. | a. | Describe the roles of the following non-traditional workers:  a) Contingent Workers  b) H1-B Workers  c) Outsourced Workers | CO5 | U | 6 |
|  | b. | Explain three ethical issues related to social networking and their impact on users and organizations. | CO5 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain the concept of an Information Security Audit, detailing its types and phases, and assess its importance in organizational security. | CO6 | U | 12 |

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

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|  | **COURSE OUTCOMES** |
| CO1 | Identify professional ethics, leadership theories, and management styles relevant to engineering practice. |
| CO2 | Describe cyberattacks, cybersecurity measures, and legal frameworks governing IT ethics and privacy |
| CO3 | Explain intellectual property rights, patent procedures, and essential considerations regarding software copyrights. |
| CO4 | Apply strategies for engineering quality software and understand the impact of IT on productivity and standards of living. |
| CO5 | Analyse social networking platforms, ethical dilemmas, industry codes of conduct, and incorporate green computing practices. |
| CO6 | Explain the implementation of ISO 27001 information security management systems, along with understanding auditing procedures and incident response protocols. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 25 | 3 | - | - | - | 29 |
| **CO2** | 1 | 10 | 6 | - | - | - | 17 |
| **CO3** | 4 | 7 | 6 | - | - | - | 17 |
| **CO4** | 1 | 16 | 6 | - | - | - | 23 |
| **CO5** | 4 | 18 | - | - | - | - | 22 |
| **CO6** | 1 | 15 | - | - | - | - | 16 |
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**END SEMESTER EXAMINATION – NOV / DEC 2024**

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| --- | --- | --- | --- |
| **Course Code** | **23DC2001** | **Duration** | **3hrs** |
| **Course Title** | **OBJECT ORIENTED PROGRAMMING** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Identify the output of the following Java code snippet:  class Example {  public static void main(String[] args) {  int x = 5;  int y = 10;  System.out.println(x \* y++ - --x + y);  } } | | CO1 | U | 1 |
| 2. | Rewrite the following code snippet using a foreach loop:  String[ ] fruits = {"Apple", "Banana", "Cherry", "Date", "Elderberry"};  for (int i = 0; i < fruits.length; i++) {  System.out.println("Fruit: " + fruits[i]);  } | | CO1 | U | 1 |
| 3. | Identify the keyword used to prevent a class from being inherited in Java. | | CO2 | U | 1 |
| 4. | Identify the method in a class which will be automatically called whenever new objects are created. | | CO2 | R | 1 |
| 5. | Identify the keyword used to pause the execution of a thread for a specified period in Java. | | CO3 | U | 1 |
| 6. | Predict the output of the following Java code snippet:  try {  String[] colors = {"Red", "Green", "Blue"};  System.out.println(colors[3]);  }  catch (ArrayIndexOutOfBoundsException e) {  System.out.println("Array Index Out of Bounds Exception");  }  catch (Exception e) {  System.out.println("Exception");  }  System.out.println("Program Completed"); | | CO3 | A | 1 |
| 7. | Predict the output of the following program:  class Karunya {  enum Day{  SUN, MON, TUE, WED, THUR, FRI, SAT  }  public static void main(String[] args) {  System.out.println(Day.FRI.ordinal());  } } | | CO4 | U | 1 |
| 8. | Predict the output of the following program:  class Dscs {  public static void main(String[] args) {  String obj = "I LIKE KARUNYA UNIVERISTY";  System.out.println(obj.charAt(5));  } } | | CO4 | U | 1 |
| 9. | State the use of iterator() method in Java. | | CO5 | R | 1 |
| 10. | List any two standard dialog boxes in Java Swing. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Explain any four features of Java programming. | | CO1 | U | 3 |
| 12. | Differentiate between super and this keyword in Java. | | CO2 | U | 3 |
| 13. | Sketch the life cycle of the thread with a neat outline. | | CO3 | A | 3 |
| 14. | Categorize the following classes into byte stream and character stream and explain it with an example.   * 1. BufferedReader   2. FileReader   3. FileInputStream | | CO4 | An | 3 |
| 15. | Write a Java code snippet that initializes a stack, adds elements, and prints them. | | CO5 | A | 3 |
| 16. | Explain any three layout managers in Java Swing package. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. | a. | Explain the bitwise and relational operator with appropriate examples. | CO1 | U | 6 |
|  | b. | Write a Java program that performs the following tasks with an array:   1. Create an array of integers with a size of N (N should be specified by the user). 2. Allow the user to input N integer values to populate the array. 3. Calculate and display the sum and average of the values in the array. | CO1 | A | 6 |
|  |  |  |  |  |  |
| 18. | a. | Differentiate between method overloading and method overriding | CO2 | U | 6 |
|  | b. | Describe the constructor and it’s types with an example. | CO2 | U | 6 |
|  |  |  |  |  |  |
| 19. |  | Write a Java program to validate employees in a company. The eligibility requirement is a minimum salary of 50,000 and a role as "Manager". If the employee earns less than 50,000, throw a user-defined exception called "SalaryTooLowException". If the role is not "Manager", throw the built-in exception called "IllegalArgumentException". | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. |  | Write the TCP socket programming program that demonstrates sending and receiving messages between the server and the client. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Explain the significance of Generic Class and Generic methods with an example. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Develop a class in Java named 'Rectangle' taking the values of its length and breadth as parameters of its constructor and having a method named 'calculateArea' which returns the area of the rectangle. Get the length and breadth of the rectangle as user input. Demonstrate the above concept with necessary object creation. | CO2 | A | 6 |
|  | b. | Write a package called library with a class Book that has properties such as title, author, and a method to display book details. Then, write a program in a different package that imports the library package and creates a Book object to display its details. | CO2 | A | 6 |
|  |  |  |  |  |  |
| 23. |  | Construct a Java application that utilizes multi-threading to achieve the following tasks:   1. Implement a thread named “InputThread” to gather input from the user. 2. Create another thread named “AdditionThread” to perform the addition of two numbers provided by the user. 3. Develop a third thread named “DivisionThread” to perform the division of the two numbers. | CO3 | A | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Develop a Java swing GUI application for the Login functionality as per the sample design given below. Show a message box “Login Successful” if username and password is “karunya”, otherwise show a message box “Login Failed”. | CO6 | A | 12 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Identify core Java fundamentals and object-oriented principles. |
| **CO2** | Develop object-oriented features and interfaces to enhance software functionality and user interaction. |
| **CO3** | Analyze the mechanisms of multithreading and exception handling to optimize performance and reliability. |
| **CO4** | Evaluate file I/O and string manipulation techniques for improved data handling. |
| **CO5** | Utilize Java generics and collections for enhanced code efficiency. |
| **CO6** | Develop desktop applications using Java Swing to solve real-time problems. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | - | 11 | 6 | - | - | - | 17 |
| **CO2** | 1 | 16 | 12 | - | - | - | 29 |
| **CO3** | - | 1 | 28 | - | - | - | 29 |
| **CO4** | - | 2 | 12 | 3 | - | - | 17 |
| **CO5** | 1 | 12 | 3 | - | - | - | 16 |
| **CO6** | 1 | 3 | 12 | - | - | - | 16 |
|  | | | | | | | **124** |

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23DC2003** | **Duration** | **3hrs** |
| **Course Title** | **DATA STRUCTURES AND ALGORITHMS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | List any two characteristics of an algorithm. | | CO1 | R | 1 |
| 2. | Group the following Big O notations in ascending order in terms of rate of growth:  O (log n), O (n), O (n log n), O (n\*n). | | CO1 | U | 1 |
| 3. | Differentiate between array and linked list. | | CO2 | U | 1 |
| 4. | List any two operations performed on a stack. | | CO2 | R | 1 |
| 5. | Define in-order traversal. | | CO3 | R | 1 |
| 6. | Define binary tree with an example. | | CO3 | R | 1 |
| 7. | Name any two data structures to represent a graph. | | CO4 | U | 1 |
| 8. | Define a bi-connected graph. | | CO4 | R | 1 |
| 9. | List any two ways to select a pivot element. | | CO5 | R | 1 |
| 10. | Define a symbol table. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Write the steps in the mathematical analysis of recursive algorithms. | | CO1 | A | 3 |
| 12. | Write an algorithm that counts the number of nodes in the linked list. | | CO2 | A | 3 |
| 13. | Explain the properties of the AVL tree. | | CO3 | U | 3 |
| 14. | Write an algorithm for breadth-first search. | | CO4 | A | 3 |
| 15. | Illustrate the selection sort algorithm with a given array of numbers [2, 81, 6, 45, 11, 21, 23, 41,11]. | | CO5 | U | 3 |
| 16. | Explain the significance of sorting in searching algorithms. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Explain the different Asymptotic notations with definitions and examples. | CO1 | A | 12 |
|  |  |  |  |  |  |
| 18. | a. | Determine the postfix expression for the given infix expression (X – Y / (Z + U) \* V) and evaluate the postfix expression where X=5, Y=10, Z, U &V are 20. | CO2 | A | 8 |
|  | b. | Write an algorithm to insert an element at the beginning of a doubly linked list. | CO2 | A | 4 |
|  |  |  |  |  |  |
| 19. | a. | Construct a binary search tree for the following numbers starting from an empty binary search tree. The data elements are 45, 15, 79, 90, 10, 55, 12, 20, 50. Delete keys 90, 77 and 45 one after the other and show the trees at each stage. | CO3 | A | 8 |
|  | b. | Write an algorithm for inserting a node in a threaded binary tree. | CO3 | A | 4 |
|  |  |  |  |  |  |
| 20. | a. | Apply the DFS-based algorithm to solve the topological sorting problem for the following digraph: | CO4 | A | 5 |
|  | b. | Apply Dijkstra’s algorithm for the below graph to find the shortest path from the sources to the other nodes. | CO4 | A | 7 |
|  |  |  |  |  |  |
| 21. | a. | Explain the heap sort algorithm and its construction in detail with a suitable example. | CO5 | A | 6 |
|  | b. | Analyze the given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function of h(X)=X (mod 10) show the resulting:   1. Separate Chaining hash table. 2. Open addressing hash table using linear probing. | CO5 | An | 6 |
|  |  |  |  |  |  |
| 22. | a. | Compute the factorial function F(n) = n! for an arbitrary non-negative integer n with the recursive algorithm and analyze its efficiency. | CO1 | A | 6 |
|  | b. | Construct a minimum spanning tree using Prim’s algorithm for the graph below: | CO4 | A | 6 |
|  |  |  |  |  |  |
| 23. | a. | Write an algorithm for linear search with a suitable example and analyze its time complexity. | CO6 | A | 8 |
|  | b. | Illustrate the working of the string-matching algorithm. Consider the text string text= "AABAACAADAABAABA" and the pattern pattern= "AABA". | CO6 | An | 4 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Write an algorithm to implement binary search and analyze the time complexity of this algorithm. | CO6 | A | 12 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Analyse and compare algorithms. |
| **CO2** | Illustrate the use of linked list, stack and queue |
| **CO3** | Explain the different types of tree data structures and the application of heap. |
| **CO4** | Demonstrate the graph representations and traversals. |
| **CO5** | Correlate the working of sorting and application of hashing. |
| **CO6** | Demonstrate various searching and selection techniques to solve problems efficiently |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 1 | 21 | - | - | - | 23 |
| **CO2** | 1 | 1 | 15 | - | - | - | 17 |
| **CO3** | 2 | 3 | 15 | - | - | - | 20 |
| **CO4** | 1 | 1 | 18 | - | - | - | 20 |
| **CO5** | 1 | 3 | 6 | 6 | - | - | 16 |
| **CO6** | 1 | 3 | 20 | 4 | - | - | 28 |
|  | | | | | | | **124** |

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

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| --- | --- | --- | --- |
| **Course Code** | **23DC2005** | **Duration** | **3hrs** |
| **Course Title** | **CYBER PHYSICAL SYSTEMS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define Industrial Internet of Things. | | CO1 | U | 1 |
| 2. | Give two examples of industrial revolution 4.0. | | CO1 | R | 1 |
| 3. | List two wireless technologies for Cyber Physical Systems. | | CO2 | R | 1 |
| 4. | Name two real life examples of cyber physical systems. | | CO2 | R | 1 |
| 5. | Define Continuous dynamics. | | CO3 | U | 1 |
| 6. | Name the model which is a form of a set of definitions and mathematical formulas. | | CO3 | R | 1 |
| 7. | Define feedback model. | | CO4 | U | 1 |
| 8. | List the layers in CPS architecture. | | CO5 | R | 1 |
| 9. | Mention the primary goal of a Denial-of-Service (DoS) attack. | | CO6 | U | 1 |
| 10. | List any two assets in CPS environment. | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Explain the revolutionary advancement in industry 3.0. | | CO1 | U | 3 |
| 12. | Describe the Sensors used in CPS. | | CO2 | U | 3 |
| 13. | Name the three key modelling issues. | | CO3 | R | 3 |
| 14. | Describe the Ill formed model with an example. | | CO4 | U | 3 |
| 15. | Explain Scheduling in embedded system design. | | CO5 | R | 3 |
| 16. | Describe the CIA Triad in information security. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Describe the five key features of CPS with example. | CO1 | R | 12 |
|  |  |  |  |  |  |
| 18. | a. | List four applications of CPS in detail | CO2 | U | 4 |
|  | b. | Compare microcontrollers with microprocessor for cyber physical systems. | CO2 | U | 8 |
|  |  |  |  |  |  |
| 19. |  | Construct state transition table for the following.  IMG_20241107_112205 | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. |  | Describe the three Synchronous Reactive models in constructing concurrent models of computation. | CO4 | R | 12 |
|  |  |  |  |  |  |
| 21. |  | Explain the classification of each layer within the IoT architecture in detail. | CO5 | U | 12 |
|  |  |  |  |  |  |
| 22. | a. | Compare IIoT with CPS, and highlight their functionalities. | CO1 | U | 8 |
|  | b. | Describe various applications of Industrial Internet of Things (IIoT). | CO1 | R | 4 |
|  |  |  |  |  |  |
| 23. | a. | Explain the CPS functionalities in heart pacemaker. | CO2 | R | 6 |
|  | b. | Explain the functioning of a smart grid as a Cyber-Physical System (CPS) and highlight its key features. | CO2 | R | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Explain the impact of limited energy resources and the use of low-power transceivers in CPS devices on their vulnerability to jamming and denial of service attacks, and identify energy-efficient countermeasures that can be implemented to mitigate these threats. | CO6 | U | 12 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Describe how Cyber Physical Systems operate in reality and their significance in Industry 4.0 and the Industrial Internet of Things (IIoT). |
| **CO2** | Identify how to design Cyber Physical Systems, learn their requirements, explore real-world uses, and understand the hardware and wireless technologies involved. |
| **CO3** | Apply the concepts of continuous dynamics, discrete dynamics, and hybrid systems to understand the models and behavioral dynamics of Cyber Physical Systems. |
| **CO4** | Analyze various models of computation such as synchronous reactive models, dataflow models, and timed models to understand their role in Cyber Physical Systems. |
| **CO5** | Design embedded Systems, Internet of Things Architecture, and Cyber Physical System Architecture, focusing on their respective components and structures. |
| **CO6** | Evaluate the security and privacy of Cyber Physical Systems, focusing on network safety, internet communication, and privacy in cloud-connected setups |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 17 | 12 |  |  |  |  | 29 |
| **CO2** | 14 | 15 |  |  |  |  | 29 |
| **CO3** | 4 | 1 |  | 12 |  |  | 17 |
| **CO4** | 12 | 4 |  |  |  |  | 16 |
| **CO5** | 12 | 4 |  |  |  |  | 16 |
| **CO6** | 17 |  |  |  |  |  | 17 |
|  | | | | | | | **124** |

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

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| --- | --- | --- | --- |
| **Course Code** | **23DC2006** | **Duration** | **3hrs** |
| **Course Name** | **IOT AND ITS APPLICATIONS** | **Max. Marks** | **100** |

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| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Define IoT. | | CO1 | R | 1 |
| 2. | Classify networks in IoT. | | CO1 | U | 1 |
| 3. | Define smart network. | | CO2 | R | 1 |
| 4. | Expand IFTTT. | | CO2 | R | 1 |
| 5. | List the components of wearable biosensors. | | CO3 | U | 1 |
| 6. | Define Internet of Medical Things. | | CO3 | R | 1 |
| 7. | Is Arduino good for IoT? | | CO4 | U | 1 |
| 8. | State the primary purpose of the Raspberry Pi. | | CO4 | R | 1 |
| 9. | Expand LabVIEW. | | CO5 | U | 1 |
| 10. | What is single rotor drone? | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | Inspect the technologies of connected devices in IoT. | | CO1 | An | 3 |
| 12. | Infer the step-by-step procedure to make smart home. | | CO2 | U | 3 |
| 13. | Interpret the concepts of wearable devices in IoT. | | CO3 | An | 3 |
| 14. | State the use of GPIO pins in an IoT device. | | CO4 | U | 3 |
| 15. | Analyze the use and future of IoT in agriculture. | | CO5 | An | 3 |
| 16. | List the uses of drone in IoT. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q.No. 17 to 23, Q.No. 24 is Compulsory)** | | | | | |
| 17. | a. | Interpret the User experience (UX) design for IoT. | CO1 | U | 6 |
|  | b. | Discuss the security and privacy issues in IoT. | CO1 | U | 6 |
|  |  | |  |  |  |
| 18. | a. | Examine the components for smart home in IoT. | CO2 | An | 6 |
|  | b. | Discuss the step-by-step guide on how to install Arduino libraries. | CO2 | U | 6 |
|  |  | |  |  |  |
| 19. | Explain about the Fundamentals, advancements, and a roadmap for the future in wearables IoT application. | | CO3 | U | 12 |
|  |  | |  |  |  |
| 20. | Outline the pin diagram and functions of Arduino with a neat sketch. | | CO4 | U | 12 |
|  |  | |  |  |  |
| 21. | Infer the smart medical devices in IoT. Also give the benefits and challenges of the IoT in smart medical devices. | | CO5 | An | 12 |
|  |  |  |  |  |  |
| 22. | Examine the internal and external representation of sensor data in healthcare application of IoT. | | CO5 | An | 12 |
|  |  |  |  |  |  |
| 23. | a. | Discuss about the role of Arduino in brief. | CO5 | U | 6 |
|  | b. | Explain how NodeMCU can be effectively used in agricultural field. | CO5 | U | 6 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain in detail steps for assembling a drone for IoT applications. | CO6 | U | 6 |
|  | b. | Discuss the step by step procedure for preparing a drone for flying. | CO6 | U | 6 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Illustrate the Internet of Things and its hardware and software components. |
| **CO2** | Interface I/O devices, Sensors & Communication modules. |
| **CO3** | Demonstrate the data and control devices. |
| **CO4** | Differentiate the connectivity technologies and protocols in IoT. |
| **CO5** | Infer security issues in IoT. |
| **CO6** | Develop real-time IoT projects. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 13 |  | 3 |  |  | 17 |
| **CO2** | 2 | 9 |  | 6 |  |  | 17 |
| **CO3** | 1 | 13 |  | 3 |  |  | 17 |
| **CO4** | 1 | 16 |  |  |  |  | 17 |
| **CO5** |  | 13 |  | 27 |  |  | 40 |
| **CO6** |  | 16 |  |  |  |  | 16 |
|  | | | | | | | **124** |

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

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code** | **23DC2020** | **Duration** | **3hrs** |
| **Course Title** | **DATA SCIENCE ECO SYSTEM** | **Max. Marks** | **100** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | Identify the type of machine learning approach used in the following problem: 'Analyze a bank credit dataset to decide whether to approve a loan for an applicant based on their profile’. | | CO1 | U | 1 |
| 2. | Differentiate between sample and population in statistics. | | CO1 | U | 1 |
| 3. | Identify why MongoDB is considered a NoSQL database. | | CO2 | R | 1 |
| 4. | Write a MongoDB query to update the email of a user in the 'users' collection where the username is ‘john\_doe’. | | CO2 | A | 1 |
| 5. | Identify the importance of measures and dimensions in Tableau. | | CO3 | R | 1 |
| 6. | List any four methods of filling missing values in the dataset. | | CO3 | R | 1 |
| 7. | Differentiate between soft clustering and hard clustering. | | CO4 | R | 1 |
| 8. | Define any two evaluation metrics for regression type with its mathematical representation. | | CO4 | R | 1 |
| 9. | Identify the stemmed form of each word in the sentence: 'The cats are running quickly.' | | CO5 | U | 1 |
| 10. | List any four credibility metrics used to determine content credibility. | | CO6 | R | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | A sample mean of 75.2 was obtained from a sample of 40 oranges, with a known population standard deviation of 3.1. Calculate the confidence interval at a 90% confidence level using a critical value of 1.645 | | CO1 | A | 3 |
| 12. | Relate the following SQL table to its equivalent MongoDB format. Provide the MongoDB document representation.   |  |  |  | | --- | --- | --- | | **first\_name** | **last\_name** | **email** | | Joe | Sam | joe@abc.in | | Bob | Michel | bob@abc.in | | | CO2 | A | 3 |
| 13. | Explain the objectives of Exploratory Data Analysis (EDA) and how it helps in understanding data. | | CO3 | U | 3 |
| 14. | Consider a confusion matrix for a model predicting whether patients have a certain disease. The model produced 50 true positives, 30 true negatives, 10 false positives, and 5 false negatives. Calculate the model’s accuracy, precision, and recall based on this confusion matrix. | | CO4 | A | 3 |
| 15. | Differentiate between data mining and text mining. | | CO5 | U | 3 |
| 16. | Describe User-Generated Content (UGC) and its impact with an example. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Using this dataset, calculate the entropy and information gain for the attributes Study Hours, Attendance, and Sleep Hours. Based on these calculations, determine which attribute should be chosen as the root node for building a decision tree to predict whether a student passes the exam. | CO1 | An | 12 |
|  |  |  |  |  |  |
| 18. |  | Apply MongoDB commands to perform the following operations:   1. Create a new database named **BlueSkyUniversity**. 2. Insert a new document into the collection named **students**. 3. Update the GPA of the student with **student\_id S101** to 7.8. 4. Delete the document where **student\_id is S105**. 5. Increase the **credits earned** by the student with **name 'Alice'** by 5. 6. Display the document of the student with **name 'John Doe'**. 7. Show all the collections in the **BlueSkyUniversity** database. 8. Create a new database named **EduTech**. 9. Insert a new document into the collection named **professors**. 10. Update the **tenure** of the professor **Dr. Smith** to 5 years. 11. Delete the document of the professor where **professor\_id is P304**. 12. Increment the **research funding** of the professor **Dr. Lee** by $2,000. | CO2 | A | 12 |
|  |  |  |  |  |  |
| 19. |  | Write the Python library commands to perform the following opertions:   1. Load a CSV file into a pandas DataFrame. 2. Display the last 10 rows of the dataset. 3. Show the data types of each column and the total number of entries. 4. Display the basic statistics (mean, median, standard deviation) of the numerical columns. 5. Extract rows 5 to 10 for the columns "Age" and "Income". 6. Filter and display rows where "Rating" is greater than 4.5 and "Category" is "Electronics". 7. Display the 3rd to 7th rows and the last 4 columns of the DataFrame. 8. Sort the dataset by "Review Count" in ascending order. 9. Show all unique values in the "City" column. 10. Display the shape (number of rows and columns) of the DataFrame. 11. Select rows from index 15 to 20 for the columns "Position" and "Salary". 12. Filter and display rows where "Work Experience" is above 10 years and "Degree" is "PhD". | CO3 | A | 12 |
|  |  |  |  |  |  |
| 20. | a. | Calculate the linear regression model of the form y=a0+a1x and find the mean squared error (MSE) using the data provided below.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | Price(Rs.) | 10 | 12 | 13 | 12 | 16 | 15 | | Amount Demanded | 40 | 38 | 43 | 45 | 37 | 43 | | CO4 | A | 8 |
|  | b. | Describe the dummy variable trap with an example. | CO4 | U | 4 |
|  |  |  |  |  |  |
| 21. | a. | Explain the various steps in text analysis subtask in Natural Language Processing (NLP). | CO5 | U | 8 |
|  | b. | Explain any three major text mining areas in NLP. | CO5 | U | 4 |
|  |  |  |  |  |  |
| 22. | a. | Explain the predictive, descriptive, prescriptive and diagnostic analytics in data analytics. | CO6 | U | 6 |
|  | b. | Describe any two machine learning classification models with an example. | CO6 | U | 6 |
|  |  |  |  |  |  |
| 23. |  | Analyze the given dataset with species information and apply Naive Bayes classification to classify the data based on the provided attributes.    Classify an entity with the following attributes:   * Color = Red * Legs = 2 * Height = Tall * Smelly = No   The goal is to classify whether the entity belongs to species X or Y. | CO4 | An | 12 |
| **COMPULSORY QUESTION** | | | | | |
| 24. | a. | Explain any two linear models and two nonlinear models used in machine learning classification. | CO6 | U | 8 |
|  | b. | Describe how BERT works as a tokenizer and embedder. | CO6 | U | 4 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Understand the data science principles and inference techniques. |
| **CO2** | Analyze the unstructured data for insights and decision-making. |
| **CO3** | Develop expertise in various python libraries for data visualization, and dashboard design principles. |
| **CO4** | Illustrate data science methods for real-world applications. |
| **CO5** | Manage text mining and NLP techniques. |
| **CO6** | Apply cutting-edge technologies for impactful decision-making in diverse domains. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | - | 2 | 3 | 12 | - | - | 17 |
| **CO2** | 1 | - | 16 | - | - | - | 17 |
| **CO3** | 2 | 3 | 12 | - | - | - | 17 |
| **CO4** | 2 | 4 | 11 | 12 | - | - | 29 |
| **CO5** | - | 16 | - | - | - | - | 16 |
| **CO6** | 1 | 27 | - | - | - | - | 28 |
|  | | | | | | | **124** |

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

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| --- | --- | --- | --- |
| **Course Code** | **DATA EXPLORATION AND VISUALIZATION** | **Duration** | **3hrs** |
| **Course Name** | **23DC2028** | **Max. Marks** | **100** |

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| **Q. No.** | **Questions** | | **CO** | **BL** | **M** |
| **PART – A (10 X 1 = 10 MARKS)** | | | | | |
| 1. | What are the steps in Exploratory Data Analysis (EDA)? | | CO1 | U | 1 |
| 2. | Write the importance of EDA. | | CO1 | R | 1 |
| 3. | When and how to use the Line Charts for Visual analysis. | | CO2 | R | 1 |
| 4. | Is Histogram a Bar Chart? Justify. | | CO2 | R | 1 |
| 5. | Write a note on Data Cleaning in EDA. | | CO3 | U | 1 |
| 6. | Why remove NaN values? | | CO3 | R | 1 |
| 7. | What is discretization and binning? | | CO4 | U | 1 |
| 8. | List the types of measures of dispersion. | | CO4 | R | 1 |
| 9. | Show the characteristics of multivariate analysis. | | CO5 | U | 1 |
| 10. | What is TSA in Statsmodel? | | CO6 | U | 1 |
| **PART – B (6 X 3 = 18 MARKS)** | | | | | |
| 11. | State the purpose of Data Aggregation. | | CO1 | An | 3 |
| 12. | Compare EDA with classical and Bayesian Analysis. | | CO2 | U | 3 |
| 13. | Differentiate between Pivot table and cross tabulation. Justify when they are more effective. | | CO3 | An | 3 |
| 14. | Discuss the smoothing techniques for time series. | | CO4 | U | 3 |
| 15. | What are quartiles in EDA? Give example. | | CO5 | An | 3 |
| 16. | Write a note on Groupby Mechanics in Python. List and explain the process steps. | | CO6 | U | 3 |
| **PART – C (6 X 12 = 72 MARKS)**  **(Answer any five Questions from Q. No. 17 to 23, Q. No. 24 is Compulsory)** | | | | | |
| 17. |  | Describe the various transformation techniques in EDA. | CO1 | U | 12 |
|  |  |  |  |  |  |
| 18. |  | Explain how to visualize a three-dimensional function in Python. Explain the same with coding. | CO2 | R | 12 |
|  |  |  |  |  |  |
| 19. |  | Explain the smoothing technique for Time Series data with appropriate example. | CO3 | An | 12 |
|  |  |  |  |  |  |
| 20. |  | Describe Data cleaning with respect to missing data, outlier detection and treatment. | CO4 | A | 12 |
|  |  |  |  |  |  |
| 21. |  | Explain about 10 essential numerical summaries in statistics with appropriate example. | CO5 | R | 12 |
|  |  |  |  |  |  |
| 22. | a. | What is scaling and standardization? | CO3 | U | 2 |
|  | b. | Explain why to standardize a variable with an example. | CO3 | U | 10 |
|  |  |  |  |  |  |
| 23. | a. | Explain TSA analysis. | CO5 | An | 2 |
|  | b. | Describe ARIMA, smooth-based and moving average. | CO5 | An | 10 |
| **COMPULSORY QUESTION** | | | | | |
| 24. |  | Describe various EDA Types and tools used for data analysis. Give example wherever possible. | CO6 | R | 12 |

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

|  |  |
| --- | --- |
|  | **COURSE OUTCOMES** |
| **CO1** | Describe exploratory data analysis fundamentals |
| **CO2** | Explain the appropriate visualization methods |
| **CO3** | Apply data cleaning techniques |
| **CO4** | Illustrate the benefits of data transformation in enhancing data quality and analysis accuracy |
| **CO5** | Examine the statistical concepts of data analysis and interpretation |
| **CO6** | Apply the advanced data analysis techniques and application of statistical methods in real-world scenarios. |

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| **Assessment Pattern as per Bloom’s Level** | | | | | | | |
| **CO / BL** | **R** | **U** | **A** | **An** | **E** | **C** | **Total** |
| **CO1** | 1 | 12+1 |  | 3 |  |  | 17 |
| **CO2** | 12+1 | 3 |  |  |  |  | 16 |
| **CO3** | 1 | 12+1 |  | 12+3 |  |  | 30 |
| **CO4** | 1 | 3+1 | 12 |  |  |  | 17 |
| **CO5** | 12 | 1 |  | 12+3 |  |  | 28 |
| **CO6** | 12 | 3+1 |  |  |  |  | 16 |
|  | | | | | | | **124** |