Reg. No. : .....

6411 Q.P. Code : [21 CSEEC 02]

(For the candidates admitted from 2021 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2022.

First Semester

Computer Science

DATA STRUCTURES AND ALGORITHMS

Time : Three hours Maximum : 50 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer

1. Which one of the following is the property of an algorithm?

(a) Finiteness (b) Design

(c) Testing (d) Documentation

2. The time complexity of O(n) is called as _____.

(a) Quadratic (b) Cubic

(c) logarithmic (d) Linear

3. If the size of the stack is 5 and the user tries to insert 6th element in the stack, then the condition is known as ————.

(a) Underflow (b) Overflow

(c) Recursion (d) Backtracking

4. The ———— principle is used if two elements in the priority queue have the same priority.

(a) Array (b) Heap

(c) FIFO (d) LIFO

5. Number of edges from the root to the node is called ————.

(a) Height (b) Depth

(c) Length (d) Breadth

6. Which one of the following is true about the binary tree?

(a) Minimum number of nodes possible at height h is equal to h+1

(b) Maximum number of nodes possible at height h is equal to h+1

(c) Minimum number of nodes possible at height h is equal to h–1

(d) Minimum number of nodes possible at height h is equal to h

7. The runtime complexity of binary search ————.

(a) O(log N) (b) O(n log N)

(c) O(n) (d) $O(n^2)$

8. Which one of the following is not the way of choosing a pivot element in the context of quick sort?

(a) It can be random

(b) It can be rightmost or leftmost element of the given array

(c) Median element

(d) Mean element

9. Which one of the following in the context of dynamic programming is false?

(a) The top down approach for dynamic programming follows the memorization technique.

(b) The top down approach for dynamic programming follows the tabulation technique.

(c) The bottom up approach for dynamic prrogramming follows the tabulation method.

(d) The two approaches to dynamic programming are top down approach and bottom up approach.

10. _____ algorithmic technique solves problems recursively by building the solution incrementally.

(a) Backtracking

(b) dynamic programming

(c) branch and bound

(d) greedy method

PART B — (5 × 3 = 15 marks)

Answer ALL the questions.

11. (a) How are data structures classified?

Or

(b) List the structure of an algorithm.

12. (a) Outline the applications of stacks.

Or

(b) Summarize the merits and demerits of array implementation of lists.

13. (a) State the applications of binary tree

Or

(b) Write short notes on Topological Sorting.

14. (a) Differentiate between feasible and optimal solution.

Or

(b) State the greedy knapsack problem.

15. (a) State the reason for terminating search path at the current node in branch and bound algorithm.

Or

(b) Write short notes on dynamic programming.

PART C — (5 × 5 = 25 marks)

Answer ALL the questions.

16. (a) List and discuss the steps needed in the development of an algorithm.

Or

(b) State and discuss about the properties of an algorithm.

17. (a) Demonstrate the operations of queue with examples.

Or

(b) Illustrate doubly linked list with examples.

18. (a) Explain AVL tree in detail.

Or

(b) Discuss about B tree and its operations.

19. (a) Demonstrate merge sort with example.

Or

(b) Explain the general principle of greedy method and give its advantages and limitations.

20. (a) Solve sum of subset problem using backtracking technique.

Or

(b) How will you solve travelling salesman problem using dynamic programming? Explain.

Reg. No. : 22CSEE15

6412 Q.P. Code : [21 CSEEC 03]

(For the candidates admitted from 2021 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2022.

First Semester

Computer Science

ADVANCED JAVA PROGRAMMING

Time : Three hours Maximum : 50 marks

SECTION A — (10 × 1 = 10 marks)

Answer ALL questions.

Each question carries 1 mark.

Choose the correct answer.

1. What is the abbreviation of AWT?

(a) Applet Windowing Toolkit

(b) Abstract Windowing Toolkit

(c) Absolute Windowing Toolkit

(d) None of the above

2. Which object can be constructed to show any number of choices in the visible window?

(a) Labels (b) Choice

(c) List (d) Checkbox

3. What are the major components of the JDBC?

(a) DriverManager, Driver, Connection, Statement, and Result Set

(b) DriverManager, Driver, Connection, and Statement

(c) DriverManager, Statement, and ResultSet

(d) DriverManager, Connection, Statement, and ResultSet

4. Thin driver is also known as

(a) Type 3 Driver

(b) Type-2 Driver

(c) Type-4 Driver

(d) Type-1 Driver

5. Ajax stands for ————.

(a) Asynchronous JavaScript and XML

(b) Asynchronous JSON and XML

(c) Asynchronous Java and XML

(d) Asynchronous JavaScript and XML Http Request

6. Which are the main features of XML?

(a) Text data description

(b) Human- and computer-friendly format

(c) Handles data in a tree structure having one- and only one-root element

(d) All Mentioned above

7. Which of the below is not a session tracking method?

(a) URL rewriting (b) History

(c) Cookies (d) SSL sessions

8. What is the maximum size of cookie?

(a) 4 KB

(b) 4 MB

(c) 4 bytes

(d) 40 KB

9. Struts supports which of these model components

(a) JavaBeans (b) EJB

(c) CORBA (d) All mentioned above

10. Which of the following is not a state of object in Hibernate?

(a) Attached () (b) Detached ()

(c) Persistent () (d) Transient ()

SECTION B — (5 × 3 = 15 marks)

Answer ALL questions.

Each question carries 3 marks.

11. (a) Explain MVC pattern in detail.

Or

(b) List the advantages of Java Packages.

12. (a) Write a short notes on the advanced data types available in JDBC.

Or

(b) Explain the layers of RMI Architecture.

13. (a) Classify JavaScript data types in detail.

Or

(b) List out the different ways an HTML element can be accessed in a JavaScript code.

14. (a) Describe Session Tracking. What are the common methods of Session Tracking?

Or

(b) Formulate the steps for creating a cookie using servlet.

15. (a) How XML is different from HTML? Explain.

Or

(b) Illustrate the benefits of using Spring.

SECTION C — (5 × 5 = 25 marks)

Answer ALL the questions. Each question carries 5 marks.

16. (a) Explain the hierarchy of Java Swing classes.

Or

(b) Illustrate in detail about Java Button with example program.

17. (a) Design the RMI architecture with example diagram.

Or

(b) Analyze the RMI applications of client and server side development with example code.

18. (a) Elaborate the types of Bean Properties.

Or

(b) Explain the syntax for XML documents.

19. (a) Point out the life cycle of a Servlet in detail.

Or

(b) Formulate Servlet input stream and Servlet output stream classes.

20. (a) Demonstrate about Hibernate architecture with necessary diagram.

Or

(b) Elaborate Spring framework with necessary diagram in detail.

Reg. No. : .....

6413 **Q.P. Code : [21 CSEEC 04]**

(For the candidates admitted from 2021 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2022.

First Semester

Computer Science

PYTHON PROGRAMMING

Time : Three hours Maximum : 50 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer

1. Which one of the following used to define a block of code in Python?

   (a) Brackets (b) Keywords

   (c) Indentation (d) Argument

2. ———— is called as Python identifier.

   (a) Variable (b) Function

   (c) Class (d) All of the above

3. Which of the following function is a built-in function in python?

(a) val()

(b) print()

(c) try()

(d) None of the above

4. Tuple is a collections of ———— in python.

(a) Class

(b) Object

(c) Method

(d) Function

5. A namespace is a ———— of variable name.

(a) dictionary (b) method

(c) keyword (d) class

6. The term module refers to ———— and ———— of specific functionality to be incorporated into a program.

(a) design and implementation

(b) documentation and design

(c) variable and string

(d) class and object

7. Which of the following keyword is used for context management

(a) assert (b) with

(c) raise (d) def

8. ———— is a sequence of meta characters.

(a) Regex

(b) Index

(c) Table

(d) Data type

9. ———— acts as a layout manager in tkinter.

(a) pack()

(b) grid()

(c) place()

(d) All of the above

10. Give the acronym of ORM

(a) Object Relational Manger

(b) Object Resource Manager

(c) Object Replace Manager

(d) Object Relational Mapping

PART B — (5 × 3 = 15 marks)

Answer ALL questions.

11. (a) Write a program that swap the value of two variables a and b without using another variable.

Or

(b) Explain the string conversion function.

12. (a) Write the features of tuple.

Or

(b) Explain about lists in python.

13. (a) What is inheritance? Give example to create a parent class.

Or

(b) Summarize Namespace with suitable examples.

14. (a) Differentiate Exception and Syntax error in python.

Or

(b) What is the role of Regexes in python, give examples?

15. (a) Summarize the Global interpreter lock.

Or

(b) Write a python code to connect to an existing database.

PART C — (5 × 5 = 25 marks)

Answer ALL questions.

16. (a) Write a Python Program to concatenate two strings without using methods.

Or

(b) List some common operations for the sequence type object with example.

17. (a) Explain mapping type operator.

Or

(b) Write the program to illustrate conditional statement.

18. (a) Discuss Object Oriented Programming in Python.

Or

(b) Write a python script for adding two numbers using command line arguments.

19. (a) Explain Context Management in detail.

Or

(b) Write a simple Client program to open a connection for a given port address 12345.

20. (a) Discuss thread and process elaborately.

Or

(b) Create a program to evaluate GUI application using Tkinter package.

Reg. No. : 22CSEE15

6408 **Q.P. Code : [21 CSEEE 01/ 22 CSEEC 01]**

(For the candidates admitted from 2021 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2022.

First Semester

Computer Science

Core/Elective — MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Time : Three hours Maximum : 50 marks

SECTION A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Find the Eigenvalues of matrix $A = \begin{bmatrix} 4 & 1 \\ 1 & 4 \end{bmatrix}$.

(a) 3, 5 (b) −2, 3

(c) 2, −3 (d) 3, −5

2. What is the determinant of the matrix $\begin{bmatrix} A & A & A \\ A & A & A \\ A & A & A \end{bmatrix}$?

(a) 0 (b) A

(c) A^3 (d) None of the above

3. If $P(A) = 0.7$, $P(B) = 0.5$ and $P(A/B) = 0.3$, find (i) $P(A/B)$ (ii) $P(A \cup B)$?

(a) 0.21, 0.98 respectively

(b) 0.14, 0.99 respectively

(c) 0.14, 0.98 respectively

(d) 0.42, 0.99 respectively

4. Which of the following is/are correct?

(i) A and B be two sets containing four and two elements.

(ii) Let R be the relation on the set of all real numbers defined by aRb if and only if $|a - b| \leq 1$, the R is symmetric

(a) (i) only

(b) (ii) only

(c) Both (i) and (ii)

(d) Neither (i) nor (ii)

5. CFG for a*

(a) $S \rightarrow aS \mid a \mid \in$

(b) $S \rightarrow aS \mid b$

(c) $S \rightarrow aS \mid a$

(d) None of these

6. Transition function maps.

(a) $\Sigma * Q- > \Sigma$ (b) $Q * Q- > \Sigma$

(c) $\Sigma * \Sigma- > Q$ (d) $Q * \Sigma- > Q$

7. Which of the following are tautologies?

(a) $((P \vee Q) \wedge Q) \leftrightarrow Q$

(b) $((P \vee Q) \wedge \neg P) \rightarrow Q$

(c) $((P \vee Q) \wedge P) \rightarrow P$

(d) Both (a) and (b)

8. $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ is equivalent to

(a) $S \wedge R$ (b) $S \rightarrow R$

(c) $S \vee R$ (d) All of above

9. Rate of convergence of the Newton-Raphson method is generally

(a) Linear (b) Quadratic

(c) Super-linear (d) Cubic

10. Torque exerted on a flywheel over a cele is listed in the table. Find the flywheel energy using Simpson 1/3 rule

Angle (degree) :	0	60	120	180	240	300	360
Toruque (Nm) :	0	1066	–323	0	323	–355	0

(a) 542 (b) 993

(c) 1444 (d) 1986

SECTION B — (5 × 3 = 15 marks)

Answer ALL questions.

11. (a) The Cartesian product $A \times A$ has 9 elements among which are found (–1, 0) and (0,1). Find the set A and the remaining elements of $A \times A$.

Or

(b) Evaluate det (A) by cofactor expansion along the first column of A. $A = \begin{bmatrix} 3 & 1 & 0 \\ -2 & -4 & 3 \\ 5 & 4 & -2 \end{bmatrix}$.

12. (a) State Axioms of Probability

Or

(b) On tossing a fair coin three times:

(i) What is the probability of three heads, HHH?

(ii) Given that you have observed at least one heads, what is the probability that you observe at least two heads?

13. (a) Let G = ({S,C},{a,b}, P,S) where P consists of S→aCa, C→aCa / b. Find L(G).

Or

(b) Find the grammars for Σ = {a,b} that generate the sets of

(i) all strings with exactly one 'a'.

(ii) all strings with at least one 'a'.

14. (a) Show that $Q \vee (P \wedge \neg Q) \vee (\neg P \wedge \neg Q)$ is a tautology

Or

(b) Construct truth table for the following formulae

(i) $(\neg(P \rightarrow (Q \wedge P)))$

(ii) $(\neg P \wedge \neg Q)$.

15. (a) Use bisection method to obtain the smallest positive root of the equation $f(x) = x^3 - 5x + 1 = 0$.

Or

(b) Find the root for the continuous function $f(x) = x^3 - x - 1$, on the interval [1, 2] using false position method.

SECTION C — (5 × 5 = 25 marks)

Answer ALL questions.

16. (a) Find the inverse of the following matrix using Adjoin method $\begin{bmatrix} 2 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & -1 & 2 \end{bmatrix}$.

Or

(b) By the principle of mathematical induction, prove that, for $n \geq 1$ $1^3 + 2^3 + 3^3 \ldots + n^3 = [n(n+1)/2]^2$.

17. (a) State and explain Bayes Theorem.

Or

(b) Calculate the coefficient of correlation between X and Y for the following

X:	1	3	4	5	7	8	10
Y:	2	6	8	10	14	16	20

18. (a) Find a deterministic finite Automata equivalent to M $(\{q_0,q_1,q_2\}, \{0,1\}, \delta, q_0, \{q_2\})$ where δ is given by

State/Σ	0	1
q_0	q_0, q_1	q_1
q_1	q_0	q_1
q_2	–	–

Or

(b) Construct a DFA which accepts all strings over $\Sigma = \{0, 1\}$ ending with 00.

19. (a) Write down any four formulas for Equivalent in mathematical logic.

Or

(b) Prove that $(P \rightarrow Q) \leftrightarrow (\neg P \vee Q)$.

20. (a) Use Gaussian elimination to find the solution for the given system of equations.

$3x + y - z = 1$

$x - y + z = -3$

$2x + y + z = 0$

Or

(b) Solve Equations $2x + y + z = 5$, $3x + 5y + 2z = 15$, $2x + y + 4z = 8$ using Gauss Seidel method.

———————

Reg. No. : 22CSEE15

6414 **Q.P. Code : [22 CSEEE 01/ 22 CSEDE 01]**

(For the candidates admitted from 2022 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2022.

First Semester

Computer Science/Data Science

Elective – ARTIFICIAL INTELLIGENCE

Time : Three hours Maximum : 50 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.
Choose the correct answer.

1. _____ to adapt to new circumstances and to detect and extrapolate patterns.

   (a) Machine learning

   (b) Knowledge representation

   (c) Natural language processing

   (d) Artificial intelligence

2. Internally, the agent function for an artificial agent will be implemented by an _____.

(a) agent program (b) agent evaluation

(c) agent function (d) agent method

3. What game theorists call deterministic, turn-taking, two-player, zero-sum games of imperfect information such as _____.

(a) chess (b) bridge

(c) go (d) 8 - puzzle

4. Recall that the wumpus agent receives a percept vector with _____ elements.

(a) five (b) four

(c) two (d) three

5. Probability provides a way of summarizing the _____ that comes from our laziness and ignorance, thereby solving the qualification problem.

(a) unification (b) uncertainty

(c) reasoning (d) planning

6. A system is _____ if the transition model cannot be described as a matrix multiplication of the state vector.

(a) Kalman filtering (b) linear Gaussian

(c) nonlinear (d) linear

7. _____ Artificial Intelligence scenario is a technique or strategy, tells us about which rule has to be applied next while searching for the solution of a problem within problem space.

(a) Control Strategy

(b) Production system

(c) Planning

(d) Partial Order Planning

8. _____ is an approach to automated planning that maintains a partial ordering between actions and only commits ordering between actions when forced to that is, ordering of actions is partial.

(a) Planning

(b) Partial-order planning

(c) Planning Graphs

(d) Rete Algorithm

9. MYCIN: This was one of the earliest expert systems that were based on _____.

(a) backward chaining

(b) forward chaining

(c) knowledge base

(d) knowledge acquisition system

10. An expert system is a computer program that is designed to solve complex problems and to provide decision-making ability like a _____.

(a) human expert

(b) knowledge base

(c) knowledge expert

(d) extracting knowledge

PART B — (5 × 3 = 15 marks)

Answer ALL questions.

11. (a) What is Artificial Intelligence?

Or

(b) Describe the heuristic functions.

12. (a) Define the game theory in games.

Or

(b) Explain about Knowledge Engineering in First Order Logic.

13. (a) Define the Unification.

Or

(b) Explain the dynamic Bayesian network.

14. (a) Evaluate a Production System in Artificial Intelligence.

Or

(b) Define by STRIPS in AI?

15. (a) What are advantages of expert system?

Or

(b) What are MYCIN and DART in expert system of AI?

PART C — (5 × 5 = 25 marks)

Answer ALL questions.

16. (a) Demonstrate the foundations of artificial intelligence?

Or

(b) Describe the structure of agents.

17. (a) Differentiate the Alpha Beta pruning.

Or

(b) Distinguish the Syntax and Semantics of First-Order Logic.

18. (a) Explain the forward-chaining and backward chaining algorithms.

Or

(b) Distinguish the approximate inference in Bayesian Network.

19. (a) What is Rete algorithm in artificial intelligence?

Or

(b) Discuss about the Planning Graphs.

20. (a) Discuss about the architecture of expert system?

Or

(b) How would a typical expert system be used?

Reg. No. : .....

6180 **Q.P. Code : [21 EIGS 02]**

(For the candidates admitted from 2021 onwards)

M.Sc. DEGREE EXAMINATION, DECEMBER 2022.

I Third Semester

Electronics and Instrumentation

Supportive — DIGITAL ELECTRONICS AND MICROPROCESSOR

Time : Two hours Maximum : 25 marks

SECTION A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer

1. The three fundamental gates are

(a) AND, NAND, XOR

(b) OR, AND, NAND

(c) NOT, NOR, XOR

(d) NOT, OR, AND

2. Which of following are known as universal gates ————

(a) NAND and NOR

(b) AND and OR

(c) EX-OR and OR

(d) EX-OR and NOR

3. A logic circuit which performs addition of two bits is called the ————

(a) Half Adder

(b) Half Subtractor

(c) Full Adder

(d) Multiplexer

4. The gates required to build a half adder are ————

(a) EX-OR gate and NOR gate

(b) EX-OR gate and OR gate

(c) EX-OR gate and AND gate

(d) Four NAND gates.

5. The decimal equivalent of $(1100)_2$ is ————

(a) 12 (b) 16

(c) 18 (d) 20

6. BCD Code has always ———— bits per number

(a) 2 (b) 4

(c) 8 (d) 10

7. The decimal equivalent of Binary number 10101 is

(a) 21 (b) 31

(c) 26 (d) 28

8. The circuits in the 8085A that provide the arithmetic and logic functions are called the

(a) CPU (b) ALU

(c) I/O (d) BUS

9. How many bits are used in the data bus?

(a) 6 (b) 8

(c) 9 (d) 16

10. A 8086 was designed by ————

(a) Intel (b) Phillips

(c) Hexagon (d) AD

SECTION B — ($5 \times 3 = 15$ marks)

Answer ALL questions.

11. (a) What are the function of AND gate with truth table?

Or

(b) Write a short note on Ex-OR gate.

12. (a) Draw and explain the function of Half Adder.

Or

(b) List out the application of shift registers.

13. (a) Summaries about the timing and control signals of 8085.

Or

(b) What are the types of addressing modes in 8085?

14. (a) Name the buses available in 8085 architecture. Why is the data bus bidirectional?

Or

(b) Describe the operation of Bus timings in 8085 microprocessors.

15. (a) Write shorts notes on ARM processor.

Or

(b) What is the function of 8086?
