Printed Page:-04

Subject Code: BMICA0104

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

MCA

SEM: I - THEORY EXAMINATION (2024 - 2025)

Subject: Problem Solving and Algorithmic Thinking

Time: 3 Hours Max. Marks: 100

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.

2. Maximum marks for each question are indicated on right -hand side of each question.

3. Illustrate your answers with neat sketches wherever necessary.

4. Assume suitable data if necessary.

5. Preferably, write the answers in sequential order.

6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A 20

1. Attempt all parts:-

1-a. for (int i = 1 , j = 2 ; j <= 7 ; j++) will this statement execute? (CO1, K1) 1

(a) Yes

(b) No

(c) Compile Time Error

(d) Runtime Error

1-b. If you have to make decision based on multiple choices, which of the following is best suited? (CO1, K1) 1

(a) if

(b) if-else

(c) if-elseif

(d) All of the above

1-c. A conditional is symbolized like this _____ (CO2, K1) 1

(a) p v q

(b) p --> q

(c) p * q

(d) p & q

1-d. The four logical connectives are (CO2, K1) 1

(a) Conjunctions, conditionals, compounds, and disjunctions

(b) Conjunctions, statements, disjuncts, and conditionals

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(c) Conditionals, disjunctions, negations, and conjunctions

(d) Conjuncts, disjuncts, conditionals, and positive

1-e. What is the field of Natural Language Processing (NLP)? (CO3, K1) 1

(a) Computer Science

(b) Artificial Intelligence

(c) Linguistics

(d) All of the mentioned

1-f. What is the worst case complexity of bubble sort? (CO3, K1) 1

(a) O(n log n)

(b) O(n2)

(c) O(n2 log n)

(d) O(n log n2)

1-g. Which of the following case does not exist in complexity theory? (CO4, K1) 1

(a) Best case

(b) Worst case

(c) Average case

(d) Null case

1-h. _____ is the formal way to express the upper bound of an algorithm's running time.(CO4, K1) 1

(a) . Omega Notation

(b) Theta Notation

(c) Big Oh Notation

(d) All of the above

1-i. If same message is passed to objects of several different classes and all of those can respond in a different way, what is this feature called? (CO5, K1) 1

(a) Inheritance

(b) Overloading

(c) Polymorphism

(d) Overriding

1-j. Encapsulation helps in (CO5, K1) 1

(a) Information hiding

(b) In providing low coupling

(c) In providing high cohesion

(d) All the above

2. Attempt all parts:-

2.a. What is the purpose of an if-else statement in programming? (CO1, K2) 2

2.b. Explain is algorithmic thinking? (CO2, K2) 2

2.c. Recursive and Iterative Binary Search: Which one is more efficient and why? 2

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	(CO3, K2)	
2.d.	Define order of growth.(CO4, K1)	2
2.e.	Define methods in OOPs? (CO5, K1)	2
SECTION-B		30
3. Answer any five of the following:-		
3-a.	Differentiate between data and information? How is data transformed into information? (CO1, K3)	6
3-b.	What is an algorithm? Explain with suitable example. (CO1, K2)	6
3-c.	How does modularization relate to algorithmic and computational thinking? (CO2,K2)	6
3-d.	Explain selection sort with appropriate example. (CO2, K2)	6
3.e.	Differentiate between Selection sort and Insertion sort. (CO3, K3)	6
3.f.	Explain asymptotic notations and its properties with example. (CO4, K2)	6
3.g.	Write the disadvantages of Abstraction. (CO5, K1)	6
SECTION-C		50
4. Answer any one of the following:-		
4-a.	Demonstrate multiple conditions in a single selection statement with example? (CO1, K3)	10
4-b.	What is a selection in programming and why is it used? How does a conditional statement work in programming? (CO1, K3)	10
5. Answer any one of the following:-		
5-a.	Explain the importance of data organization in computer. Mention some examples of data organization. (CO2, K2)	10
5-b.	Illustrate conditional logical operator with the help of truth table. (CO2, K2)	10
6. Answer any one of the following:-		
6-a.	Distinguish between linear search algorithm with binary search algorithm. (CO3, K4)	10
6-b.	Apply insertion sort on the following elements 3, 1, 4,7,5,9,2,6,5,10 (CO3, K3)	10
7. Answer any one of the following:-		
7-a.	Derive the best, worst and average case complexity of Merge sort technique. (CO4, K3)	10
7-b.	Derive the worst case complexity of the Selection sort algorithm. (CO4, K3)	10
8. Answer any one of the following:-		
8-a.	Explain the advantages of using OOPs? Elaborate its applications. (CO5, K2)	10
8-b.	Explain the application of Object oriented programming. (CO5, K2)	10

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