



Register Number:

DATE:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
M.Sc. (BIG DATA ANALYTICS) – I SEMESTER
SEMESTER EXAMINATION: OCTOBER 2021
(Examination conducted in January-March 2022)
BDA 1421: COMPUTING FOR DATA SCIENCE

TIME 2.5 HOURS

MAXIMUM MARKS 70

This Question Paper Contains FOUR Printed Papers and THREE Parts

PART A

Answer ALL questions (MCQs)

20 X 1 = 20

1. What will be the output of the following C code?

```
#include <stdio.h>
void main()
{
    int x = 5;
    if (x < 1);
    printf("Hello");
}
```

- i) Nothing
 - ii) Run time error
 - iii) Hello
2. Which keyword is used to come out of a loop only for that iteration?
- i) Break
 - ii) Continue
 - iii) Return
3. R language is superficially similar with _____
- i) C
 - ii) SAS
 - iii) Python
4. Packages are useful in collecting sets into a _____ unit ?
- i) Single
 - ii) Multiple
5. What is the best case for linear search?
- i) $O(n \log n)$
 - ii) $O(\log n)$
 - iii) $O(n)$
 - iv) $O(1)$

6. Which of the following is a disadvantage of linear search?
 - i) Requires more space
 - ii) Greater time complexities compared to other searching algorithms
 - iii) Not easy to understand
 - iv) Not easy to implemen
7. What is the worst case complexity of binary search using recursion?
 - i) $O(n \log n)$
 - ii) $O(\log n)$
 - iii) $O(n)$
 - iv) $O(n^2)$
8. Which of the following is not an application of binary search?
 - i) To find the lower/upper bound in an ordered sequence
 - ii) Union of intervals
 - iii) Debugging
 - iv) To search in unordered list

i) Given an array $arr = \{45, 77, 89, 90, 94, 99, 100\}$ and $key = 100$; What are the mid
Decreasing sorting order
9. Values(corresponding array elements) generated in the first and second iterations?
 - i) 90 and 99
 - ii) 90 and 100
 - iii) 89 and 94
 - iv) 94 and 99
10. What is an internal sorting algorithm?
 - i) Algorithm that uses tape or disk during the sort
 - ii) Algorithm that uses main memory during the sort
 - iii) Algorithm that involves swapping
 - iv) Algorithm that are considered 'in place'
11. Any algorithm that sorts by exchanging adjacent elements require $O(N^2)$ on average.
 - i) True
 - ii) False
12. On which algorithm is heap sort based on?
 - i) Fibonacci heap
 - ii) Binary tree
 - iii) Priority queue
 - iv) FIFO
13. In heap sort, after deleting the last minimum element, the array will contain elements in?
 - ii) Increasing sorting order
 - iii) Tree inorder
 - iv) Tree preorder
14. Merge sort uses which of the following technique to implement sorting?
 - i) Backtracking
 - ii) Greedy algorithm
 - iii) Divide and conquer
 - iv) Dynamic programming

15. If a function is real and continuous in the region from a to b and $f(a)$ and $f(b)$ have opposite signs then there is no real root between a and b.
- True
 - False
16. Rate of convergence of the Newton-Raphson method is generally _____
- Linear
 - Quadratic
 - Super-linear
 - Cubic
17. Gradient Descent is an optimization algorithm used for
- Certain Changes in algorithm
 - Minimizing the cost function in various machine learning algorithms
 - Maximizing the cost function in various machine learning algorithms
 - Remaining same the cost function in various machine learning algorithms
18. Gradient Descent is used in _____
- Data Science and Machine Learning
 - Machine Learning and Deep Learning
 - Machine Learning and Artificial Intelligence
 - Deep Learning and Artificial Intelligence
19. How many important characteristics of Monte-Carlo method?
- 2
 - 3
 - 4
 - 5
20. Which of the following are Advantages Monte Carlo Simulation?
- Easy to implement
 - Provides statistical sampling for numerical experiments using the computer
 - Provides approximate solution to mathematical problems.
 - All of the above

PART B

Answer ANY SIX questions

6 X 5 = 30

- Write an algorithm to find the sum of a series – $1.2 + 2.3 + 3.4 + 4.5 + \dots$ upto 10 terms.
- When do we prefer to use binary search? What are the advantages of linear search?
- Write the bubble sort algorithm.
- Using Insertion sort Algorithm, arrange the given sequence of number in an ascending order – 10,23,8,6,4,9,16
- Heapify (Max Heap) the given sequence of numbers – 12,10,9,21,32,56,28,74,12,64.
- Find the first two approximation of the root the equation $x^2 + 3x - 5$ in $[1,2]$ using Bisection method

27. Find the gradient(first 3 steps) for the function $x^2 - 4x + 1 = 0$, considering learning rate as 0.1 and starting point as $x=9$.
28. Find the Random Numbers with $x_0 = 79$, $N = 100$, $P_1 = 263$, and $P_2 = 71$

PART C

Answer ANY TWO questions

2 X 10 = 20

29. Explain Merge sort with an example.
30. Solve $2x^3 - 2.5x - 5 = 0$ for the root in $[1, 2]$ by Newton-Raphson method.
31. For a particular shop, the daily demand of an item with associated probabilities is given below:

Daily Demand	0	10	20	30	40	50
Probability	0.01	0.20	0.15	0.50	0.12	0.02

If random number stream $(X_1, X_2, \dots, X_{10})$ is generated using linear congruential generator $(X_i = a \cdot X_{i-1} + c) \bmod m$ with $X_0 = 27$, $a = 17$, $c = 4$, and $m = 100$, find the average daily demand for the first ten days.