EXAMINATION PAPER

FACULTY	**:**	**COMPUTER SCIENCE AND MULTIMEDIA**		
COURSE	**:**	**BACHELOR OF INFORMATION TECHNOLOGY (Hons)**		
YEAR/ SEMESTER	**:**	**SECOND YEAR / SEMESTER THREE**		
MODULE TITLE	**:**	**DATA STRUCTURE & ALGORITHM**		
CODE	**:**	**BIT 234**		
DATE	**:**	**24 – APRIL, 2019, WEDNESDAY**		
TIME ALLOWED	**:**	**3 HOURS**		
START	**:**	**1:00 PM**	**FINISH**	**: 4:00 PM**

Instruction to candidates

1. This question paper has THREE (3) Sections.
2. Answer **ALL** questions in Section A, MCQ.
3. Answer **5** questions in Section B, MSAQ.
4. Answer **2** questions in Section C, MEQ.
5. No scripts or answer sheets are to be taken out of the Examination Hall.
6. For Section A, answer in the OMR form provided.

Do not open this question paper until instructed

(Candidates are required to give their answers in their own words as far as practicable)

SECTION A

Multiple Choice Questions **(30*1=30)**

1. **When new data are to be inserted into a data structure, but there is no available space; this situation is usually called:**
    a. Underflow
    b. Overflow
    c. House full
    d. Saturated

2. **A graph is collection of node, called _____ and line segments called _____.**
    a. vertices, edges
    b. edges, vertices
    c. vertices, path
    d. none of the above

3. **Any node in path from root to node is called:**
    a. Successor node
    b. Ancestor node
    c. Internal node
    d. None of the above

4. **The combination of _____ and algorithm is considered as program.**
    a. flowchart
    b. pseudo code
    c. data structure
    d. all of the above

5. **The efficiency of algorithm is measured in _____ .**
    a. time complexity
    b. space complexity
    c. both of the above
    d. none of the above

6. **Which of the following best describes an array?**
    a. A data structure that shows a hierarchical behavior
    b. Container of objects of similar types
    c. Container of objects of mixed types
    d. All of the above

7. **Process of inserting an element in stack is called _____ .**
    a. create
    b. push
    c. evaluation
    d. pop

8. In a stack, if a user tries to remove an element from empty stack it is called _____ .

a. underflow
b. empty collection
c. overflow
d. garbage collection

9. What is the value of the postfix expression 6 3 2 4 + – *:

a. 10
b. 15
c. 18
d. 20

10. The postfix form of A*B+C/D is:

a. *AB/CD+
b. AB*CD/+
c. A*BC+/D
d. ABCD+/*

11. Which of the following sorting algorithms can be used to sort a random linked list with minimum time complexity?

a. Insertion Sort
b. Quick Sort
c. Heap Sort
d. Merge Sort

12. What would be the asymptotic time complexity to find an element in the linked list?

a. O(1)
b. O(n)
c. O(n2)
d. None of the above

13. Which of the following is a non-linear data-structure?

a. Arrays
b. Queues
c. Linked-lists
d. Tree

14. The no of external nodes in a full binary tree with n internal nodes is:

a. n
b. n+1
c. 2n
d. 2n + 1

15. The Disadvantage of using array representation for binary trees is:

a. Difficulty in knowing children nodes of a node
b. Difficult in finding the parent of a node
c. Have to know the maximum number of nodes possible before creation of trees
d. Difficult to implement

16. Which of the following points is/are true about Linked List data structure when it is compared with array?

a. Arrays have better cache locality that can make them better in terms of performance.
b. It is easy to insert and delete elements in Linked List
c. Random access is not allowed in a typical implementation of Linked Lists
d. All of the above

17. Which of the following statement about binary tree is CORRECT?

a. Every binary tree is either complete or full
b. Every complete binary tree is also a full binary tree
c. Every full binary tree is also a complete binary tree
d. A binary tree cannot be both complete and full

18. Which type of traversal of binary search tree outputs the value in sorted order?

a. Pre-order
b. In-order
c. Post-order
d. None of the above

19. The number of edges from the root to the node is called _____ of the tree.

a. height
b. depth
c. length
d. none of the above

20. A connected planar graph having 6 vertices, 7 edges contains _____ regions.

a. 15
b. 1
c. 3
d. 11

21. For a given graph G having v vertices and e edges which is connected and has no cycles, which of the following statements is TRUE?

a. v = e+1
b. v=e
c. v + 1 = e
d. None of the above

22. In linked list each node contain minimum of two fields. One field is data field to store the data second field is:

a. Pointer to character
b. Pointer to integer
c. Pointer to node
d. Node

23. A graph with all vertices having equal degree is known as a _____ .

a. multi graph
b. regular graph
c. simple graph
d. complete graph

24. What is the worst case complexity of bubble sort?

a. O(nlogn)
b. O(logn)
c. O(n)
d. O(n2)

25. Which of the following is NOT true about QuickSort?

a. In-place algorithm
b. Adaptive sorting algorithm
c. Can be implemented as a stable sort
d. Pivot position can be changed

26. The Data structure used in standard implementation of Breadth First Search is:

a. Stack
b. Queue
c. Linked List
d. None of the above

27. In an order traversal of a binary tree, the root node is visited:

a. After the traversal of right and left subtrees
b. Before the traversal of right & left subtrees
c. In-between the traversal of left and right subtrees
d. None of the above

28. The complexity of linear search algorithm is:

a. O(n)
b. O(log n)
c. $O(n^2)$
d. O(n log n)

29. The given expression AB+ is in the form of:

a. Infix
b. Postfix
c. Prefix
d. None of the above

30. Links between the pair vertices in the graph is called as :

a. Line
b. Edge
c. Corner
d. Node

SECTION B
Short Answer Questions
Attempt any five (5) questions out of eight (8) questions (5*6=30)

1. Discuss Link list with its type.

2. Construct a binary tree for which in – order and pre-order traversals are as follows
In- order D B E A F C G
Pre- order A B D E C F G

3. Explain the concept of recursion giving an example of Fibonacci series.

4. Define tower of Hanoi with its algorithm.

5. Differentiate between singly and doubly circular link list.

6. Write an algorithm that perform bubble sort. How is bubble sort different from selection sort? (3+3)

7. Write to convert prefix expression to an infix and algorithm expression using stack. Given this prefix expression **+AB - + CDEF Use your algorithm to convert it into infix expression. (3+3)

8. Explain queue with an example. Discuss en queue and de queue.(2+4)

SECTION C
Long Answer Questions
Attempt any two (2) questions out of three (3) questions (2*20=40)

1. Trace the following infix to postfix expression.
A$B*C-D+E/F(G+H)
Evaluate the postfix expression acquired from above for the given values:
A=6, B= 2 , C=5 ,D=1 ,E= 4, F=4 , G= 2 ,H = 3

2. What is graph traversal? Write BFS and DFS algorithm and trace the algorithms with example. Briefly explain difference between selection and insertion sort. (2+8+10)

3. Explain in order, post order and preorder with suitable example. List the application of stack. Why linked list is suitable for programming while implementing other data structures such as queue, stack etc. ? (9+3+8)

******BEST OF LUCK******