K15U 0121

Reg. No. : .....

Name : .....

III Semester B.Sc. Degree (CCSS – Supple./Imp.) Examination, November 2015

GENERAL COURSE IN COMPUTER SCIENCE/COMPUTER APPLICATION

3A14CSC/BCA : Methodology of Computer Science

(2013 and Earlier Admissions)

Time : 3 Hours Max. Weightage : 21

Instructions : 1) Section – ***A*** : Answer ***all*** questions.
2) Section – ***B*** : Answer ***any five*** questions.
3) Section – ***C*** : Answer ***any five*** questions.
4) Section – ***D*** : Answer ***any one*** question.

SECTION – A

Answer **all** questions. Bunch weightage **1** :

1. The postfix expression of A + B * (C + D)/F + D*E
   a) AB + CD + *F/D + E*
   b) ABCD + *F/+DE* +
   c) A*B + CD/F* DE**
   d) A+ *BCD/F*DE + +

2. Maximum number of nodes at level 'r' of a Binary tree is
   a) 2^r b) 2^{r-1} c) 2^r-1 d) 2^{r+1}

3. An algorithm is made up of two modules M1 and M2. If the order of M1 is f(n) and M2 is g(n) then the ordered of the algorithm is
   a) min (f(n), g(n)) b) avg (f(n), g(n))
   c) max (f(n), g(n)) d) None of these

4. Algorithms which maintain the relative order of records with equal keys are called
   a) Consistent b) Stable
   c) External d) Internal

P.T.O.

5. Time complexity of merge sort in worst case is
   a) O(n)
   b) $O(n^2)$
   c) O(n log n)
   d) O(long n)

6. Algorithms which use no additional storage
   a) Internal
   b) Inplace
   c) Stable
   d) External

7. A strictly binary tree with 10 leaves
   a) Cannot have more than 19 nodes
   b) Has exactly 19 nodes
   c) Has exactly 17 nodes
   d) Cannot have more than 17 nodes

8. What is the relationship between f(n) and g(n) if there exists positive constants c and n_o such that $f(n) \geq c\ g(n)$, for all n $n \geq n_o$?
   a) f(n) = o(g(n))
   b) g(n) = o(f(n))
   c) $f(n) = \Omega(g(n))$
   d) $g(n) = \Omega(f(n))$

(2×1=2)

SECTION – B

Answer **any five** questions. Weightage **1 each**:

9. Define algorithm. What are its characteristics ?

10. Define "Theta".

11. Define linked lists.

12. Explain row major arrangement of arrays.

13. Explain linked representation of sparse matrix.

14. Explain the limitations of arrays.

15. What is space complexity ?

16. Prove that f(n) = o(g(n)) where f(n) = 7n $g(n) = n/10$.

(5×1=5)

SECTION – C

Answer **any five**. Weightage **2 each** :

17. Show the various passes of Bubble sort on the unsorted list : 11, 15, 2, 13, 6.

18. Write a procedure to insert a node into a linked list at a specific position.

19. Write down the algorithm for quicksort.

20. Write down the selection sort algorithm. Analyse its best-case behaviour.

21. What are circular queues ? Write down the algorithms for inserting and deleting elements from a circular queue. Implemented using arrays.

22. Write down the pseudo code for Huffman algorithm.

23. Write a procedure to reverse a singly linked list.

24. Describe the binary search technique. What is the maximum number of key comparisons in binary search ? **(5×2=10)**

SECTION – D

Answer **any one**. Weightage **4** :

25. What are the applications of Stack ? Also write algorithms to implement that.

26. A binary tree has 9 nodes. The inorder and pre-order traversals of the tree are given below :

    Inorder : E A C K F H D B G

    Pre-order : F A E K C D H G B.

    Draw the tree. Also write down the algorithm to construct the tree. **(1×4=4)**
