

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MCA
BRANCH: MCA

SEMESTER : II/BL
SESSION : SP/2014

TIME: 3 HOURS

SUBJECT: MCA2001 DATA STRUCTURES

FULL MARKS: 60

INSTRUCTIONS:

1. The question paper contains 7 questions each of 12 marks and total 84 marks.
 2. Candidates may attempt any 5 questions maximum of 60 marks.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Steam Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
-

Q.1(a) Explain in brief a Model for an Abstract Data type. Explain with an example a difference between Function subalgorithms and procedure subalgorithms. [5]

(b) What do you mean by Big-O notation, Big- Ω notation, Big- θ Notation? Determine the time complexity of the given program fragment: [6]

- (i) $i = 2n$
- (ii) for $j = 1$ to i
- (iii) for $k = 3$ to j
- (iv) $m = m + 1$;
- (v) end
- (vi) end.

Q.2(a) Explain the difference between a circular linked list and a singly linked list. [5]

(b) Specify the use of a header node in a header linked list. Write an algorithm to Merge two linked list. [7]

Q.3(a) What do you mean by the term push, pop and peep operations. Convert the following infix expression into its post fix using the algorithm to convert infix notation to post fix: [6]

$$A - (B/C + (D \% E * F) / G) * H$$

(b) Explain how circular Queue is better than a linear Queue? Also discuss the array representation of a priority Queue? [6]

Q.4(a) How to analyze recursive programs? Solve the recurrence relation for the tower of Hanoi puzzle? [5]

(b) What do you mean by 2-tree? Suppose A, B, C, D, E, F, G and H are 8 data items, and suppose they are assigned weights as follows: [7]

Data Items	:	A	B	C	D	E	F	G	H
Weight	:	22	5	11	19	2	11	25	5

Construct a tree T with minimum-weighted path length using the above data and Huffman's algorithm.

Q.5(a) Explain how to represent Binary trees in a computer memory? Create a binary search tree using the following data elements: [6]

45, 39, 56, 12, 34, 78, 32, 10, 89, 54, 67, 81

(b) Explain how is an AVC tree better than a binary search tree? [6]

Q.6(a) Compare B-trees with B+trees? [5]

(b) Differentiate between a min-heap and a max-heap? Form a binary max-heap and a min-heap from the following sequence of data: [7]

50, 40, 35, 25, 20, 27, 33

Q.7(a) Quick sort shows quadratic behaviour in certain situations. Justify. [5]

(b) Trace the shell sort procedure on the unordered list L of keys given by - [7]
 $L = \{24, 37, 46, 11, 85, 47, 33, 66, 22, 84, 95, 55, 14, 09, 76, 35\}$ for an increment sequence.
 $\{h_3, h_2, h_1, h_0\} = \{8, 4, 2, 1\}$.