MCA 2nd Semester Examination, 2016

MCA

PAPER—MCA-201

Full Marks : 100

Time : 3 hours

Answer any five questions

The figures in the right-hand margin indicate marks

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

Illustrate the answers wherever necessary

1. (*i*) What is ADT? Give one example.

   (*ii*) How we can measure the performance of an algorithm ?

   (*iii*) Define : Big O Notation, Big Omega(Ω) and Theta(Θ).

(*iv*) Compute the computational complexity of the equation

$$10\,n^2 + 4n + 2$$

and show that it will be $O(n^2)$

$2 + 3 + (2 \times 3) + 3$

2. (*i*) What is sparse matrix ? How we can store sparse matrix in computer memory ?

(*ii*) Write a C program to store a sparse matrix in memory.

(*iii*) Write down the general formula for representing location of a 2D matrix in row major form and column major form.

$(2 + 3) + 5 + 4$

3. (*i*) Write an algorithm to evaluate a postfix expression. Trace the same algorithm with stack contents for the following expression ABC + *C BA – + * with A = 1, B = 2, C = 3.

(*ii*) Define threaded binary tree with example.

$10 + 4$

4. (*i*) What is circular queue ? Write implementation

of circular queue using array. Also write the following algorithms for circular queue :

Insertion, deletion, display.

(*ii*) Define Binary Tree. (2 + 10) + 2

5. Write an algorithm to construct a binary search tree and check for duplicate data. Draw binary search tree constructed for the following input : 14

14, 5, 6, 2, 18, 20, 16, 18, –1, 21

6. (*i*) Solve the following maze using stack (only steps are to be shown, no algorithm is needed).

0	1	1	1	1	1
0	0	0	1	1	1
1	0	0	0	0	0
1	1	1	1	1	0
0	1	0	0	1	0
1	1	0	1	1	0

(*ii*) Convert the following infix to postfix and prefix :

$$(A + B) * C - D \$ E * F$$ 10 + 4

7. Explain merge sorting with following example : 14

(26) (5) (77) (1) (61) (11) (59) (15) (48) (19)

[*Internal Assessment* : 30 Marks]