

**MASTER'S IN MATHEMATICS WITH
APPLICATIONS IN COMPUTER SCIENCE
M.Sc. (MACS)**

**Term-End Examination
December, 2013**

**MMT-001 : PROGRAMMING AND DATA
STRUCTURES**

Time : 1½ hours

Maximum Marks : 25

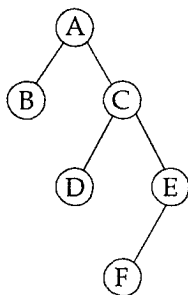
Weightage : 20%

Note : Question No. 1 is compulsory. Answer any three questions from question nos. 2 to 5. All programs should be written in 'C' language. Use of calculator is not allowed.

1. Write the output of the following piece of code. Justify your answers with short explanations. **2x5=10**
- (a) `int a[5] = {2,3};
printf("\n%d,%d,%d", a[2], a[3], a[4]);`
 - (b) `int a, b = 5;
a = b + NULL;
printf("%d", a);`
 - (c) `char *a = "We Like C++."
char b = 'I';
int i;
printf("%c", b);
for(i=3; i<9; i++)
putchar(*(a+i));`

- (d)

```
int i, j;
for(i=1; i<=3; i++)
{
for(j=1; j<=i; j++)
printf("%2d", i%j+i/j);
printf("\n");
}
```
- (e) Post order traversal of the following Binary Tree :



2. (a) Explain "break" and "continue" statements in 'C' with an example for each. 2
- (b) Write a function which takes a square matrix as a parameter and returns true if the matrix is skew - symmetric, and false otherwise. 3
 [Note that a square matrix is skew - symmetric iff $A = -A^T$].
3. (a) Convert the expression $6 + 5 - 4/2 + 3*2$ to RPN. 2
- (b) The area of a triangle with sides a, b, and c is given by 3

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)},$$
 where $s = (a + b + c)/2$. Declare a data structure called "Triangle" having three members a, b, c of type *int*. Write a program that prints the area of a triangle, using the above formula.

4. (a) Evaluate the following expressions : 3
(i) $2 - 4 / (5 * (6 < 3) + 1)$
(ii) $2 < 3 \ \&\& \ 5 <= 5 - 1$.
- (b) Construct a Binary Search Tree with the 2
following keys :
3, 6, 9, 2, 1, 5, 7, 8.
5. Write a program which solves $t^2 - 6t + 2 = 0$ 5
iteratively. Your program should terminate either
after 10 iterations or the difference between the
successive approximations becomes less than
 10^{-4} . The initial approximation to the root may
be taken as 0.
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