

M.C.A. DEGREE EXAMINATIONS: DECEMBER 2009

First Semester

MCA502: PROBLEM SOLVING AND PROGRAMMING

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 2 = 20 Marks)

- List the characteristics of algorithms.
- What do you mean by time complexity and space complexity of an algorithm?
- Write an algorithm to find the largest of three numbers.
- Write an algorithm to check whether the given number is even or odd.
- Evaluate the following expression and show its hierarchy of execution.

$on = ink * act / 2 + 3 / 2 * act + 2 + tig;$

Where  $ink = 3$ ,  $act = 2$ ,  $tig = 3.2$ , and assume  $on$  to be an  $int$ .

- What are ternary operators? Give an example.
- What is the use of typedef? Give an example.
- Write a C program to return the absolute value of given number using user defined function.
- What is the use of the built in function free ().
- List the operations that can not be performed over pointers.

PART B (5 x16 = 80 Marks)

- 1. a) i) Explain the steps for problem solving. (9)
- ii) Explain the features of algorithm. (7)

(OR)

b) How do you analyze the efficiency of an algorithm? Explain with examples.

- 12. a) i) Write an algorithm to find the biggest of n numbers. (5)
- ii) Write an algorithm to find the GCD of two integers. Find the time complexity and space complexity of it. (6)
- iii) Write a recursive algorithm to find the permutations for the given set of n elements. (5)

(OR)

- b) i) Write the iterative and recursive algorithms to find the sum of n numbers. (6)
- ii) Write an algorithm to generate prime numbers. (6)
- iii) Write an algorithm to add two matrices. (4)

13. a) i) Write short notes on bitwise operators.

ii) Explain the data types in C.

iii) Give the output of the following C programs.

```
1. void main()
{
    int i;
    i = 300*300/300;
    printf ("%d\n",i);
}
```

```
2. void main ( )
{
    float a = 0.7;
    if (a == 0.7) printf ("Pink\n");
    else printf ("Orange\n");
}
```

```
3. void main( )
{
    int i = 5;
    printf ("%d\n",i++);
    printf ("%d\n",i);
}
```

```
4. void main( )
{
    int a = 97;
    if (a == 'a' ) printf ("Clever\n");
    else printf ("Fool\n");
}
```

```
5. void main( )
{
    int i,j;
    i = -2 %5;
    j = 2 %-5;
    printf("%d %d\n",i,j);
}
```

```
6. void main( )
{
    int i,j,k;
    i = 3; j = 2;
    k = 3^2;
    printf("%d\n",k);
}
```

(OR)

b) i) Distinguish between switch ( ) case and nested if statements.

ii) Explain the use of **goto** statement in C with an example.

iii) Write a C program to print out all Armstrong numbers between 1 and 500. If sum of cubes of each digit of the number is equal to the number itself, then the number is called an Armstrong number.

14. a) i) Write a C program to print all rotations of the given input string. For example, rotations of the word "space" are space paces acesp cespa espac.

ii) Write a C program to sort n numbers using bubble sort technique.

(OR)

b) i) Write a C program to generate first 25 terms of Fibonacci series using recursive function.

ii) Write a C program to pass an entire structure to a user defined function?

5. a) i) Write a C program which would remove all comments from a C program. Your program should be capable of removing comments which occur at the beginning of the statement, at the end of a statement as well as the comments which are split over multiple lines. (8)

ii) Explain array of pointers to strings with an example. (8)

(OR)

b) i) Explain the following built in functions malloc() and calloc() with examples (8)

ii) Explain macro expansion and file inclusion preprocessor directives with examples. (8)

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