# First Semester MCA Degree Examination, June/July 2011
## Problem Solving using C

Time: 3 hrs.                                                                    Max. Marks:100

### Note: *Answer any FIVE full questions.*

**1**  a.  Find the final values stored in the variables in following program segments:     **(06 Marks)**

i)  int x, y ;
   float a, b;
   $$x = \frac{1565}{1000} + 2.7 ;$$
   $$y = \frac{1565}{1000.0} + 2.7 ;$$
   $$a = \frac{1565}{1000} + 2.7 ;$$
   $$b = \frac{1565}{1000.0} + 2.7 ;$$

ii)  int x, y ;
   float a, b;
   $x = 12.6 ;$
   $y = x + 0.5 ;$
   $x = x - 2 ;$
   $y = y + 1 ;$
   $a = x + y - 2.5 ;$
   $b = a + x ;$

iii)  int x, y ;
   $x = 025 ;$
   $y = x + 012;$

b.  Explain the following with examples: i) Constants and types of constants.
                                      . ii) Variables and rules for naming variables. **(06 Marks)**

c.  Write the structure of a typical C program and explain the significance of each section.
                                                                                    **(08 Marks)**

**2**  a.  Evaluate the following expressions:

i)   $5/3 * 3 - 8\%5 * 2 + 6 * 3/9$
ii)  $9/4 * 2 + 5\%8 * 3 - 5 * 4/2$
iii) $fabs(10 - 20) < 40 \,||\, sqrt(100) >= 10 \,\&\&\, 30 == 20 + 10$
iv)  $20 * 10 <= 500 \,\&\&\, !20 == 20 \,||\, !30 < 50$     **(04 Marks)**

b.  Write equivalent C expressions for the following:

i)   $0 < x < 1$
ii)  $\sqrt[n]{x} + \log_{10} x + e^x$
iii) $\sqrt{\sin\sqrt{|x|} + \tan^{-1} x}$
iv)  $\dfrac{\sin 45° + \cos 60°}{xy}$
v)   $\dfrac{x^{5/7} + x^{3/5}}{e^{\frac{x}{x-y}}}$
vi)  $\alpha\beta x^5 [1 - e^x] 9.183 \times 10^8$     **(06 Marks)**

c.  Find the outputs of the following program segments:     **(06 Marks)**

i)  int x = 1234;
   printf("%d/n", x)";
   printf("%6d/n", x)";
   printf("%3d/n", x)";
   printf("%06d/n", x)";

ii)  float a = 12.6876;
   printf("%f/n", a)";
   printf("%0.3f/n", a)";
   printf("%8.2f/n", a)";
   printf("%e/n", a)";

iii)  float b = 92.6148e4;
    printf("%e/n", b)";
    printf("%f/n", b)";
    printf("%0.3e/n", b)";
    printf("%12.4e/n", b)";

d.  Explain any four bit-wise operators.     **(04 Marks)**

**3**    a.   $M_1$, $M_2$, $M_3$ are the marks scored in 3 tests. Write an algorithm to find the average of best 2 test marks.    **(06 Marks)**

      b.   Write a complete program to find the roots of a quadratic equation using if statement.    **(08 Marks)**

      c.   Explain the following with examples:
        i)    Ternary or conditional operator.
        ii)    Goto statement.    **(06 Marks)**

**4**    a.   Explain different forms of if statements with examples.    **(06 Marks)**

      b.   The marks scored in an exam ranges from 0 – 100. The result is declared as :
Fail if marks < 40;    Pass if marks > = 40 and < 50; Second class if marks >=50 and <60; First class if marks >=60 and <70; First class with distinction if marks >=70. Write a program to read student –id (int) and marks. Compute result of the student using switch statement. Present the output with suitable messages.    **(10 Marks)**

      c.   Write a program to read principal amount, period of deposit and rate of interest. The program should compute the simple interest rounding to nearest rupee without using if statements and built-in functions.      **(04 Marks)**

**5**    a.   Compare while and do-while loops.    **(06 Marks)**

      b.   Write a program to find all the points with integer coordinates those lie on and with in the circle of radius 4 units, whose centre is at origin.    **(08 Marks)**

      c.   Write a flow chart to count the number of digits and sum of digits in a given integer value.    **(06 Marks)**

**6**    a.   What are subscripted variables? How one and two dimensional subscripted variables (arrays) are declared?    **(06 Marks)**

      b.   Write a program to invert an array A having n integer elements without using another array. i.e. A[O] is interchanged with A[n-1], A[1] with A[n-2], A[2] with A[n-3], and so on.    **(06 Marks)**

      c.   What are pointers? Explain 2 operators associated with pointers.    **(04 Marks)**

      d.   If x and y are integer variables, p and q are pointers to integers, which of the following are valid and invalid expressions:
        i)    p = &x ;
        ii)    y = &p;
        iii)    q = *x;
        iv)    *p = *q;    **(04 Marks)**

**7**    a.   Write user defined functions to multiply 2 matrices of orders $m \times n$ and $n \times l$, and print a matrix of order $m \times l$. Use these functions to find $A^3$ in a main function where A is a square matrix of order $p \times p$. The program should print the input and resultant matrices.   **(10 Marks)**

      b.   Write a recursive function to find the $n^{th}$ Fibonacci number. Call this function from a main function that reads the value of n and prints the result.    **(06 Marks)**

      c.   Explain structures with examples.    **(04 Marks)**

**8**    a.   Explain built-in functions for handling strings.    **(08 Marks)**

      b.   Write a program that copies the content of one file into another.    **(06 Marks)**

      c.   Write a C statement for declaring an array of integer with n locations dynamically.    **(02 Marks)**

      d.   Explain macro substitution and file inclusion as preprocessor.    **(04 Marks)**

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# First Semester MCA Degree Examination, June/July 2011
## Problem Solving Using C

Time: 3 hrs.                                                                 Max. Marks:100

**Note: *Answer any FIVE full questions.***

1   a.  What is a flow chart? Draw a flow chart to find biggest of three numbers.   **(04 Marks)**
    b.  Describe the characteristics of an algorithm.   **(04 Marks)**
    c.  State the differences between the declaration of a variable and definition of a symbolic name.   **(05 Marks)**
    d.  What are enumeration variables? How are they declared? What is the advantage of using them in a program? Explain with an example program.   **(07 Marks)**

2   a.  Write notes on the following: i) Conditional operator       ii) Comma operator
        iii) Post and pre increment operator.   **(06 Marks)**
    b.  Write a C program to accept radius, center co-ordinates $(x_c, y_c)$ of a circle and a point $(x, y)$ on the surface. Find the distance between center co-ordinate and the point, also check whether the point lies inside the circle or on the circle or outside the circle using distance formula: $d = \sqrt{(x_c - x)^2 + (y_c - y)^2}$   **(08 Marks)**
    c.  What are the differences between formatted and unformatted input-output statements?   **(06 Marks)**

3   a.  Discuss implicit conversion in C.   **(04 Marks)**
    b.  Write a C program to find sum of all integers between 100 and 200 that are divisible by 7.   **(10 Marks)**
    c.  Describe the working of following keywords: i) goto  ii) continue  iii) return.   **(06 Marks)**

4   a.  What is a nested loop? Write a program to print multiplication table from 1 to 10 using nested loop.   **(10 Marks)**
    b.  What is a dynamic array? Name a few functions that are used to create dynamic arrays.   **(02 Marks)**
    c.  Write a C program to check whether the given matrix is symmetric or not.   **(08 Marks)**

5   a.  How do you create an array of strings? Explain with an example.   **(06 Marks)**
    b.  Write a 'C' program to copy the contents of an array to another using a user defined function.   **(08 Marks)**
    c.  Explain the differences between the following pair of functions:
        i)   strcmp( ) and strcmpi ( )
        ii)  strcat ( ) and strncat ( )
        iii) strupr ( ) and toupper ( ).   **(06 Marks)**

6   a.  What is a recursive function? Write a 'C' recursive function to find natural sum of a given number, $\sum n = 1 + 2 + 3 + \ldots\ldots + n$.   **(08 Marks)**
    b.  How can we use address operator and indirection operator to return multiple values from a function? Explain with an example program.   **(08 Marks)**
    c.  Discuss the scope and life time of static variables with an example code.   **(04 Marks)**

7 a. What are the two methods of creating structure variables? Explain with an example code.

**(04 Marks)**

   b. Write a program to create a structure and a structure pointer variable, so that the members of the structure could be accessed by the pointer variable. **(06 Marks)**

   c. Write a program to add two complex numbers represented by a structure and passed to a function for adding. **(10 Marks)**

8 a. Write a program to show the amount of space required to hold different data type pointers in the memory. **(04 Marks)**

   b. Write a program to find the sum of all elements in an array using a pointer. **(05 Marks)**

   c. What is a file pointer? Explain the functions used to open and close a file, along with their syntax. **(05 Marks)**

   d. Define dynamic memory allocation. How is dynamic memory allocation done to a pointer variable using calloc function? Explain with syntax. **(06 Marks)**

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