

2011**MCA****1st Semester Examination****INTRODUCTION TO PROGRAMMING LANGUAGE****&****DATA STRUCTURE****PAPER—MCA-101***Full Marks : 100**Time : 3 Hours**The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.**Illustrate the answers wherever necessary.***Group—A**

Answer Q. No. 1 and any three from the rest

1. (a) How does a structure differ from an array? 4

(b) What would be the output of the following program?

main ()

{

Char ch = 'A';

printf ("%d %d", size of (ch), size of ('A'));

}

1

(Turn Over)

2. (a) What is pointer? How is a pointer initialized?

3+3

(b) If m and n have been declared as integers and P1 P2 as pointers to integers, then state errors, if any in the following statements. 4

- (i) P1 = &m;
- (ii) P2 = m;
- (iii) *P1 = &n;
- (iv) P2 = & * &m;
- (v) m = P2 - P1;
- (vi) P1 = &P2;
- (vii) m = *P1 + *P2 ++
- (viii) n = (*(P+i) + j)

where i & j represents row & column of an array.

3. (a) What is dynamic memory allocation? How does it help in building complex programs. 2+3

(b) Write a program in C which will extract a portion of a character string and print the extracted string. Assume that m characters are extracted, starting with nth character. 5

4. (a) Compare in terms of their functions, the following pairs of statements : 2×3

- (i) while and for ;
- (ii) break and exit ;

(iii) continue and go to.

- (b) The daily maximum temperatures recorded in 10 cities during the month January (for all 31 days) have been tabulated as follows :

Day	City			
	1	2	10
1				
2				
.				
.				
.				
31				

Write a program to read the table elements into a two-dimensional array 'temp' and to find the city and day corresponding to highest and lowest temperature.

4

5. (a) Main is a user-defined function. How does it differs from other use-defined function. 2

- (b) Distinguish between the following : 2×4

- (i) Actual and formal arguments;
- (ii) Global and local variables;
- (iii) Automatic and static variables;
- (iv) Global and extern variables.

6. What is the purpose of (any *five*) : 5×2
- (a) Preprocessor directives ;
 - (b) macro ;
 - (c) `f open ()` ;
 - (d) `str cpy ()` ;
 - (e) `str cat ()` ;
 - (f) function prototype ;
 - (g) `getchar ()`.

Group—B

Answer Q. No. 1 and any *two* from the rest

1. In a lower triangular matrix A with n rows and n columns, the maximum number of non zero elements in $n(n + 1)/2$.

For large n it would be worthwhile to save the space taken by zero entries in the upper-triangle. Obtain an addressing function for elements A[i, j] in the lower-triangle if this lower-triangle is stored by rows in an array D [1..... $n(n + 1)/2$] with A[1, 1] being stored in D [1]. What is the relationship between i and j for elements in the zero part of A. 5+2

2. (i) Consider the expression —
 $X = A/B \ \$ \ C + D * E - A * C.$
At first fully parenthesize the expression and find out the post fix form. 2+2
- (ii) What is deque ? What are the types of deque ? What are the types of deque ? Explain each with block diagram. 2+1+2
- (iii) Write a general algorithm for deleting a node from lines list (the node may be the first node, last node or a middle node). 5
3. (i) The in order traversal form of a binary tree is C B A E F D G and Post order form is A B C D E F G. Draw the binary tree. 4
- (ii) Write the algorithm of binary search for n elements. Find out its complexity its terms of Big-Oh (O). 5+2
- (iii) What is Priority Queue ? Give example. 3
4. (i) Write a general algorithm to insert a node in a doubly linked list (node may be inserted in front, end or at middle). 6

(ii) Use stack to evaluate the following —

$A B C * \$ / D E * + A C * -$

(\$ means exponentiation).

6

(iii) What is complete binary tree ?

2

Internal Assessment - 30
