Group - D

6. (a) Distinguish between
   i. int* ip[10] and int (*ip)[10]
   ii. int p(char *a) and int *p(char *a)

   (b) What is memory leak? Why should it be avoided?

   (c) What is dangling pointer? Explain with example.

6 + 3 + 3 = 12

7. (a) With a suitable example explain the working of calloc ( ) and free ( ).

   (b) A C program contains the following declaration.
   float table[2][3] = {{ 1.1 , 1.2, 1.3}, {3.1, 3.2, 3.3}};
   What are the values of the following?
   i. *(*(table + 1) + 1)
   ii. *(*(table) + 1)
   iii. * (*(table + 1))

   (c) Explain the meaning of the following declarations:
   i. int *p (char (*a)[ ]);
   ii. int p (char *a[ ]);

5 + 3 + 4 = 12

Group - E

8. (a) State the difference between the file open modes “w” and “w+”.

   (b) Write a C program to copy the contents of a source file to a destination file, where names of both files are supplied from the command line.

   (c) Consider the statement
   float result = 36.0/SQUARE(2+1);
   For each of the four versions of the macro SQUARE() below, what will be the corresponding value of ‘result’ ?
   i. #define SQUARE(x) x*x
   ii. #define SQUARE(x) (x*x)
   iii. #define SQUARE(x) (x)*(x)
   iv. #define SQUARE(x) ((x)*(x))

2 + 6 + 4 = 12

9. (a) Write a C program to display the frequency of characters in a given ASCII text file.

   (b) Write a C program which will take a filename as a command line input and search whether the file is in the current working directory or not. It will print “SUCCESS” if the file is present in the current working directory else it will print “FAILURE”.

6 + 6 = 12

INTRODUCTION TO PROGRAMMING
(MCAP 1102)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

   (i) The output of the following program would be:
```
int main(void) {
    int i  = -1, j = -1, k = 0, m = 2, n;
    n = i++ && j++ && k++ || m++;
    printf("%d %d %d %d %d", i, j, k, m, n);
    return 0;
}
```
   (a) 0 0 1 3 1 (b) -1 0 1 3 0 (c) 0 -1 1 2 1 (d) -1 -1 0 2 1.

   (ii) Which of the following is not a valid name of a C variable?
   (a) result22 (b) _result22 (c) 22result (d) re2sult2.

   (iii) In a two dimensional array int *a*[10] [20], the element *a*[4][5] can be denoted by:
   (a) *(*a* + 4) + 5 (b) **a*[4] + 5 (c) *(*(*a* + 4) + 5) (d) *a*[4] + 5.

   (iv) What happens when the following code is executed?
```
int f(char *p);
int main(void) {
   char str[ ] = "HITK";
   printf("%d", f(str));
   return 0;
}
int f(char *p) {
    char *q = p;
    while (*++p);
     return (p-q);
}
```
   (a) 4 (b) 5 (c) 3 (d) compilation error

(v) What will be the output of the following program segment?

```
void junk (int i, int *j) {
    i = *j * *j;
    * j = i * i;
}
int main (void) {
    int i = 5, j = 2;
    junk (i, &i);
    printf( "%d, %d", i, j);
    return 0;
}
```

(a) 4, 25 (b) 25, 4 (c) 625, 2 (d) 625, 25.

(vi) The operator used to get the value at address stored in a pointer variable is
(a) * (b) & (c) && (d) &*.

(vii) The expression 7 + 10 % 6 / 2 evaluates to
(a) 8 (b) 9 (c) 7 (d) 17.

(viii) Which of the following cannot be a member of a structure in C language?
(a) function (b) array (c) union (d) another structure.

(ix) What is the output of the following code snippet?

```
int main(void){
  enum { india, is=7, GREAT };
  printf("%d %d", india, GREAT);
 return 0;
}
```

(a) 0 1 (b) 0 2 (c) 0 8 (d) 1 2.

(x) What is B, when it is declared as int *B[10] ?
(a) An array of integers (b) A pointer to an array
(c) An array of pointers (d) A pointer to an integer.

Group - B

2. (a) Explain with examples the concepts "L-value" and "R-value" of a variable.

(b) State the difference between explicit and implicit casting with an example.

(c) What do you mean by scope and lifetime of a variable? What is an external variable?

4 + 4 + 4 = 12

3. (a) Explain with a suitable example the functionality of ternary operator in C language.

(b) Discuss with suitable examples the bitwise operators **^** and **~** in C language.

(c) What will be the output of the following C code snippet?


```
int main() {
    int x=1, y=1, z=1 ;
    x += y += z ;
    printf("%d\n", x < y ? y : x) ;
    printf("%d\n", x < y ? x++ : y++) ;
    printf("%d\n", x) ; printf("%d\n", y) ;
    return 0 ;
}
```

3 + 5 + 4 = 12

Group - C

4. (a) lmplement the following function with the prototype given below
int exponent(int x, int y);
This function will evaluate and return x^y if there is no overflow. Otherwise in case of overflow (i.e. value out of range for integer), the function will return 0.

(b) Write a C program to print the pattern where the number of rows (h) is taken as input from user. For example, when h = 4, the following pattern will be the output.

```
4 5 6 7 6 5 4
  3 4 5 4 3
    2 3 2
      1
```

5 + 7 = 12

5. (a) State the differences between a while loop and a do-while loop. Give a suitable example where do-while is preferred over while.

(b) Write a C program to print the following pattern where the input from the user is number of rows of the pattern.

```
        * * * *
        * * *
        * *
        *
      * *
    * * *
  * * * *
```

(c) What value does the function call fun(5) return, when 'fun' is defined as follows?

```
int fun (int n) {
    if ( n == 0)
    return 1;
    return 2 * fun ( n – 1 );
}
```

4 + 5 + 3 = 12