



DOON UNIVERSITY, DEHRADUN  
School of Technology

Integrated MCA, First Semester, End Semester Examination, 2016  
TMC-104: Programming in C

Time Allowed: 3 Hours Maximum Marks: 60  
Note: Complement your answers with suitable examples (code segments).

**SECTION: A (Short Answer Type Questions)** **(Total Marks: 12)**

1. Define: a) Array    b) Structure (2)
2. Name two operators that cannot be applied to bit fields. (1)
3. What is the output of the following code segments? (5)
  - a) `int k = 45, *a, *b;`  
`a = &k; b = a; (*a)++; k++;`  
`printf("k = %d", k);`
  - b) `int k = 45;`  
`printf("%d %d %d %d", k == 45, k && 0, k > 0, sizeof(k));`
  - c) `short k = 0XABCD;`  
`k |= (1 << 4); printf("%hX\n", k);`  
`k &= ~(1 << 4); printf("%hX\n", k);`
4. a) Define a macro ISLOWER(c) to check whether c is a lowercase alphabet. (2)  
b) Define a nested macro TOUPPER(c) to convert c to uppercase alphabet if it is in lowercase.
5. Write C statements, using fseek(), to seek the position pointer (corresponding to a FILE \*fp) (2)
  - a) At the beginning of the file.
  - b) At the end of the file.
  - c) 1000 bytes forward from the current position.
  - d) 1000 bytes backward from the end of the file.

**SECTION: B (Long Answer Type Questions)** **(Total Marks: 6 × 4 = 24)**

1. Define a C function to test whether a string (the input argument) is a palindrome or not.
2. Differentiate between the following functions:
  - a) gets() and fgets()
  - b) puts() and fputs()
3. Store the months of a year using either 2D-array of char or array of pointers to char. Define a C function that accepts a date from the user in d/m/y format and return the corresponding month name. (1 - January, 2 - February ...; for other values output Illegal month)
4. Write short notes on any two of the following:
  - a) fgetc() and fputc()
  - b) fprintf() and fscanf()
  - c) fread() and fwrite()

5. How do you open a file in C? Explain various modes in which the file can be opened.
6. What is the objective of the following code?

```
main() {
    int n, i;
    printf("Enter a number: ");
    scanf("%d", &n);
    for(i = 0; i < 8*sizeof(int); ++i)
        if(n & (1 << i)) break;
    for(i = i+1; i < 8*sizeof(int); ++i)
        n = n ^ (1 << i);
    printf("%d", n);
}
```

**SECTION: C (Very Long Answer Type Questions)**

**(Total Marks: 24)**

1. Suppose there are two types of users viz., owner and others; and four types of permission that can be granted viz., read, write, append and execute. (7)
  - a) Define a variable permission that contains eight 1-bit fields – first four representing owner's permission and next four representing others' permission. Initialize the variable so as to grant all but append permission to the owner and only execute permission to others.
    - i) Write C expression to grant append permission to both types of users.
    - ii) Write C expression to take away read permission from both types of users.
  - b) Define a variable permission of type unsigned char and implement the task specified in-a) using bitwise operators.
2. Differentiate between (7)
  - a) internal and external variables in the context of scope, lifetime and initial value.
  - b) pointer to an array and array of pointers.
  - c) structure and union
3. Consider the following DATE and EVENT structures; and global variables diff of type DATE and e of type EVENT. (10)

```
typedef struct date {
    unsigned short d, m, y;
} DATE;
DATE diff;

typedef struct event {
    char name[10]; //name of the event
    DATE date; //date of the event
} EVENT;
EVENT e;
```

- a) Define a C function to compute the difference between two DATES in days, months and years. Store the difference in variable diff.
- Write C functions to implement the following actions so as to maintain event records.
- b) Add one or more event records.
  - c) Update the records of one or more events.
  - d) Display the names of recent events (not older than 20 days).