KATHMANDU UNIVERSITY
End Semester Examination
March, 2025

Marks Scored:

Level : B.E./BIT
Year : I

Course : COMP 102
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

20 MAR 2025

Registration No.:

Date :

SECTION "A"
[20Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate answer. Symbols have their usual meanings.

1. switch case cannot be implemented in a ____ datatype.
   a. int b. char c. short int d. float

2. What is the size of the pointer variable int *ptr; in a 32-bit system?
   a. 2 bytes
   b. 4 bytes
   c. 8 bytes
   d. It depends on the data type pointed to.

3. What does the following statement do in C?
```
arr[i] = *(arr + i);
```
   a. It assigns the value of i to the element at index arr[i].
   b. It assigns the value of the element at index arr[i] to arr + i.
   c. It assigns the value of the i-th element of the array arr using pointer arithmetic.
   d. It is an error in C.

4. What is the output of the following C code?
```
#include <stdio.h>
int main() {
    int arr[5] = {10, 20, 30, 40, 50};
    int *ptr = arr;
    printf("%d\n", *(ptr + 2)+2);
    return 0;
}
```
   a. 14 b. 22 c. 32 d. Generate error

5. If a pointer is not freed after dynamic memory allocation, what will happen?
   a. The program will crash immediately.
   b. The program will encounter a memory leak, which may lead to increased memory usage.
   c. The program will automatically free the memory after execution.
   d. The program will raise a runtime error.

6. Which function is used in C to allocate memory dynamically for an array of n integers?
   a. malloc(n)
   b. malloc(n * sizeof(int))
   c. calloc(n)
   d. malloc(sizeof(n))

7. Which of the following is the correct order of evaluation for the below expression?
```
z = 3 - m * z / 4 % 2 + 1
```
   a. * / % + - = b. = * / % - + c. = * / % + - d. * / % - + =

8. Given the following structure:

```
struct Student {
    int roll_no;
    char name[50];
};
```

What is the correct way to assign a value to the name field of a structure using a pointer to the structure?

a. studentPtr->name = "John";
b. studentPtr.name = "John";
c. strcpy(studentPtr->name, "John");
d. strcpy(studentPtr.name, "John");

9. Which of the following is **NOT** a valid identifier in C programming?

a. Auto
b. auto
c. _auto
d. _1auto

10. What will be the output of the following C code?

```
char a = 'A';
int b = 65;
if (a == b)
    printf("Equal");
else
    printf("Not Equal");
```

a. Equal
b. Not Equal
c. Compilation Error
d. Runtime Error

11. What does variable 'y' store in the following statement?

```
int y = 5 | 3
```

a. 1
b. 0
c. 5
d. 7

12. What will be the output of the following C code?

```
int arr[2][2] = {{1, 2}, {3, 4}};
arr[0][1] = arr[1][0] + arr[1][1];
printf("%d", arr[0][1]);
```

a. 3
b. 5
c. 7
d. 6

13. What happens when the following C code is executed?

```
int *ptr;
ptr = (int*) malloc(sizeof(int) * 10);
free(ptr);
printf("%d", *ptr);
```

a. 0
b. Undefined Behavior
c. Compilation Error
d. Runtime Error

14. What will happen if the function prototype and the function definition do not match in terms of return type or parameters in C?

a. The linker will handle the mismatch
b. The program will run but may produce incorrect output.
c. The compiler will throw an error.
d. It will cause a segmentation fault at runtime.

15. Which of the following is the correct use of the static storage class specifier in C?

a. A variable declared as static inside a function retains its value between function calls.
b. A variable declared as static is accessible only within the function it is declared in.
c. A static variable has automatic storage duration but cannot be modified.
d. A static variable is not initialized by the compiler.

16. What happens if you try to take the address of a register variable in C?
    a. Compilation error.
    b. The address is returned as NULL.
    c. The address can be taken, but it will point to the memory location.
    d. It will result in undefined behavior.

17. Which of the following is the correct order of steps in the compilation process of a C program?
    a. Compilation → Preprocessing → Assembling → Linking
    b. Preprocessing → Linking → Compilation → Assembling
    c. Preprocessing → Compilation → Linking → Assembling
    d. Preprocessing → Assembling → Compilation → Linking

18. Which of the following is a benefit of using structured programming in C?
    a. It makes the program less modular and harder to debug.
    b. It simplifies program development by reducing complexity and increasing readability.
    c. It encourages the use of global variables to manage data.
    d. It eliminates the need for functions and procedures.

19. What is the effect of using the continue statement in a loop in C?
    a. It terminates the loop and transfers control to the next statement.
    b. It restarts the loop from the next iteration, skipping the remaining code in the current iteration.
    c. It stops the program execution.
    d. It breaks out of all nested loops.

20. An entire array is always passed by ___ to a called function.
    a. Call by value
    b. Call by reference
    c. Address relocation
    d. Address restructure

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SECTION "B"
[6Q. × 4 = 24 marks]

Attempt *ANY SIX* questions.

1. Define a function in C and explain its components. Explain function prototypes and their importance in C programming. [3+1]

2. Write a C program to generate the Fibonacci series using a recursive function.

3. What is operator associativity? How does it affect expression evaluation in C? [2+2]

4. Write in brief about ternary operators in C. Differentiate between logical AND and bitwise AND operators in C. [2+2]

5. Explain the concept of passing an array to a function in C with an example. Explain how memory is allocated for multidimensional arrays in C. [2+2]

6. Write a program to check whether a number is palindrome or not. Palindrome number remains the same when its digits are reversed.

7. Write a program to count the total number of prime numbers stored in an array.

SECTION "C"
[2Q. × 8 = 16 marks]

Attempt *ANY TWO* questions.

8.
   a. Differentiate in brief between static memory allocation and dynamic memory allocation with appropriate examples. [4]
   b. Write in brief about variable declaration and rules for identifiers. Write static storage class specifiers in C programming. [2+2]

9.
   a. Write in brief about the difference between if-else ladder and switch case with appropriate syntax. [4]
   b. Write a program that converts a number between its binary and decimal equivalents, with two options: Binary to Decimal or Decimal to Binary. [4]

10. Write a program to store employee information, including name, employee ID (int), basic salary (int), allowance (int), and net salary (basic salary + allowance). Implement a function to input information for a user-specified number of employees, and another function to display the employee details sorted by their net salary. Use structures to store employee data, and demonstrate the concept of passing a structure to a function as well as using pointers to structures