



VIT[®]
Vellore Institute of Technology
(Approved by the University Grants Commission, VIT-UGC, No. 1946)

Final Assessment Test – November 2025

Course: MAEDS503 - Embedded Programming

Class NBR(s): 5659

Time: Three Hours

Slot: E2+TE2

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

COs	CO Statements
CO1	Apply the fundamental concepts of C programming and data structures to solve basic computational problems.
CO2	Apply knowledge of Linux basics in SHELL programming.
CO3	Analyze the components of embedded Linux systems to understand their roles and interactions.
CO4	Apply kernel module programming techniques to develop and test basic device driver programs.
CO5	Design and implement embedded and Linux-based development environments using state-of-the-art hardware and software tools.

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

Answer ALL Questions

(10 X 10 = 100 Marks)

1. Analyse the following codes by determining the output of print statements and justify your answer:

CO1 BL5

- (i) #include <studio.h>

```
int main()
{
    char s[]={'a','b','c','\n','c','\0'};
    char *p,*str,*str1;
    p=&s[3];
    str=p;
    str1=s;
    printf("%c",++*p + ++*str1-3);
    return 0;
}
```

- (ii).

#include <studio.h>

```
int main()
{
    int const *q = 2;
    printf("Output: %d\n",++(*q));
    return 0;
}
```

(iii).

```
#include<stdio.h>
int main() {
    int a=2,b=7,c=10;
    c=a==b;
    printf("%d",c);
    return 0;
}
```

(iv).

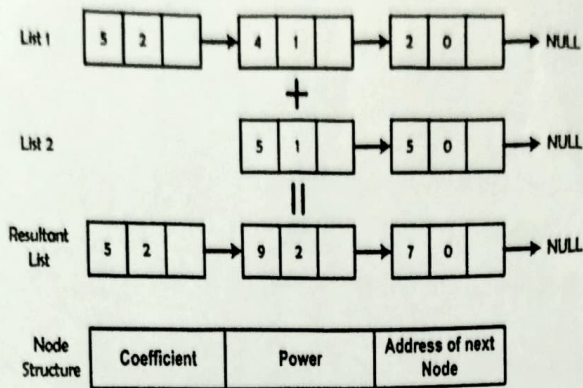
```
#include <stdio.h>
void main()
{
    int i = 0, j = 0;
    for (i = 0; i < 5; i++)
    {
        for (j = 0; j < 1;)
        {
            break;
        }
        printf("Embedded \n");
    }
}
```

2. a) Develop a C program and corresponding flowchart to display the specified pattern as shown below. [5] CO1 BL3

```
1 2 3 4 5
1      5
1      5
1      5
1      5
1 2 3 4 5
```

- b) Compare and contrast the functionalities of the *break* and *continue* statements in C programming. Illustrate your answer with appropriate C code examples and a flowchart to demonstrate their control flow differences. [5]

- 3.(a) Given two polynomial expressions represented by linked lists. You need to write a function that adds these lists, that is, adds the coefficients that have the same variable powers. CO1 BL3



OR

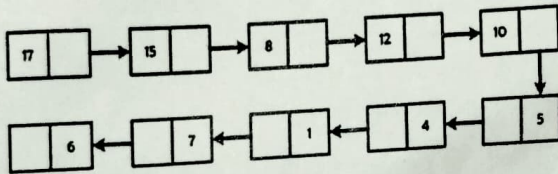
3.(b)

Design and implement a C program to rearrange a given linked list of integers such that all even numbers appear before all odd numbers, while preserving their original relative order. Illustrate your solution with suitable C code and explain the logic used for the modification.

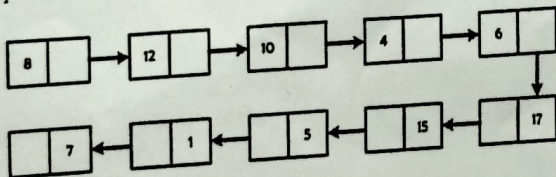
CO1 BL3

Example:

Input:



Output:



CO2 BL3

4.

- (i) Identify the shell commands for the following operation
- Cut a section of a file and print the result to standard output.
 - Show the IP address of the system.
 - To append file contents to another file.
 - To show the path of the present working directory.
 - To display the contents of a file page by page.
- (ii) Brief on following Linux Commands

- Ctrl + c
- ifconfig
- touch
- pwd
- more file.txt

CO2 BL3

5.(a)

Develop a shell script and outline its algorithm to perform the following tasks:

- Read 10 numbers from the user.
- Separate the positive and negative numbers.
- Calculate the average of the positive numbers.
- Compute the sum of the negative numbers.

Input: 7, -4, -6, 8, 3, -4, 3, 5, 4, 9

OR

- 5.(b) Design a shell script along with its algorithm to perform the following operations: CO2 BL3
- (i) Accept an input string from the user.
 - (ii) Using function calls, determine and display the count of vowels, consonants, and special characters present in the string.
6. a) Write a shell script for displaying the following pattern given below CO2 BL2
- ```

0
1 0
2 1 0
3 2 1 0
4 3 2 1 0

```
- b) Write a shell script to count the number of integers in the given digit.  
Input: 98765
7. a) Examine the *fork()* system call in Linux. Discuss how it creates new processes, differentiate between parent and child processes, and illustrate the process creation mechanism using a neat diagram. CO3 BL2
- b) Compare and contrast the *getpid()* and *getppid()* system calls in Linux. Support your explanation with appropriate C code and a flowchart.
8. Describe the role of the *ioctl()* system call in Linux device drivers. Explain how it facilitates communication between user applications and device drivers. CO4 BL3
9. Analyze the procedure for implementing a character device driver in Linux. Explain each step in detail and illustrate the complete process using a well-labelled flowchart, highlighting how the driver interacts with the kernel and user space. CO4 BL3
10. a) Analyze the architectural differences between Monolithic and Microkernel operating systems. Discuss their advantages and disadvantages, and provide suitable examples to support your explanation. [5] CO5 BL3
- b) Analyze the role of the Linux kernel in file and device management. Explain how it handles file operations, device I/O, and resource allocation, highlighting the interaction between user space and kernel space. Support your answer with relevant examples. [5]

⇔⇔⇔ BH/K/TY ⇔⇔⇔