



VIT[®]

Vellore Institute of Technology
(Chartered to be University under section 3 of the UGC Act, 1956)

Reg. No. :

21BEC1851

Final Assessment Test(FAT) - Nov/Dec 2024

Programme	B.Tech.	Semester	Fall Semester 2024-25
Course Code	BECE320E	Faculty Name	Prof. Srinivasan R
Course Title	Embedded C Programming	Slot	E1
		Class Nbr	CH2024250102674
Time	3 hours	Max. Marks	100

General Instructions

- Write only Register Number in the Question Paper where space is provided (right-side at the top) & do not write any other details.

Course Outcomes

- CO1. Apply the C programming language for various data types and decision making applications.
- CO2. Comprehend the derived data types, pointers and creation of functions.
- CO3. Describe the architecture of 8051 microcontroller for programming & interfacing applications.
- CO4. Write the embedded C code to 8051 for programming I/O ports, timers, serial communication, interrupt and interfacing external peripherals.
- CO5. Develop microcontroller based applications.

Section - I

Answer all Questions (4 × 5 Marks)

*M - Marks

Q.No	Question	*M	CO	BL						
01.	What is the output of the following C code snippets? <table><tr><td>A. int x = 3; int result = (x-- > 2) && (++x == 3); printf("%d", result);</td><td>B. int i = 4, j = -3, k = 0; int y = i && j k; printf("%d", y);</td></tr><tr><td>C. int d = 5, e = 9; d = d ^ e; e = d ^ e; d = d ^ e; printf("%u, %u", d, e);</td><td>D. int a = -10, b = 5, c = 2; int result = a + b * c / 2 - a % c; printf("Result: %i\n", result);</td></tr><tr><td>E. char str[] = "Hello, World!"; printf("String: %-6s\n", str);</td><td></td></tr></table>	A. int x = 3; int result = (x-- > 2) && (++x == 3); printf("%d", result);	B. int i = 4, j = -3, k = 0; int y = i && j k; printf("%d", y);	C. int d = 5, e = 9; d = d ^ e; e = d ^ e; d = d ^ e; printf("%u, %u", d, e);	D. int a = -10, b = 5, c = 2; int result = a + b * c / 2 - a % c; printf("Result: %i\n", result);	E. char str[] = "Hello, World!"; printf("String: %-6s\n", str);		5	1	1
A. int x = 3; int result = (x-- > 2) && (++x == 3); printf("%d", result);	B. int i = 4, j = -3, k = 0; int y = i && j k; printf("%d", y);									
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E. char str[] = "Hello, World!"; printf("String: %-6s\n", str);										
02.	Write a C program to evaluate and print the value of the expression given as $w = \sqrt{\sin x + y + e^z * \ln x - y^3}$. Assume the user inputs x, y, and z are real numbers and $x > 0$.	5	1	3						
03.	List the special function registers (SFRs) of the 8051 microcontroller, and indicate which of them are bit-addressable.	5	3	1						

04.	Write a C program to sort a list of 10 user names alphabetically. The names can be 20 characters long.	5	2	2
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Section - II
Answer all Questions (3 × 8 Marks)

*M - Marks

Q.No	Question	*M	CO	BL
05.	Write a C program to implement a number guessing game with two players. Player 1 enters a secret number between 1 and 100, and Player 2 tries to guess the number. For each guess, the program should provide feedback indicating if the guess is too high, too low, or correct. Player 2 has a maximum of 10 attempts to guess the correct number. If Player 2 fails to guess the number within 10 attempts, the game ends with a message displaying the correct number.	8	1	3
06.	Write an 8051 C program that continuously monitors P2. If P2 < 0x40, the lower nibble of P2 is passed to the lower nibble of P1. If P2 is between 0x40 and 0x80, the upper nibble of P1 is set to 1111. If P2 ≥ 0x80, the upper nibble of P1 toggles with a small delay created using nested loops.	8	4	2
07.	With the complete circuit diagram and 8051 C program, explain how the temperature sensor LM35 is interfaced with 8051 microcontroller using ADC 0848.	8	5	2

Section - III
Answer all Questions (4 × 14 Marks)

*M - Marks

Q.No	Question	*M	CO	BL
08.	Write a C program to simulate ATM functions of checking balance, depositing money and withdrawing money. The program should start with a display menu. Based on the choice of the user, the respective function is called. Initially the account balance is 0. Validations for valid amounts in depositing and withdrawal and for sufficient funds in withdrawal are to be included. After deposit and withdrawal operation, new balance should be shown. At the end of each operation, the program should get back to display menu.	14	2	3
09.	Briefly explain the concept of baud rate generation, the significance of RI and TI flags in 8051 serial communication, and write an embedded C program to transmit the message "We are safe" at a baud rate of 19200. Assume that XTAL = 11.0592 MHz.	14	3,4	2
10.	In an 8051-based system, a set of eight LEDs connected to Port 1 toggle in two different patterns with a time interval of 0.5 seconds, generated using Timer 1 in Mode 2. Pattern 1 is toggling between 0x55 (01010101) and 0xAA (10101010) and pattern 2 is toggling between 0xFF (11111111) and 0x00 (00000000). If the switch connected to P3.3 is high, pattern 1 is followed and if it is low, pattern 2 is followed. P3.3 controls the blinking pattern. Simultaneously, edge-triggered pulses received at P3.2 are counted and displayed on Port 2. Write an 8051 C program for this task. Assume XTAL = 11.0592 MHz.	14	4	3
11.	A flame sensor that outputs a logic high (1) on flame detection and the data pins of an LCD are connected to pin P1.0 and port 3, respectively, of an 8051 microcontroller. The LCD's RS, RW, and E pins are connected to P2.0, P2.1, and P2.2. Write an embedded C program to display the message 'Flame detected' on flame detection and turn on a buzzer connected to P2.3. The LCD should be configured for 2 lines, 5×7 matrix, and 8-bit mode. Sketch the complete schematic.	14	5	4

BL-Bloom's Taxonomy Levels - (1.Remembering, 2.Understanding, 3.Applying, 4.Analysing, 5.Evaluating, 6.Creating)

