



VIT School of Electronics Engineering (SENSE)  
CONTINUOUS ASSESSMENT TEST - 1  
FALL SEMESTER 2026-2027

SLOT: E1+TE1

Program Name & Branch : B.Tech. -Computer Science and Engineering  
Course Code and Course Name : BACSE324- Embedded Systems Architecture  
Class Number(s) : VL2026270100683/ VL2026270100689/  
VL2026270100681/VL2026270100673/ VL2026270100675/ VL2026270100685/  
VL2026270100687/ VL2026270100670/ VL2026270100669/ VL2026270100671/  
VL2026270100679  
Faculty Name(s) : Dr Anis Fatema / Dr Muthuraja .S / Dr Rohit Mathur / Dr  
Jaffino. G / Dr Dhanabal R / Dr Shabeeb Ahamed / Dr Nimal J Kumar / Dr Sidharth Gautam / Dr  
Sudhakar M S / Dr Debashish Dash /Dr Vivek Rajpoot  
Exam Duration : 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
  1. Explain the design aspects of a typical microprocessor and illustrate its capabilities.
  2. Practice and emulate assembly programs. To develop logic at assembly level for various operations

| Q. No | Question                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | M          | CO | BL |
|-------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----|----|
| 1.    | With a neat block diagram, explain the architecture of the 8051 Microcontroller.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 10         | 1  | 2  |
| 2.    | <p>a) Assume the following 8-bit signed arithmetic operation is executed by the 8051 microcontroller using the Accumulator (A) and Register R3. Determine the final content of Register A and the status of the CY, AC, OV, and P flags.</p> <p style="margin-left: 40px;">A = -60;<br/>R3 = 80;<br/>A = A - R3;</p> <p>b) A company is developing a smartwatch for continuous health monitoring. Discuss any five-performance metrics that should be considered while designing this embedded system. Explain the importance of each metric in the context of the smartwatch.</p> | 5<br><br>5 | 1  | 3  |
| 3.    | <p>An 8051-based system requires 32 KB of external program memory and 16 KB of external data memory. Design the memory interfacing circuit such that the ROM begins at address 0000H and the RAM begins at address 8000H. Clearly show:</p> <p>a) Complete interfacing circuit showing all required address, data, and control signal connections.</p>                                                                                                                                                                                                                             | 10         | 2  | 3  |



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|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |   |   |   |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
|    | <p>b) Determine the address range occupied by the ROM and RAM.<br/>c) Show the memory address map indicating both used and unused address spaces</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |   |   |
| 4. | <p>a) Draw a schematic to interface ADC (0808) with 8051 for the conversion of analog i/p signal of 2.28V applied at channel no. 6 of ADC (0808) by making 8051 Port 1 as input, Port 2 as address line and Port 3 as control line. Determine the digital output for <math>V_{ref} = 0 : 5V</math>.</p>                                                                                                                                                                                                                                                                                                                                                                                                                               | 5 | 2 | 4 |
|    | <p>b) Consider the following Embedded C program for the 8051 <math>\mu C</math>, assume a 12 MHz crystal:</p> <pre>#include &lt;reg51.h&gt; void main(void) {     TMOD = 0x10;     while(1)     {         TH1 = 0xFE;         TL1 = 0x0C;         TR1 = 1;         while(TF1 == 0);         TR1 = 0;         TF1 = 0;         P3 ^= 0x20;     } }</pre> <p>Answer the following questions:</p> <p>I. Identify the <b>timer</b> used and its <b>operating mode</b>. (1 Mark)</p> <p>II. Determine the <b>effective timer count</b> and the <b>time delay generated</b> during each timer overflow. (2 Mark)</p> <p>III. To generate a <b>2 kHz square wave</b> at P3.5. Show the new values of <b>TH1</b> and <b>TL1</b>. (2 Mark)</p> | 5 |   |   |
| 5. | <p>a) Determine the sequence of output bit patterns generated at Port P1 by the following Embedded C program for the first five iterations of the loop.</p> <pre>#include &lt;reg51.h&gt; void Delay(unsigned int n); void main(void) {     unsigned char LeftLED = 0x80;     unsigned char RightLED = 0x01;     while(1)     {         P1 = LeftLED   RightLED;         Delay(200);     } }</pre>                                                                                                                                                                                                                                                                                                                                    | 5 | 2 | 4 |



# VIT

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

REG.NO.:

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```
LeftLED = LeftLED >> 1;
RightLED = RightLED << 1;
if((LeftLED == 0x08) && (RightLED == 0x10))
{
    P1 = LeftLED | RightLED;
    Delay(200);
    LeftLED = 0x80;
    RightLED = 0x01;
}
}
```

- b) Consider the following Embedded C program for the 8051 microcontroller. Assume a crystal frequency of 11.0592 MHz. Answer the following questions:

```
#include <reg51.h>
void UART_Tx(unsigned char value)
{
    SBUF = value;
    while(TI == 0);
    TI = 0;
}
void UART_Init(void)
{
    TMOD = 0x20;
    TH1 = 0xF4;
    SCON = 0x50;
    TR1 = 1;
}
void main(void)
{
    unsigned char i, n;
    UART_Init();
    n = 1;
    for(i = 0; i < 10; i++)
    {
        if(n == 1)
            n = 2;
        else
            n = n + (i + 1);
        UART_Tx(n);
    }
    while(1);
}
```

- 1) Determine the baud rate used for serial communication. (2 Mark)
- 2) Determine the sequence of decimal values transmitted through the serial port. (3 Marks)

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