B. E. ELECTRONICS & TELE-COMM. ENGG. EXAM., 2019
(3rd Year, 2ⁿᵈ Semester Examination, 2019)

EMBEDDED SYSTEMS

Time: Three Hours   Full Marks: 100

Answer ALL the Five Modules
(All Parts of the same question must be answered at one place only)

MODULE I

1. (a) What is an Embedded System (ES)? Explain the three most important
   differences between an General Purpose Computing System and ES.   [5]
   (b) Draw and explain the Block Diagram of a typical ES.   [10 Marks]

   (c) (i) The Instruction set of RISC Processor is _____ and _____
       (ii) The Instruction set of CISC Processor is Non-orthogonal   [True/False]
       (iii) _____ Processor architecture supports easier pipeline.
       (iv) _____ and _____ are the example of the wireless
       communication interface.
       (v) _____ is an example of Digital Actuator.   [5]
       [OR]
       (i) Explain the role of Reset circuit in ES.
       (ii) Explain the role of Oscillator unit in ES.   [5]

MODULE II

2. (a) List the features that has made Intel 8051 Microcontroller Unit (MCU) as an
   efficient core for real time applications.   [3]
   (b) (i) The memory map of the upper RAM Block and the SFR area of 8052
   MCU are _____ and _____, respectively.   [7]
   (ii) The register address of the registers in each bank of the On-chip RAM is
   _____ and the direct address of the registers in each bank are
   _____ (specify the direct address of registers in each bank
   separately).
   (iii) The memory map of the Bit and Byte addressable area of the RAM is
   _____ and the memory map of the bit addressable locations of the
   on-chip RAM is _____.
   (iv) The instruction _____ will ensure that the Stack starts from the
   Scratch Pad Area of the RAM.
   (v) Both the TMOD and TCON registers are bit addressable [state True / False]
   (c) (i) List the 8051 MCU Internal and External Interrupts and their
   corresponding ISR vector address as per their polling priorities.
   (ii) The 8051 MCU has a total of _____ registers in the SFR area in
   connection with the Interrupts operation and they are _____
   (iii)Explain the function of all the interrupt related SFR registers in 8051 MCU.
   [3+1+6]

MODULE III

3. (a) (i) All the conditional branching instructions in 8051 specify the destination address by _____ [5 X 1]

(ii) The instruction _____ is an example of Indexed addressing and is used to read _____

(iii) The registers _____ are used by indirect addressing only.

(iv) The carry bit must always be cleared before using the instruction _____ during arithmetic operations.

(v) The addressing mode used by the instruction CLR is _____

(b) (i) Write the format of the CALL instruction using Absolute Addressing mode. Explain the computation of the 16-bit CALL location using this addressing mode format.

(ii) Why is this addressing mode faster than the conventional CALL instruction?

(iii) Let (A) = 5FH. The (A) after the execution of the SWAP A instruction is _____ [7+2+1]

(c) (i) Let (DPTR) = 2050H. What will be the (DPTR) after executing the following instructions:

    XCH A, DPL
    DEC A
    CJNE A,#0FFH, SKIP
    DEC DPH
    SKIP: XCH A,DPL

(ii) Let (A) = 0FH. After the execution of DAA, the (A) = _____

(iii) Let (A) = 28BCD. After executing the instruction ADD A,#12H, the (A) = _____ [3+1+1]

MODULE IV

4. (a) (i) Write an 8051 Assembly Language Program (ALP) to implement **n!**

(ii) Write an 8051 ALP to convert a binary number (< 100) to a BCD Number. [10+10]

[OR]

(b) (i) Write an 8051 ALP to find the largest number from an array of 10 numbers.

(ii) Write an 8051 ALP to arrange the array of 10 numbers in ascending order. [10+10]

MODULE IV

5. Design and implement a Temperature Controller using 8051 MCU as the Core of the ES. Draw the Block Diagram of the system and Flow Chart. Write the 8051 ALP. Compare the MCU and MPU (Microprocessing Unit) based implementations. [6+4+8+2]