

B. E. ELECTRONICS & TELE-COMM. ENGG. EXAM., 2017
(3rd Year, 2nd Semester Examination, 2017)

EMBEDDED SYSTEMS

Time: Three Hours

Full Marks: 100

Answer **Q. No.1** and any **Four** from the rest.
(All Parts of a question must be answered at one place only)

1. Fill-in the Blanks / State TRUE or FALSE [2 Marks X 10]

- (a) An Embedded Systems (ES) is designed to perform a _____ and is a combination of _____
- (b) _____ is designed specifically to meet the computational demand and power constraints.
- (c) The instruction set of _____ is complex and less in number.
- (d) The core of the ES in majority of the cases is likely to be _____ based.
- (e) The number of timer units supported by standard 8051 architecture is _____
- (f) The address bus of 8051 architecture is 8-bit wide (TRUE / FALSE)
- (g) During the execution from On-Chip ROM, the signal _____ remains in-active.
- (h) Let $(A) = 28_{BCD}$;
after the execution of the following instructions, $ADD A, \#12H$
 $DA A$
then, $(A) =$ _____
- (i) The 8051 architecture does not support SUB instruction. (TRUE / FALSE)
- (j) The dedicated I/O Port in 8051 architecture is _____

2. (a) Show the Building Blocks of an Embedded System with a neat Block Diagram, and explain the same. [10]
(b) Explain in detail the *most important and unique characteristics* of an Embedded System. [10]

3. (a) Explain in detail, the on-chip data memory (DM) organization of the standard 8051 architecture with the help of a detailed memory map. [5+4+3]
(b) Show the timing diagram for External DM Read operation and explain. [8]

4. (a) Draw the memory map of on-chip Special Purpose / Function Register segment of the 8051 architecture. [3]
(b) How do you identify the registers in this segment which are both bit and byte addressable? [3]
(c) List and explain the function of the registers as per Q. 4(b) in detail. [14]
5. (a) Explain in detail with example, the working of the relative addressing mode supported by the MCS51 family. [4]
(b) Name the addressing mode which is designed to read the Look Up Tables (LUT) in the MCS51 family. Explain in detail the working of this addressing mode and its application indicating the relevant instructions that supports this addressing mode. [8]
(c) Illustrate the working of the PUSH and POP instructions with appropriate examples. [4+4]
6. (a) Write an 8051 Assembly Language Program (ALP) to implement $y = mx + c$, where m , x and c are 8-bit data values; Store the final result at the external memory location 8000H and 8001H. Ensure that the Stack is re-initialized to non-register specific area of the on-chip RAM.
(b) Write an 8051 ALP to find the largest element in the given data array: 02H, 01H, 09H, 00H, 0AH, 04H, FFH
(c) Implement the Full Adder (FA) logic using Bit-addressing. [4+6+10]
7. Explain the example of an automation application with 8051 based ES design to implement *conditional sequencing* with appropriate Algorithm, Flow Chart and ALP. [5+5+10]
8. Write short notes on: [2 X 10]
(a) Contrast Harvard Vs Von-Neumann Architecture
(b) Fundamental issues in Hardware Software Co-Design