B. E. ELECTRONICS & TELE-COMM. ENGG. EXAM., 2018
(3rd Year, 2nd Semester Examination, 2018)

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

[Answer Questions 1 (a) & (b) and either 1 (c) or (d)]

1. (a) Describe and Differentiate General Purpose Computing Systems and Embedded Systems [5 Marks]
   (b) Show the classification of the Embedded Systems (ES) based on the Complexity and Performance [5 Marks]
   (c) List and briefly explain the different elements of the ES using appropriate Block Diagram [10 Marks]
   (d) List and briefly explain the components used as the core of an Embedded System [10 Marks]

MODULE II

2. (a) Explain why 8051 Microcontroller Unit (MCU) is the popular choice for Low Cost and yet good performance ES design. **[5]**
   (b) Show the on-chip RAM configuration of 8051 MCU with a neat diagram along with the complete memory map details. Explain the Bit-and-Byte area of the on-chip RAM with its respective complete memory map details. **[8]**
   (c) Show the memory map of the Special Function Register (SFR) area of the 8051 MCU. Identify and specifically name the registers in the SFR area which are both bit-and-byte addressable. **[7]**

MODULE III

3. (a) List all the addressing modes available with the 8051 MCU **[4]**
   (b) (i) Identify the Boolean Accumulator in 8051 MCU. (ii) Implement Bitwise EX- NOR logic and Write an 8051 Assembly Language Program (ALP) for the same. **[4]**
   (c) 8051 does not have the HLT instruction. Show and explain the addressing mode that is used to implement HLT instruction. Show the range of jump associated with this addressing mode **[4]**
   (d) Explain in detail with example, the working of the addressing mode that use Ri registers. What does i stand for and its numerical value? **[4]**

(e) What is the default content of Stack Pointer – SP Register? Explain why and how the SP register can be re-initialized in the Scratch Pad area of the on-chip RAM? **[4]**

MODULE IV

4. **(a)** Show how to subtract 40H from 44H using two different addressing modes. Write the 8051 ALP for the same. Repeat the task by changing from the default register bank to the last register bank **[8]**
(b) Let the external memory block [9000H] to [900FH] have the data 00H. Write an 8051 ALP to replace this memory block with the data FFH. **[12]**

MODULE IV

5. (a) Design and implement a Process Controller using 8051 MCU as the Core of the ES. Draw the Block Diagram, Flow Chart of the system and write the 8051 ALP. **[5+5+10]**