

B.E. Electronics & Telecommunication Engineering
Third Year, Semester 2 Examinations, May 2025

Embedded Systems

Ref. No.: Ex/ET/PC/H/T/325/2025

Time: 3 Hours

Full Marks: 100

Instructions:

- (i) Questions must be answered serially.
- (ii) All parts of the same Section / Question must be answered at ONE place, only.

Section 1 (CO1):

1. (A) List the major requirements of an Embedded Systems, and enumerate how the ARM Processor Design have incorporated them. (10 Marks)
- (B) List and explain the major hardware components that makeup the ARM-based Embedded device with a suitable illustration. (10)

Section 2 (CO2):

2. (A) (a) Justify the Provision of 8-bit address for the Data Memory (DM) for the MCS-51 Microcontroller Unit (MCU) devices.
- (b) What is the size of the Intel 8051 MCU DM? (2+1)
- (B) The 8051 MCU is termed as a "Bit & Byte Processor". Justify this Statement by Illustrating the corresponding Block of DM with their associated Memory Map. (8)
- (C) For the On-Chip Serial Interface of 8051 MCU, illustrate the Mode-1 Operation and the method of baud-rate generation. (5+4)

Section 3 (CO3):

3. (A) Illustrate the Von Neumann Implementation of the ARM Processor Core, and how the different parts interact. (10)
- (B) Illustrate the ARM On-chip Register Profile. List and explain their salient features. (10)

Section 4:

4. (A) (a) Identify the addressing mode that is unique to 8051 MCU. (1+1+3)
- (b) What is the default contents of the Register Bank Select Bits of the Program Status Word (PSW - Special Function Register – SFR)?
- (c) Write instructions in order to change / choose the last register bank in the DM.
- (B) Write an Efficient 8051 MCU Assembly Language Program (ALP) to generate the numbers which are in Geometric Progression (up to the data size of FFH). (15)

Section 5 (CO5):

5. (A) Name the widely used Serial Communication Protocol, and the associated Handshake signals used in this Protocol. (4)
- (B) Design and Implement an Application for 'Industrial Automation' with Appropriate Algorithm, Flow chart and ALP. List and explain the 8051 MCU On-Chip Peripheral used in this application. (4X4)