

(Time: 2½ hours)

Total Marks: 75

N. B.: (1) **All** questions are **compulsory**.(2) Make **suitable assumptions** wherever necessary and **state the assumptions** made.(3) Answers to the **same question** must be **written together**.(4) Numbers to the **right** indicate **marks**.(5) Draw **neat labeled diagrams** wherever **necessary**.(6) Use of **Non-programmable** calculators is **allowed**.1. Attempt **any three** of the following: 15

- What is an embedded system? Classify embedded systems based on complexity and performance.
- Explain the purpose of embedded systems in data communication.
- State the differences between Harvard and Von-Neumann architecture.
- State the advantages of programmable logic devices over fixed logic devices.
- What is non-operational quality attribute? Explain the various non-operational quality attributes to be considered in any embedded system design.
- Explain the significance of quality attributes maintainability in embedded system design context.

2. Attempt **any three** of the following: 15

- Give an overview of the various types of electronic control units employed in automotive applications.
- Write a short note on memory map.
- Explain the role of watch dog timer in embedded systems.
- What is the purpose of memory testing in embedded systems?
- State the importance of device driver.
- What is the significance of memory in embedded firmware/systems? What is on-chip memory and off-chip memory? Explain FLASH memory in brief.

3. Attempt **any three** of the following: 15

- Compare and contrast microprocessor and microcontroller.
- List and explain the data types of 8051.
- What is port 0? Explain the dual role of port 0.
- Write an embedded C program to toggle all bits of P0, P1 every 1/4 of a second.
- Write an embedded C program to count up P1 from 0-99 continuously.
- Write an embedded C program to convert ASCII digits of '4' and '8' to packed BCD and display them on P1.

4. Attempt **any three** of the following: 15

- List and explain any five factors to be considered in selecting a microprocessor.
- Draw the architectural block diagram of 8051 and explain oscillator unit.
- Write a short note on infinite loop.

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- d. Briefly explain the structure of embedded program with example.
- e. Describe the linking process for embedded programs.
- f. What are remote debuggers? Explain.

5. Attempt any three of the following:

15

- a. Explain the difference between the memory management of general purpose kernel and real-time kernel.
- b. What are the various functional requirements that needs to be evaluated in the selection of an RTOS (Real Time Operating System)?
- c. List the types of files generated on cross-compilation and explain any two types.
- d. Explain the advantages and limitations of simulator based debugging.
- e. What is EDLC? Why EDLC is essential in embedded product development?
- f. Describe the various phases of Embedded Product Development Life Cycle.

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