Q.P. Code: 36151

(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**

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

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

a. Give an overview of the various types of electronic control units employed in automotive applications.
b. Write a short note on memory map.
c. Explain the role of watch dog timer in embedded systems.
d. What is the purpose of memory testing in embedded systems?
e. State the importance of device driver.
f. 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**

a. Compare and contrast microprocessor and microcontroller.
b. List and explain the data types of 8051.
c. What is port 0? Explain the dual role of port 0.
d. Write an embedded C program to toggle all bits of P0, P1 every 1/4 of a second.
e. Write an embedded C program to count up P1 from 0-99 continuously.
f. 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**

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

[TURN OVER]

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.

****