Q. P. Code: 36152

(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. Explain the difference between general purpose computer system and embedded system. What are different application areas of embedded systems?

b. Enlist various purposes of embedded systems. Explain any two in detail.

c. What is difference between
   1. RISC and CISC processors.
   2. Little endian and big endian processors.

d. Explain sensor and actuator. Explain any one sensor device used in embedded system in detail.

e. Explain I2C bus in detail.

f. Explain operational quality attributes of embedded system

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

a What is embedded firmware? Explain watchdog timer in detail.

b Explain the following
   1. EPROM and EEPROM.
   2. Static RAM and dynamic RAM.

c Explain importance of memory testing. What are different memory testing methods? Explain any one memory testing method in detail.

d Write short note on washing machine-application specific embedded system.

e Explain memory map and interrupt map of 8051 microcontroller.

f What is device driver? Explain role of device driver in embedded operating system based products.

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

a. What are the features of 8051 microcontroller? Draw block diagram of 8051 and explain.

b. Explain I/O ports in microcontroller 8051. Write 8051 C program to toggle all bits of P0 continuously.

c. Explain data types in 8051. Write an 8051 C program to send values of -4 to +4 to port P1.

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d. Explain the following registers
   1. Program status word.
   2. Data pointer and program counter.

e. Explain following
   1. ROM.
   2. NV RAM.
   3. Flash memory.

f. Write 8051 C program to convert ASCII digits '4' and '7' to packed BCD and display them on port P1.

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

a. What are different factors to be considered in selecting a microcontroller for any application?

b. Define the following
   1. Machine language.
   2. Hex file.
   3. Linker.
   4. Assembler.
   5. Simulator.

c. What is pointer in embedded C? Explain its role in embedded C programs.

d. What is function of delay programming in embedded applications? Explain how infinite loop can be used to introduce delay. Give suitable embedded C program for the same.

e. What is debugging? What are different debugging techniques?

f. Explain register banks in 8051 microcontroller. Which is default register bank? How register bank can be selected using Program Status Word register (PSW)?

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

a. What are basic functions of real time kernel?

b. What are functional requirements in selection of real-time operating system (RTOS)?

c. What is the importance of disassembler and emulator?

d. What is Embedded Product Development Life Cycle? Explain the following phases
   1. Need.
   2. Conceptualization.
   3. Development and testing.

e. What are different files generated in cross compiler?

f. Write short note on trends in embedded industry with the following points
   1. Processor.
   2. Development languages.

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