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Paper Code : EC-704B

EMBEDDED SYSTEMS

Time Allotted : 3 Hours | *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) The instruction set of RISC processor is
   a) simple and lesser in number
   b) complex and lesser in number
   c) simple and larger in number
   d) complex and larger in number.

ii) Which of the following is one time programmable memory ?
   a) SRAM
   b) PROM
   c) FLASH
   d) NVRAM.

[Turn over

iii) What is theoretical maximum data rate supported by GPRS ?
   a) 8 Mbps
   b) 12 Mbps
   c) 100 Kbps
   d) 171·2 Kbps.

iv) Which of the following is a distributed embedded system ?
   a) Cell phone
   b) Notebook computer
   c) SCADA system
   d) All of these.

v) What is the size of SFR memory supported by standard 8051 architecture ?
   a) 64 bytes
   b) 128 bytes
   c) 256 bytes
   d) 1024 bytes.

6 vi) Which of the following is the best suited architecture for implementing a DSP embedded system ?
   a) Controller Architecture
   b) CISC
   c) Data path architecture
   d) None of these.

vii) Which of the following is not a static diagram in UML ?
   a) Class diagram
   b) Object diagram
   c) Use case diagram
   d) Component diagram.

viii) The memory area which holds the program code corresponding to the core OS application / services is known as
   a) User space
   b) Kernel space
   c) Shared memory
   d) all of these.

ix) The data memory of a process holds
   a) local variables
   b) global variables
   c) program instructions
   d) none of these.

x) Multitasking involves
a) Context switching b) Context saving
c) Context retrieval d) All of these.

xi) The program that converts machine codes into target processor specific assembly code is
a) Disassembler b) Assembler
c) Cross-compiler d) Decompiles.

xii) Example of unconditional branching is
a) if-else statement b) if-else-if statement
c) switch case d) goto label.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. Write the comparison between embedded system and general computing systems. What is the purpose of embedded system ? 3 + 2

3. What are the fundamental issues in hardware & software co-design in an embedded system ? What are qualities of good RTOS ? 3 + 2

4. Give examples of some popular microcontrollers used in embedded systems. Mention how I/O devices are classified for embedded system ? 3 + 2

5. Mention what are buses used for communication in embedded system ? Why embedded system is useful ? 3 + 2

6. List out various uses of timers in embedded system ? What is the need for an infinite loop in embedded systems ? 3 + 2

7. What is Robotics ? Discuss its applications ? 3 + 2

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

8. a) Explain the sensors and actuators. 5
b) Explain the brain machine interface ? Discuss RFID. 5 + 5

9. a) Explain the hardware architecture of the real time systems. 7
b) Discuss the Hardware Software trade-offs DFG model. 8

10. a) Explain task, process and threads. What is the difference between task communications and task synchronization ? 5 + 3
b) Describe the various building blocks of UML. 7

11. a) Explain the various hardware-software co-design issues in embedded system. 7
b) Discuss the finite state machine ? Give the examples of serial bus communication protocols. 5 + 3

12. Write short notes on any *three* of the following : 3 × 5
a) Watchdog Timer
b) System on Chip (SoC)
c) UART
d) USB & Bluetooth
e) FPGA.