

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

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Course Code

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Fourth Semester B.E. Degree Examinations, September/October 2024

MICROCONTROLLER AND EMBEDDED SYSTEMS

(Common to CSE & AIML)

Duration: 3 hrs

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Missing data, if any, may be suitably assumed.

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO:PI)</u>
MODULE – 1			
1.	a. Compare and Contrast CISC and RISC architecture.	06	(2 :1 : 1.3.1)
	b. Explain briefly the ARM processor based embedded system hardware with diagram.	08	(2 :1 : 1.3.1)
	c. Discuss the ARM design Philosophy.	06	(2 :1 : 1.3.1)
OR			
2.	a. Elaborate how ARM instruction set differs from the pure RISC definition.	04	(2 :1 : 1.3.1)
	b. Explain briefly the complete ARM register set.	08	(2 :1 : 1.6.1)
	c. Give the schematic of a Current Program Status Register of ARM7 processor briefing the individual bits.	08	
MODULE – 2			
3.	a. Explain the different data processing instructions for ARM processor	10	(2 :2 : 1.6.1)
	b. If $r0 = 0 \times 00000000$, $r1 = 0 \times 80000004$, Find the content of the registers $r0$ and $r1$ after the following instructions are executed in isolation. Mention if the CPSR register is updated or not. (i) MOV $r0, r1$ (ii) MOV $r0, r1, LSL \#1$ (iii) MOVS $r0, r1, LSL \#1$ (iv) MVN $r0, r1$ (v) MOV $r0, r1, LSR \#1$.	10	(2 :2 : 1.6.1)
OR			
4.	a. Discuss the different single register Load-Store instructions used with ARM.	10	(2 :2 : 1.3.1)
	b. If $r0 = 0 \times 00000000$, $r1 = 0 \times 02040608$ and $r2 = 0 \times 10305070$, Find the content of the register $r0$ & $r1$ after the following instructions are executed in isolation and also mention if the CPSR register is updated or not. (i) AND $r0, r1, r2$ (ii) ORR $r0, r1, r2$ (iii) BIC $r0, r1, r2$ (iv) CMP $r1, r2$ (v) CMN $r1, r2$	10	(3 :2 : 1.3.1)
MODULE – 3			
5.	a. Explain with example purpose of embedded systems.	06	(2 :3 : 1.6.1)
	b. What is 7-Segment LED display? What are the different configurations of 7-segment LED display? Explain.	07	(2 :3 : 1.6.1)
	c. Compare and contrast I2C and SPI communication interface.	07	
OR			
6.	a. Differentiate between Von-Neumann versus Harvard Architecture.	05	(2 :3 : 1.3.1)
	b. What is Stepper Motor? Explain different step modes. Also, explain the role of stepper motor in embedded applications.	10	(3 :3 : 1.3.1)

- c. Explain briefly wireless communication interfaces. **05** (2 :3 : 1.6.1)

MODULE – 4

7. a. Describe operational and non-operational quality attributes of embedded systems. **08** (2 :4 : 1.3.1)
b. Design FSM model for seat belt warning in automotive system. **06** (3 :4 : 1.3.1)
c. Design FSM model for tea/coffee vending machine. **06** (2 :4 : 1.6.1)

OR

8. a. Explain the fundamental issues in hardware software co-design. **06** (3 :4 : 1.3.1)
b. Explain with a neat block diagram, how source file to object file translation takes place. **08** (2 :5 : 1.4.1)
c. Explain the different embedded firmware design approaches. **06** (3 :4 : 1.3.1)

MODULE – 5

9. a. With neat diagram explain operating system architecture. **08** (3 :5 : 1.3.1)
b. Differentiate between hard real time and soft real time operating system with an example for each. **04** (3 :5 : 1.3.1)
c. Define process. Explain in detail the state transition of the process with a neat diagram. **08** (3 :5 : 1.3.1)

OR

10. a. Explain the role of IDE for Embedded software development **08** (3 :5 : 1.3.1)
b. Write a note on simulation and emulation. **08** (3 :5 : 1.3.1)
c. Explain the concept of deadlock with a neat diagram. **04** (2 :5 : 1.3.1)

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