

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, July 2026

MICROCONTROLLER & EMBEDDED SYSTEM

(Computer Science & Engineering)

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>
<u>Module-1</u>			
1.	a. Taubate difference between CISC and RISC.	07	(2 : 1 : 1.7.1)
	b. Differentiate between microprocessor and microcontroller.	07	(2 : 1 : 1.7.1)
	c. Explain briefly the current program status register (CPRS).	06	(2 : 1 : 1.7.1)
(OR)			
2.	a. Explain embedded system software.	07	(2 : 1 : 1.7.1)
	b. Explain arm 3 stage and 5 stage pipelines.	07	(2 : 1 : 1.7.1)
	c. Explain different processor modes of ARM processor.	06	(2 : 1 : 1.7.1)
<u>Module-2</u>			
3.	a. What is inline barrel shifter? Discuss various operations of barrel shifter.	07	(2 : 2 : 1.7.1)
	b. With suitable example, explain BRANCH instructions.	07	(2 : 2 : 1.7.1)
	c. Explain the following instructions with syntax and example: (i) ADD (ii) SUB (iii) LSR	06	(2 : 2 : 1.7.1)
(OR)			
4.	a. If r0=0x00000000, r1=0x00000002 and r2=0x00000001 Find the content of the register r0, r1 and r2 after the following instructions are executed separately. Mention if the CPSR register is updated or not. (i) ADD r0,r1,r2,LSL #1 (ii) SUB r0,r1,r2	07	(3 : 2 : 1.7.1)
	b. Explain MSR and MRS instructions with suitable examples.	07	(2 : 2 : 1.7.1)
	c. Explain (i) LDR (ii) STR (iii) LDRB Instructions in ARM.	06	(2 : 2 : 1.7.1)
<u>Module-3</u>			
5.	a. What is an embedded system? Differentiate between general computing system and embedded system.	07	(2 : 3 : 1.7.1)
	b. List any four purposes of embedded systems with examples.	07	(2 : 3 : 1.7.1)

Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

- c. Briefly describe the classification of embedded system based on complexity and performance. **06 (2 :3 : 1.7.1)**

(OR)

6. a. Explain different types of program storage memory (ROM). **07 (2 :3 : 1.7.1)**
 b. With a neat diagram explain Von Neuman architecture and Harvard architecture. **07 (2 :3 : 1.7.1)**
 c. What are sensors and actuators? Show how the information flows from sensors to the actuators. **06 (2 :3 : 1.7.1)**

Module-4

7. a. Explain the unique characteristics of embedded system. **07 (2 :4 : 1.7.1)**
 b. Explain briefly the operational quality attributes of an embedded system. **07 (2 :4 : 1.7.1)**
 c. With a neat block diagram, explain design and working of washing machine. **06 (2 :4 : 1.7.1)**

(OR)

8. a. Explain Data Flow Graph (DFG) model and for the following equations draw DFG:
 $x = a + b; \quad y = x - c; \quad z = y * d;$ **07 (2 :4 : 1.7.1)**
 b. Design and automatic Tea/coffee vending machine-based FSM model for the following requirements. **07 (2 :4 : 1.7.1)**
 The Tea/coffee vending is initiated by user Inserting a ₹5 coin. After inserting the coin, the user can either select coffee or tea or press cancel to cancel the order. And take back the coin.
 c. Explain, briefly, the fundamental issues in hardware software co-design. **06 (2 :4 : 1.7.1)**

Module-5

9. a. Explain operating system basics architecture with neat diagram. **10 (2 :5 : 1.7.1)**
 b. Draw the diagram of process states and explain the same. **10 (2 :5 : 1.7.1)**

(OR)

10. a. Define deadlock. With diagram explain conditions favouring deadlock and handling deadlock. **10 (2 :5 : 1.7.1)**
 b. Discuss about Kernel Level thread in the operating system context. Explain Many-to-One Model, One-to-One Model, Many-to-Many Model. **10 (2 :5 : 1.7.1)**

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