Basavarajeswari Group of Institutions

2022 SCHEME

BALLARI INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institute under Visvesvaraya Technological University, Belagavi)

USN										

Course Code **22CA62**

Sixth Semester B.E. Degree Examinations, June/July 2025

MICROCONTROLLERS & EMBEDDED AI

(CSE- AI)

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

Q. No		*Question*	*Marks*	*(RBTL:CO: PI)*
		Module-1		
1.	**a.**	Compare and contrast ARM instruction set with that of pure RISC.	**06**	**(2:1:1.3.1)**
	b.	Explain CPSR with suitable diagrams.	**08**	**(2:1:1.3.1)**
	c.	Discuss various ARM registers.	**06**	**(2:1:1.3.1)**
		(OR)		
2.	**a.**	Explain the ARM processor based embedded system hardware.	**10**	**(2:1:1.3.1)**
	b.	Discuss the different hardware extensions of ARM.	**05**	**(2:1:1.3.1)**
	c.	Discuss how ARM handles exceptions.	**05**	**(2:1:1.3.1)**
		Module-2		
3.	**a.**	Discuss in detail the data processing instructions with an example for each	**10**	**(2:2:1.3.1)**
	b.	Write a C code find whether c is a letter and convert it into a Assembly Code	**10**	**(2:2:1.3.1)**
		(OR)		
4.	**a.**	Discuss in detail the software interrupt instruction with an example.	**05**	**(2:2:1.3.1)**
	b.	Write a C code to identify whether the character is a vowel or a consonant and convert it into Assembly Code	**10**	**(2:2:1.3.1)**
	c.	Discuss the various branch instructions in ARM.	**05**	**(2:2:1.3.1)**
		Module-3		
5.	**a.**	Explain in detail core of embedded systems.	**10**	**(2:3:1.3.1)**
	b.	Compare and contrast general purpose computing system and embedded system.	**10**	**(2:3:1.3.1)**
		(OR)		
6.	**a.**	Describe the classification of embedded systems.	**10**	**(2:3:1.3.1)**
	b.	Compare and contrast Harvard architecture and Von-Newman architecture.	**05**	**(2:3:1.3.1)**
	c.	Write the short notes on sensors and actuators.	**05**	**(2:3:1.3.1)**

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

Module-4

7.	**a.**	With the help of functional block diagram, explain washing machine application specific embedded system.	**10**	**(2:4:1.3.1)**
	b.	Compare and contrast dataflow graph diagram with control flow graph diagram.	**05**	**(2:4:1.3.1)**
	c.	Discuss the issues hardware software codesign.	**05**	**(2:4:1.3.1)**

(OR)

8.	**a.**	Explain concurrent processing program model for the seat belt warning system	**10**	**(2:4:1.3.1)**
	b.	Discuss the characteristics and quality attributes of embedded systems.	**10**	**(2:4:1.3.1)**

Module-5

9.	**a.**	Explain the benefits of integrating AI into embedded systems.	**07**	**(2:5:1.3.1)**
	b.	Demonstrate how to use TinyML for environmental monitoring.	**07**	**(2:5:1.3.1)**
	c.	Analyze the trade-off between model accuracy and inference latency in edge devices.	**06**	**(2:5:1.3.1)**

(OR)

10.	**a.**	Summarize the main limitations of embedded AI systems.	**07**	**(2:5:1.3.1)**
	b.	Implement a sound classification model on a microcontroller.	**07**	**(2:5:1.3.1)**
	c.	Examine how hardware constraints impact model selection.	**06**	**(2:5:1.3.1)**

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