PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – MAY/ JUNE 2025

Date: 05-06-2025   **Time:** 09:30 am – 12:30 pm

School: SOCSE	**Program:** B. Tech
Course Code: ECE3040	**Course Name:** Embedded Systems
Semester: VI	**Max Marks**: 100 **Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4
Marks	9	24	36	31

Instructions:

    (i) Read all questions carefully and answer accordingly.

    (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.   **10Q x 2M=20M**

1.	What is an embedded system and can you provide two examples?	2 Marks	L1	CO1

2.	Indicate whether each statement is True or False:
	  1. Embedded systems process input data in the form of analog signals.
	  2. Embedded systems are also known as dedicated systems.
		2 Marks	L1	CO1

3.	Which of the following components are typically integrated on-chip in an ARM microcontroller? a) RAM b) Timer c) I/O d) All of the above	2 Marks	L1	CO2
4.	Write assembly instructions that add the hexadecimal values 0x16 and 0xCD, storing the final result in the R1 register.	2 Marks	L1	CO2
5.	Define what peripherals are in computing systems. What are the different categories or types of peripherals that exist?	2 Marks	L1	CO3
6.	Define modular programming and explain two benefits or advantages that it offers in software development.	2 Marks	L1	CO3
7.	Explain the Control Area Network (CAN) protocol and clarify whether it operates with a master-slave architecture or not.	2 Marks	L1	CO3
8.	Compare general purpose operating systems (GPOS) and real-time operating systems (RTOS) by highlighting two key differences between them.	2 Marks	L1	CO4

9.	Provide two specific examples of applications or domains where Real-Time Operating Systems (RTOS) are implemented.	2 Marks	L1	CO4
10.	For each of the following operating systems, identify its primary application domain or typical use case: a) macOS b) iOS c) RTOS d) Linux	2 Marks	L1	CO4

Part B

Answer the Questions.   **Total Marks 80M**

11.	a.	What are addressing modes? Describe the different addressing modes used in ARM architecture, providing one example for each.	10 marks	L1	CO2
	b.	What are the advantages and disadvantages of a microprocessor using a fixed 32-bit instruction length?	5 Marks	L1	CO2
	c.	How are embedded systems classified?	5 Marks	L1	CO1
		Or			
12.	a.	Compare the TM4C123X and LPC21xx (NXP) architectures based on clock frequency, flash memory, I/O pins, and power consumption.	10 Marks	L1	CO2
	b.	Why is ARM architecture so widely used? Name three companies that manufacture ARM-based processors and list two key features of ARM.	5 Marks	L1	CO2
	c.	Discuss the applications and research areas of embedded systems.	5Marks	L1	CO1

13.	a.	Explain the I^2C protocol used for serial communication in embedded systems.	10 Marks	L3	CO3
	b.	What are a logic probe and an oscilloscope? Describe their uses and limitations.	5 Marks	L2	CO3
	c.	List five key features of the ARM instruction set.	5 Marks	L3	CO2
		Or			
14.	a.	Explain the CAN protocol used for serial communication in embedded systems.	10 Marks	L3	CO3
	b.	What is a logic analyzer and a JTAG debugger? Describe their uses and limitations.	5 Marks	L2	CO3
	c.	Describe the key features of the Thumb instruction set.	5 Marks	L3	CO2

15.	a.	What is an operating system (OS)? Why is an operating system necessary? List the key functions of an OS.	10 Marks	L3	CO4
	b.	Explain five different types of operating systems, each tailored for specific use cases.	5 Marks	L2	CO4
	c.	What is MicroC/OS-II? Highlight its key features and typical applications.	5 Marks	L3	CO4
		Or			

16.	a.	What is a real-time operating system (RTOS)? What challenges does an RTOS face in embedded systems? Provide an example of a real-life application of RTOS.	**10 Marks**	**L3**	**CO4**
	b.	Explain the architecture of a real-time operating system (RTOS).	**5 Marks**	**L2**	**CO4**
	c.	What is a kernel? List its key responsibilities.	**5 Marks**	**L3**	**CO4**

17.	a.	What is serial communication? What are the two main types of serial communication? Explain each with an example.	10 Marks	**L3**	**CO3**
	b.	What is a stepper motor? Explain its working principle.	**5 Marks**	**L2**	**CO3**
	c.	What is RTLinux? Highlight its key features and typical applications.	**5 Marks**	**L2**	**CO4**
		Or			
18.	a.	Compare I^{2}C and CAN as serial communication protocols used in embedded systems.	**10 Marks**	**L3**	**CO3**
	b.	What is a DC motor? Explain its working principle.	**5 Marks**	**L2**	**CO3**
	c.	What is VxWorks? List its key features and typical applications.	**5 Marks**	**L2**	**CO4**