CBCS SCHEME

USN

BEC601/BTE601/BVL601

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Embedded System Design

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Define Embedded System. Explain the six purpose of Embedded system with an example for each.	8	L2	CO3
	b.	Bring out the differences between RISC and CISC.	4	L2	CO3
	c.	Mention all the cores around which an embedded system is built. Discuss any two in detail.	8	L2	CO3
		OR			
Q.2	a.	What are the different types of memories need in Embedded System Design? Explain the role of each.	8	L2	CO3
	b.	With a neat interfacing diagram, explain Inter Integrated Circuit (I2C) Bus.	6	L2	CO3
	c.	Explain the following circuits in an Embedded System. i) Brown out Protection Unit ii) Watch Dog Timer (WDT)	6	L2	CO3
		Module – 2			
Q.3	a.	Explain the different characteristics of Embedded System in detail.	8	L2	CO4
	b.	Explain the different types of serial interface bus used in Automotive Communication.	6	L2	CO4
	c.	Compare CDFG and DFG with an example.	6	L4	CO4
		OR			
Q.4	a.	Explain the different fundamental design approaches used in Hardware Software Co-design.	8	L2	CO4
	b.	With FSM model, explain the design and operation of Automatic Tea/Coffee Vending Machine.	6	L2	CO4
	c.	Explain with a neat diagram, the process of converting assembly language to machine language.	6	L2	CO4
		Module – 3			
Q.5	a.	With a neat diagram, explain the different functions of operating system.	8	L2	CO5
	b.	Explain in detail the structure, memory organization and state transitions of the process.	8	L2	CO5
	c.	Differentiate between Hard Real Time System and Soft Real Time System with an example for each.	4	L4	CO5

		OR			
Q.6	a.	Three process with process IDS P_1, P_2 and P_3 are having estimated completion time of 10, 5, 7 milliseconds respectively. A new process P_4 with estimated completion time of 2 ms enter the READY queue after 2 ms. Calculate the waiting time and turnaround time for each process and the average waiting time and turnaround time (assuming no I/O waiting for the processes) in SJF scheduling algorithm.	7	L3	CO5
	b.	Explain the concept of Dead lock with an example. Also explain the methods of handling Dead lock.	5	L2	CO5
	c.	Discuss the different techniques for embedding the firmware into the target processor.	8	L2	CO5
		Module – 4			
Q.7	a.	With a neat diagram, explain the four main hardware components of ARM-based embedded device.	8	L2	CO1
	b.	Discuss about RISC design philosophy.	6	L2	CO1
	c.	Explain the factors that make the ARM instruction set suitable for embedded applications.	6	L2	CO1
		OR			
Q.8	a.	Explain ARM core data flow model with neat diagram.	8	L2	CO1
	b.	Explain the different processor modes of ARM processor with the help of ARM register set.	6	L2	CO1
	c.	With suitable diagrams, explain the following hardware extensions of ARM code. i) Cache and tightly coupled memory ii) Memory Management	6	L2	CO1
		Module – 5			
Q.9	a.	Explain with diagram, barrel shifter operation in ARM processor. Give an example.	8	L2	CO2
	b.	Explain the following instructions with example i) UMLAL ii) RSC iii) SWI iv) SWPB.	6	L2	CO2
	c.	Develop an assembly language program to count the number of ones and zeros in two consecutive memory locations.	6	L3	CO2
		OR			
Q.10	a.	Explain single register load-store instructions with example.	8	L2	CO2
	b.	Explain both forward and backward branch instructions with an example.	6	L2	CO2
	c.	Develop an assembly language program to find the largest/smallest number in an array of 32 bit numbers.	6	L3	CO2

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