K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:VII
Class:FINAL	Program:B.Tech
Branch Code:ETC	Pattern:2022
Name of Course:Real Time Operating System	Course Code:ETC224005C
Max. Marks:60	Duration:2.30 Hrs.

Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains 2 pages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1a)	What are the different types of software maintenance? How do they apply to embedded systems?	(6)	CO1
Question No. 2			
2a)	What is a critical section in real-time systems? Why is it important to handle critical sections carefully in multitasking environments?	(6)	CO2
Question No. 3			
3a)	Apply task scheduling and task-level context switching concepts in UC/OS-II through a program.	(8)	CO3
	OR		
3b)	Design an interrupt service routine (ISR) for a real-time clock and integrate it with task scheduling.	(8)	CO3
3c)	Construct a task management strategy for a home automation system using µC/OS-II.	(8)	CO3
	OR		
3d)	Demonstrate the use of UC/OS-II features by writing a simple program example.	(8)	CO3
Question No. 4			
4a)	Implement an RTOS-based system where a mailbox is used to pass temperature sensor readings from a data acquisition task to a display task.	(8)	CO3
	OR		
4b)	Construct a real-time communication system using message mailboxes for exchanging messages between producer and consumer tasks.	(8)	CO4
4c)	Apply counting semaphores to manage access to a limited number of identical hardware resources (e.g., ADC channels) among several tasks.	(8)	CO4

OR

4d)	Draw a block diagram showing how an analog signal is read by one task and another task takes action based on the signal data using a semaphore in µC/OS-II.	(8)	CO4

Question No. 5

5a)	Design Software for vending machine with RTOS.	(8)	CO5

OR

5b)	Apply Queue features in µC/OS-II to enable communication between a temperature monitoring task and a control task.	(8)	CO5
5c)	Apply the concept of memory partitioning in µC/OS-II to manage limited RAM in a portable instrument.	(8)	CO5

OR

5d)	Demonstrate how to configure system tick and timer functions while porting µC/OS-II to a new embedded platform.	(8)	CO5

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