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: IV
Class: SY	Program: B.Tech
Branch Code: ELE	Pattern: 2023
Name of Course: Microcontroller and Embedded Systems	Course Code: 2306216
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 page(s).
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)	Differentiate between the concepts of RISC and CISC architecture in the microcontrollers.	(6)	CO 1
Question No. 2			
2a)	With the help of well labelled diagram, explain the pin diagram of microcontrollers	(6)	CO 2
Question No. 3			
3a)	With the help of a well-labelled diagram, describe the pin diagram of the Power Control register in the 8051 microcontroller.	(8)	CO 2
	OR		
3b)	With the help of a well-labelled diagram, describe the pin diagram of the Interrupt Priority register in the 8051 microcontroller.	(8)	CO 2
3c)	Write an assembly language program to generate a square wave of 50 Hz frequency with a duty cycle of 50 % on pin 2.3. Assume the crystal frequency of 11.0592 MHz while using Timer 0 in mode 1 operation.	(8)	CO 2
	OR		
3d)	Write an assembly language program to toggle bit P1.5, 5000 times. Uses a suitable loop to generate the time delay.	(8)	CO 2
Question No. 4			
4a)	With the help of a neat and well-labeled diagram, explain the interfacing circuit of a 3×3 matrix keypad with a microcontroller. Write an algorithm to detect a key pressed on the keypad and display the corresponding key value on Port 2.	(8)	CO 3
	OR		
4b)	With the help of a well-labeled diagram, explain the interfacing circuit of a light-dependent resistor (digital sensor) with a microcontroller. Write an algorithm to measure the light intensity from the LDR connected to analog input Pin 4 of the microcontroller and display the value on an LCD.	(8)	CO 3

4c) To automatically control the irrigation of plants in a greenhouse, an embedded system is to be designed. With the help of a well-labeled diagram, explain the soil moisture sensor and its interfacing with a microcontroller to operate the water pump as per the moisture level. (8) CO 3

OR

4d) To automatically monitor vehicle speed on highways and generate alerts for over-speeding, an embedded system is to be designed. The system uses a radar speed sensor, GSM module, and microcontroller. Develop an algorithm for the system so that it detects over-speeding vehicles and sends SMS alerts to the control center. (8) CO 3

Question No. 5

5a) Explain the different states of pipeline architectures with the help of a suitable diagram. (8) CO 4

OR

5b) List and explain the various shift operators in ARM architecture. Provide suitable examples for each operation. (8) CO 4

5c) With the help of suitable example explain the following arithmetic instructions: (8) CO 4

- ADD
- ADC
- RSB
- MLA

OR

5d) With the help of suitable example explain the following instructions related to ARM processors: (8) CO 4

- AND
- MOV
- CMP
- LSR

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