



**K. K. Wagh Institute of Engineering Education & Research, Nashik**  
(An Autonomous Institute From A.Y. 2022-23)

SUMMER-2024	
Exam Seat No.:	
Academic Year: 2023-2024	Semester: IV
Class: SY	Program: B.Tech Electrical Engineering
Branch Code: ELE	Pattern: 2022
Name of Course: Microcontroller and Embedded Systems	Course Code: ELE222012
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 \_\_\_\_\_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.

**Question No. 1 Attempt following Question**

- 1a) Draw and explain each bit of power control (PCON) register of 8051. (6) CO1

**Question No. 2 Attempt following Question**

- 2a) List the different addressing modes of 8051 instructions. Explain any two of them in details by giving appropriate examples. (6) CO1

**Question No. 3 Attempt following Question**

- 3a) What is embedded system? Classify them according to the generation. (8) CO1

**OR**

- 3b) Differentiate between CISC and RISC based processors. (8) CO1

- 3c) List and explain the different modes of Processor operation available in the ARM processors. (8) CO1, CO3

**OR**

- 3d) Draw and explain each bit of the current program status register (CPSR) in the ARM processors. (8) CO1, CO3

**Question No. 4 Attempt following Question**

- 4a) List and explain with examples the arithmetic operations in the ARM architecture. (8) CO1, CO3

**OR**

- 4b) Explain in detail various data transfer instructions used in ARM architecture with suitable examples. (8) CO1, CO3
- 4c) Write a short note on the Interrupt library available in ARM. Write a program to generate toggle a LED continuously. (8) CO1, CO2

**OR**

- 4d) Write a short note on the PWM library available in ARM. Write a program to generate a square wave of 100KHz frequency with a duty cycle of 65%. (8) CO1, CO2

**Question No. 5 Attempt following Question**

- 5a) To design a traffic light control, write an assembly language to control the three LEDs, red, yellow and green. The designed controller should switch between the lights every 60 milliseconds. Use a software program to generate the required delay with a 12 KHz frequency. Assume that the LEDs are connected to Port 1 of the microcontroller with red LED connected to P1.0, yellow to P1.1 and green to P1.2. (8) CO4

**OR**

- 5b) A push-button switch is connected to pin P1.2 of a microcontroller based on whose input the display in a 7-segment display connected to port 0 (a connected to P0.0 and g connected to P0.0) will vary. Write an assembly level program to display "1" when the push-button is pressed and "0" otherwise. Also draw the respective interfacing arrangement. (8) CO4
- 5c) A overhead tank controller system is to be developed by using a microcontroller such that it will turn ON a pump through a relay when the water level had reached a certain threshold (LOW digital input). The pump will be turned OFF when the water level had exceeded some threshold (another HIGH digital input). Write the algorithm and the interfacing circuit. (8) CO4

**OR**

- 5d) To measure the moisture content of an agriculture field, you need to design a setup which requires an moisture (analog) sensor which is connected to a microcontroller. In this regard with help of block diagram explain in detail the steps to interface an analog sensor with a microcontroller. (8) CO4

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