

ANSWER KEY: EMBEDDED SYSTEMS.

Sno.	Questions	Answer Keys
1	Design an 8-bit generic microcontroller with illustration. How will you modify your design to meet the following criteria? i) Time & space complexity ii) Upgradability	8- bit generic microcontroller architecture with explanation with Registers, Clock, Timer, Various Bus along with Time & Space complexity Upgradability
2	Analyze the challenges and issues with respect to embedded system design for the given scenarios. i) Logistics ii) Home Automation	Logistics: Sensors & actuators, communication interfaces, user interface, controls-washing modes, inlet, outlet, etc, energy conservation, alerts and notifications with possible illustrations Home Automation: Sensors & actuators, communication interfaces, user interface, controls-humidity, temperature, irrigation, ventilation, heating, and lighting, soil moisture, CO ₂ and alerts and notifications with possible illustrations
3	Analyze the importance of timers and counters in an embedded system with an example for each with justification. Design and implement a program using embedded C/ALP to create a square wave with duration of 1second per cycle. Show all relevant calculations.	Timers and Counters in 8051 Microcontrollers The 8051 microcontroller features two main timers/counters: Timer 0 and Timer 1. Both are 16-bit wide and can function as either timers or event counters. Each timer is divided into two 8-bit registers: a low byte (TL0, TL1) and a high byte (TH0, TH1) ² . Timer 0 and Timer 1 Registers <ul style="list-style-type: none"> • Timer 0: TL0 (low byte) and TH0 (high byte) • Timer 1: TL1 (low byte) and TH1 (high byte) These registers can be accessed and manipulated like any other register in the microcontroller. <ul style="list-style-type: none"> • For 8051, Timer Can Roll Max Of 65ms. • Given The Question 1sec=1000ms • To Roll= $1000/65=15.3$ Approx 16 Counts • On =8 Counts; Off= 8 counts
4	Analyze the need for signal conversion in handling mixed signal data. Illustrate and discuss the optimal design of ADC with necessary parameters.	Need for Signal Conversion, uses of ADC Successive Approximation operation and illustration
5	Discuss the working principle of proximity sensor. How it can be used for developing autonomous vehicle navigation. Show the illustration of navigation and interfacing with 8051.	Distance Measurement, Explanation with interfacing of sensors, and illustration of navigation example.