EMBEDDED SYSTEMS

CAT-1

A2 – Answer keys:

Sno.	Questions	Answer Keys
1	Justify why a desktop system could not be defined as an embedded system. Illustrate architecture of PIC microcontroller with sufficient explanation.	An embedded system refers to a dedicated computing device engineered to execute a particular function or a collection of functions. It is usually incorporated within a broader system and is frequently limited by specific criteria regarding processing capabilities, physical dimensions, energy usage, and dependability. A desktop system is fundamentally distinct from an embedded system in various essential ways. A desktop system is a general-purpose computer-run a wide variety of software applications-word processing, gaming, multimedia • An embedded system-perform a specific task or a limited set of tasks- controlling a washing machine, a microwave, or an industrial robot. • Desktop systems powerful CPUs, large memory (RAM and storage), multiple I/O ports, and support for complex operating systems (such as Windows or Linux). • Embedded - specialized processors, minimal memory, and simplified hardware components optimized for specific functions, more compact and energy-efficient. • Refer 8051 architecture
2	Identify the various features for the following embedded system i. Smart Washing Machine ii. Green House Monitoring iii. Textile Manufacturing Classify the above systems with respect to scalability with necessary justifications	**Smart washing machine:-** Sensors & actuators, communication interfaces, user interface, controls-washing modes, inlet, outlet, etc, energy conservation, alerts and notifications **Green House Monitoring:** Sensors & actuators, communication interfaces, user interface, controls-humidity, temperature, irrigation, ventilation, heating, and lighting, soil moisture,CO_2 and alerts and notifications **Textile Manufacturing:** Sensors & actuators, communication interfaces, user interface, controls-humidity, temperature, speed, pressure, quality ventilation, heating, and lighting and alerts and notifications.

3	Mention the various use of serial communication. Construct a program using Embedded C/ALP to transfer message “AI-The Devil or Angel” serially with baud rate of 9600 bps using UART protocol.	Enable device to device communication, used to inrteface other peripherals like keyboard, mouse and card readers, can be used to connect other sub-systems like robot arm, wheels, etc. As per the code and calculation based on: Timer 1 is configured in Mode 2 (8-bit auto-reload mode). • TH1 = 0xFD, calculated for a baud rate of 9600 using the formula: TH1=(osc-frequency) / (12 x 32x Baud Rate) Where osc-frequency = 11.0592 Mhz • SCON = 0x50 for UART Mode 1 (8-bit data, 1 stop bit). • TR1 = 1.
4	Mention at least three real life examples where digital to analog conversion is required. Design and illustrate R-2R ladder based DAC.	Robots, UAVs, Home automation Systems Refer R-2R DAC operation and illustration
5	Discuss how actuator could be used to control various types of movements. How such movement control can be applied to design a mobile vacuum cleaner. Show the interfacing and operation with 8051.	Angular movement, linear movement and rotary movement. Refer DC motor interfacing and need to be customized for mobile vacuum cleaner.