

GUJARAT TECHNOLOGICAL UNIVERSITY

BE-6 SEMESTER – OLD PAPER – S22 TO W25 – QUESTION BANK

Subject Name & Code:

EMBEDDED SYSTEMS- 3161009

Unit 1: Introduction to Embedded Systems

Repeated Questions:

1. Define Embedded Systems / What is an Embedded system? What are its characteristics? (Appears in 5 papers)
 - Define Embedded Systems. (W24 - Q1a, 03 marks)
 - What is an Embedded system? What are its characteristics? (S25 - Q1b, 04 marks)
 - What is meant by embedded systems? What are the components of it? Give examples of embedded system. (S24 - Q1b, 04 marks)
 - Define Embedded system. Describe its type with two examples of each. (W23 - Q1a, 03 marks)
 - Classify Embedded system and discuss the various components of embedded system design in brief. (W22 - Q1a, NA)
2. Classify Embedded systems / Give classification of Embedded systems. (Appears in 4 papers)
 - Define and classify the embedded systems, give few examples of such systems. (S22 - Q1a, 03 marks)
 - Give classification of Embedded systems. (S24 - Q1a, 03 marks)
 - Classify Embedded system and discuss the various components of embedded system design in brief. (W22 - Q1a, NA)
 - Define Embedded system. Describe its type with two examples of each. (W23 - Q1a, 03 marks)
3. Skills Required for an Embedded System Designer. (Appears in 3 papers)
 - Describe skills required for embedded design engineer. (S22 - Q1b, 04 marks)
 - Write down skills Required for an Embedded System Designer. (S25 - Q1a, 03 marks)
 - Write down the skills required for an Embedded System Designer. (S23 - Q1a, 03 marks)

Other Important Questions:

1. Describe criteria to choose microcontroller for designing embedded system. (W25 - Q1a, 03 marks)
 2. Describe use of FPGA and SoC to design Embedded system. (W25 - Q1b, 04 marks)
 3. Discuss the design process in embedded systems with examples. (W24 - Q1c, 07 marks)
 4. Describe an embedded processor as (i) GPP (ii) ASIP (iii) Single purpose processor. (S23 - Q1b, 04 marks)
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Unit 2: Device and Communication Buses

Repeated Questions:

1. Compare/Describe Serial Communication protocols (UART, SPI, I2C, etc.). (Appears in 6 papers)
 - Compare UART, SPI, I2C, USB protocol for different criteria. (W25 - Q2c, 07 marks)
 - Compare and contrast various Serial Communication protocols. (W24 - Q2b, 04 marks)
 - Differentiate between serial and parallel communication. Explain USART protocol in brief. (S23 - Q1c, 07 marks)
 - Compare: IrDA, Wi-Fi and ZigBee. (S24 - Q2c, 07 marks)
 - Compare UART, I2C, SPI protocol. Give advantage of each protocol over other protocol. (W23 - Q1c, 07 marks)
 - Explain SPI bus protocol to establish serial communication between a processor and a device. (W22 - Q1b, NA)
2. Describe/Explain the CAN bus protocol. (Appears in 4 papers)
 - Describe CAN bus protocol with merits and demerits. (W25 - Q1c, 07 marks)
 - Explain I2C and CAN bus protocol in brief. (S23 - Q2c, 07 marks)
 - Describe CAN bus protocol. (W23 - Q2c, 07 marks)
 - List and explain the protocols used for wireless and mobile system communication. (W22 - Q1c, NA)
3. Describe/Explain the USB protocol. (Appears in 3 papers)
 - Explain USB Protocol in detail. (S24 - Q1c, 07 marks)
 - Compare UART, SPI, I2C, USB protocol for different criteria. (W25 - Q2c, 07 marks)
 - (Implied in syllabus list) (Syllabus - Unit 2, NA)
4. Explain/List Wireless Communication Protocols (Bluetooth, Zigbee, Wi-Fi). (Appears in 5 papers)
 - Compare Wi-Fi, Blue- tooth and Zigbee algorithm (S22 - Q2c, 07 marks)
 - List down wireless communication protocol and explain any one in detail. (S25 - Q3a, 07 marks)
 - Explain Wireless Communication protocols and their significance in embedded systems. (W24 - Q2c OR, 07 marks)
 - Describe the features associated with Bluetooth and Zigbee protocols used in wireless and mobile systems. (S23 - Q2a, 03 marks)
 - List the down features of Bluetooth protocol. (S24 - Q2a, 03 marks)
 - Describe and compare Wi-fi and Bluetooth protocol. (W23 - Q2c OR, 07 marks)
 - List and explain the protocols used for wireless and mobile system communication. (W22 - Q1c, NA)
5. Describe Watch Dog Timer (WDT). (Appears in 6 papers)
 - Describe how WDT can used to solve unavoidable software loop. (W25 - Q2b, 04 marks)
 - Describe Watch Dog Timer and Brown Out Reset with example. (S22 - Q2b, 04 marks)
 - What is watch dog Timer? Explain its function in brief. (S25 - Q2a, 03 marks)
 - Explain the role of Timer and Counting Devices in embedded systems. (W24 - Q2a, 03 marks)
 - Explain the function of Watchdog timer in MSP430 processor. (S23 - Q5a, 03 marks)
 - Describe the features available with Watch Dog Timer along with its requirements in embedded system design. (W22 - Q3c OR, 07 marks)
 - Discuss watch dog timer of MSP430. (S24 - Q4a OR, 03 marks)

Other Important Questions:

1. Describe AMBA protocol and its variant. (W25 - Q2c OR, 07 marks)

2. Compare the advantages and disadvantages of data transfers using serial and parallel ports devices. Describe SPI protocol. (S22 - Q2c OR, 07 marks)
 3. Discuss the features and applications of Parallel Communication protocols. (W24 - Q2c, 07 marks)
 4. Explain the working of the Secure Digital Input Output (SDIO) protocol. (S25 - Q1c, 07 marks)
 5. Explain the working of Spy- Bi- Wire serial communication protocol. (S25 - Q2c, 07 marks)
 6. List the features associated with AHB and ASB Buses. (S23 - Q2b, 04 marks)
 7. Explain following: 1. Context and the Periods for Context Switching, 2. Interrupt Latency and Deadline (S24 - Q2c OR, 07 marks)
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Unit 3: Device Drivers and Interrupt Services Mechanism

Repeated Questions:

1. Define/Describe Interrupt Latency and Interrupt Service Deadline. (Appears in 5 papers)
 - Define interrupt, interrupt latency, Task Deadline. (W23 - Q3a, 03 marks)
 - Define Interrupt Latency and Interrupt Service Deadline. Describe the parameters that govern their values. (W22 - Q3a OR, 03 marks)
 - Explain following: 1. Context and the Periods for Context Switching, 2. Interrupt Latency and Deadline (S24 - Q2c OR, 07 marks)
 - Define interrupt latency. Describe equations to find interrupt latency. (W25 - Q3a OR, 03 marks)
 - Define Interrupt Deadline. How embedded software designer solve interrupt deadline problem? (W25 - Q3a, 03 marks)
2. Describe/Explain the Interrupt Service Routine (ISR) concept. (Appears in 4 papers)
 - Explain concept of interrupt service routine. (S25 - Q3b, 04 marks)
 - What is an Interrupt Service Routine (ISR)? (W24 - Q3a, 03 marks)
 - Explain concept of interrupt service routine. (W22 - Q3b OR, 04 marks)
 - List down the steps executed before handling an Interrupt in an embedded system. (S24 - Q3a, 03 marks)
3. Describe/Explain Direct Memory Access (DMA). (Appears in 5 papers)
 - Describe Direct Memory Access. (S22 - Q1c, 07 marks)
 - Describe use of DMA in embedded system design for data transfer from IO device to memory. (W25 - Q3b, 04 marks)
 - Explain the Direct Memory Access (DMA) concept. (W24 - Q3b OR, 04 marks)
 - What is DMA? Using diagram show the operation of a DMA controller. [Figure given - refer Question paper of W22] (W22 - Q2c OR, 07 marks)
 - Sketch diagram to interface DMA with microprocessor or microcontroller. (W23 - Q3b OR, 04 marks)
 - Sketch diagram to interface DMA with microprocessor or microcontroller. (S25 - Q4b OR, 04 marks)
4. Describe/Explain the Interrupt Mechanism for I/O. (Appears in 3 papers)
 - Describe interrupt mechanism for accessing IO. (S22 - Q3a OR, 03 marks)
 - Describe polled based IO and interrupt based IO. (W23 - Q3a OR, 03 marks)
 - Describe busy wait approach for accessing IO. (S22 - Q3a, 03 marks)
5. Describe Device Drivers / information required for writing them. (Appears in 4 papers)
 - Describe types of device driver with examples. (W25 - Q3b OR, 04 marks)
 - Explain the role of Device Driver Programming in embedded systems. (W24 - Q3c, 07 marks)
 - What is Device driver? Explain role of Interrupt in Device driver programming. (S23 - Q2c OR, 07 marks)
 - Describe the information required for writing a device driver. (S24 - Q3b, 04 marks)
 - What is a device driver? What are its requirements? Describe the information required for writing a device driver. (W22 - Q2c, 07 marks)

Other Important Questions:

1. Compare Synchronous and Asynchronous serial communication method. (W25 - Q2a, 03 marks)
2. Describe Synchronous, Iso-synchronous, and Asynchronous communication. (W23 - Q2a, 03 marks)
3. How does Brown Out Reset work in microcontroller? (S25 - Q2b, 04 marks)
4. Describe the concept of Interrupt Latency and its impact. (W24 - Q3b, 04 marks)
5. Discuss the context-switching mechanism in the presence of multiple interrupts. (W24 - Q3a OR, 03 marks)
6. Explain different types of interrupt sources. (S23 - Q3a, 03 marks)
7. Describe the classification of processor interrupt service mechanisms (W24 - Q3c OR, 07 marks)

Unit 4: Inter-process Communication

Repeated Questions:

1. **Describe Semaphores (Types, P and V, Mutex).** (Appears in 7 papers)
 - Describe different types of semaphore and its related OS level functions. How it can be used as resource handling mechanism? (W25 - Q3c, 07 marks)
 - What is Semaphore? Explain where Semaphore can be utilized? (S23 - Q3b, 04 marks)
 - What is Semaphore? Write down advantages and disadvantages of semaphore. (S24 - Q3c, 07 marks)
 - What do you mean by Mutex? Also explain P and V semaphore with appropriate example. (S25 - Q3b OR, 04 marks)
 - Differentiate : Binary Semaphore and Mutex (S22 - Q4b, 04 marks)
 - Discuss use of a semaphore as an event signaling or notifying variable in brief. (W22 - Q4b OR, 04 marks)
 - What do you mean by Mutex. Also explain P and V semaphore with appropriate example. (W22 - Q4c OR, 07 marks)
 - Describe PV Semaphore with example. (W23 - Q4b OR, 04 marks)
2. **Describe Mailbox functions / IPC methods.** (Appears in 4 papers)
 - Describe Mailbox functions and RPC used for inter-process communication. (W25 - Q4c, 07 marks)
 - Describe Mailbox function for IPC. (S22 - Q3b OR, 04 marks)
 - Give advantages, disadvantages and uses of mailbox, pipe and socket functions in interprocess communication. (S23 - Q3c, 07 marks)
 - What is inter process communication? How it is done? (S24 - Q2b, 04 marks)
 - What is inter process communication (IPC)? List down and explain methods of IPC in brief. (S25 - Q4c, 07 marks)
3. **Describe the Shared Data Problem.** (Appears in 4 papers)
 - Describe shared data problem with example. How to solve this issue? (S22 - Q3c, 07 marks)
 - Describe shared data problem with example. (W23 - Q3c OR, 07 marks)
 - Discuss shared data problems and give solutions to such problems. (W22 - Q2a, 03 marks)
 - Describe shared data management in multi-threaded applications. (W24 - Q4a OR, 03 marks)
4. **Describe Priority Inversion.** (Appears in 3 papers)
 - Describe priority inversion problem. How to solve it? (W25 - Q3c OR, 07 marks)
 - Describe Priority inversion and Deadlock condition. How to solve these issues? (S22 - Q3c OR, 07 marks)
 - Describe Priority inversion problem. How to solve it? (W25 - Q3c OR, 07 marks)

Other Important Questions:

1. Define Interrupt Deadline. How embedded software designer solve interrupt deadline problem? (W25 - Q3a, 03 marks)
2. Describe use of DMA in embedded system design for data transfer from IO device to memory. (W25 - Q3b, 04 marks)
3. Differentiate : Process and Thread (S22 - Q3b, 04 marks)
4. Explain the significance of semaphores in inter-process communication. (W24 - Q4a, 03 marks)
5. Discuss various IPC mechanisms such as message queues and sockets. (W24 - Q4b, 04 marks)
6. Compare the characteristics of tasks and ISRs. (W24 - Q4c, 07 marks)
7. Explain the use of Pipe Functions in IPC. (W24 - Q4b OR, 04 marks)
8. Discuss the role of signal functions in process communication. (W24 - Q4c OR, 07 marks)
9. Explain: 1.RPC function 2.Socket function. (S24 - Q5a OR, 03 marks)

10. Describe Lock, Unlock and Spin- lock mechanism used for inter- process communication. (W25 - Q4c OR, 07 marks)

Unit 5: Introduction to OS and Real Time Operating System

Repeated Questions:

1. **Define RTOS / Describe its types.** (Appears in 6 papers)
 - Define RTOS. Describe its type with examples. (W25 - Q4a, 03 marks)
 - Define RTOS. Enlist types of RTOS with examples. (S22 - Q2a, 03 marks)
 - What is RTOS? Describe types of RTOS with two examples. (S23 - Q4a, 03 marks)
 - Define RTOS. Describe its type with example. (W23 - Q1b, 04 marks)
 - List down the services provided by RTOS. (S24 - Q3a OR, 03 marks)
 - Write down advantages and disadvantages of RTOS. (S24 - Q4b OR, 04 marks)
2. **Compare Preemptive and Cooperative Scheduling/Multitasking.** (Appears in 6 papers)
 - Compare pre-emptive and co- operative scheduling mechanism. (W25 - Q4a OR, 03 marks)
 - Compare cooperative and preemptive multitasking. (W24 - Q5b, 04 marks)
 - Explain the differences between Preemptive & Non-Preemptive scheduling policies. (S23 - Q3a OR, 03 marks)
 - What is multitasking? Differentiate between Preemptive and Cooperative Multitasking. (S24 - Q4c, 07 marks)
 - Describe co-operative and pre-emptive scheduling mechanism. (S22 - Q4c OR, 07 marks)
 - Enlist co-operative scheduling mechanism (W23 - Q4a, 03 marks)
 - Enlist pre-emptive scheduling mechanism. (W23 - Q4a OR, 03 marks)
3. **Describe Earliest Deadline First (EDF) Scheduling.** (Appears in 5 papers)
 - Describe Earliest Deadline First (EDF) scheduling mechanism. (W25 - Q4b OR, 04 marks)
 - Describe Earliest Deadline First Mechanism with example. (S22 - Q4a, 03 marks)
 - Describe Earliest Deadline First Mechanism with example. (S25 - Q3a, 03 marks)
 - Compare Rate-Monotonic Scheduling and Earliest-Deadline First Scheduling. (W24 - Q5c, 07 marks)
 - Describe Earliest Deadline First (EDF) and rate-monotonic scheduling mechanism. (W23 - Q4c, 07 marks)
 - Explain Earliest-Deadline First Scheduling. (S24 - Q3b OR, 04 marks)
4. **List/Describe features of an Operating System.** (Appears in 3 papers)
 - List down features of an operating system. (S25 - Q5a, 03 marks)
 - Define the key features of an Operating System. (W24 - Q5a, 03 marks)
 - Write down the features of an operating system. (S24 - Q4a, 03 marks)
5. **Define/Describe Process Control Block (PCB).** (Appears in 2 papers)
 - Define : Process Control Block. Which data is stored in PCB? (S22 - Q4a OR, 03 marks)
 - Define: Process Control Block. Which data is stored in PCB? (S23 - Q4a OR, 03 marks)

Other Important Questions:

1. Describe Function Queue Scheduling mechanism. (W25 - Q4b, 04 marks)
2. Describe Round-robin with interrupt mechanism for embedded software. (S22 - Q4c, 07 marks)
3. Explain Rate- monotonic scheduling. (S25 - Q5b OR, 04 marks)
4. Differentiate between Clock-driven and Event-driven Scheduling. (S25 - Q5c OR, 07 marks)
5. What is meant by benchmarking Real time operating system (RTOS)? Why it is required? (S25 - Q5b, 04 marks)
6. Compare hard real time and soft real time. (W22 - Q4a, 03 marks)
7. Describe the differences between Hard Real Time and Soft Real Time System with an

- example of each one. (S23 - Q4b, 04 marks)
8. Write short note on memory management. (W22 - Q4b, 04 marks)
 9. Name all the RTOS task scheduling models. Describe any one in brief. (W22 - Q3a, 03 marks)
 10. What is a Scheduler? Explain any one scheduling policies. (W22 - Q4a OR, 03 marks)
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Unit 6: Software architectures and Real Time Task Scheduling

Repeated Questions:

1. **Describe/Explain Context Switching.** (Appears in 5 papers)
 - What is context switching? Explain context switching on interrupts. (S25 - Q3c, 07 marks)
 - Explain process context switching and thread context switching in detail. Justify "threads are lightweight processes". (S23 - Q4c, 07 marks)
 - Discuss the context-switching mechanism in the presence of multiple interrupts. (W24 - Q3a OR, 03 marks)
 - (Implied in syllabus list) (Syllabus - Unit 6, NA)
2. **Describe/Explain Rate-Monotonic Scheduling.** (Appears in 4 papers)
 - Explain Rate- monotonic scheduling. (S25 - Q5b OR, 04 marks)
 - Compare Rate-Monotonic Scheduling and Earliest-Deadline First Scheduling. (W24 - Q5c, 07 marks)
 - Describe Earlier Deadline First (EDF) and rate-monotonic scheduling mechanism. (W23 - Q4c, 07 marks)
 - (Implied in syllabus list) (Syllabus - Unit 6, NA)
3. **Compare/Differentiate Clock-driven and Event-driven Scheduling.** (Appears in 4 papers)
 - Differentiate between Clock-driven and Event-driven Scheduling. (S25 - Q5c OR, 07 marks)
 - Explain the difference between clock- driven and event- driven scheduling. (W24 - Q2b, 04 marks)
 - Differentiate Clock driven and Event driven scheduling. (S24 - Q5b OR, 04 marks)
 - (Implied in syllabus list) (Syllabus - Unit 6, NA)
4. **Describe Round-robin with Interrupts scheduling.** (Appears in 3 papers)
 - Describe Round Robin with Interrupts. (S25 - Q5a OR, 03 marks)
 - Describe Round-robin with interrupt scheduling with example. (W23 - Q4c OR, 07 marks)
 - Describe Round-robin with interrupt mechanism for embedded software. (S24 - Q4c OR, 07 marks)
 - (Implied in syllabus list) (Syllabus - Unit 6, NA)

Other Important Questions:

1. Describe the main problem with semaphores and its limitation. (S25 - Q3c OR, 07 marks)
 2. Explain device, file and I/O management in RTOS. (S23 - Q3c OR, 07 marks)
 3. Write down various types of states of tasks? Explain them. (S24 - Q3c OR, 07 marks)
 4. Compare process, task and thread with an appropriate example. Explain multithreading mechanism in context of the display process of desktop systems. (S23 - Q4c OR, 07 marks)
 5. Compare process, task and thread with appropriate example. Also explain multithreading mechanism in context of display process of mobile phone. (W22 - Q4c, 07 marks)
 6. State the differences between a Task, a Function and an Interrupt Service Routine. (W22 - Q3b, 04 marks)
 7. Give comparison between process and thread. (S24 - Q4b, 04 marks)
 8. Compare Process, Thread and Function. (W23 - Q4b, 04 marks)
 9. What do you understand by Interrupt Service Thread? Explain its usage with an example in RTOS based systems. (W22 - Q2b, 04 marks)
 10. Give difference between Multiprocessing and Multithreading. (S25 - Q4c OR, 07 marks)
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Unit 7: MSP430 (Case Study)

Repeated Questions:

1. **Describe the Low-Power modes of MSP430.** (Appears in 6 papers)
 - Describe how to achieve low-power modes in MSP430. (W25 - Q5b, 04 marks)
 - Describe low-power modes of MSP430. (S22 - Q5b, 04 marks)
 - Discuss the low- power features of MSP430 microcontrollers. (W24 - Q2c, 07 marks)
 - Describe low-power modes of MSP430. (W23 - Q5b, 04 marks)
 - Describe low power mode of MSP430. (S24 - Q5a, 03 marks)
 - (Implied in syllabus list) (Syllabus - Unit 7, NA)
2. **Describe/Sketch the MSP430 block diagram / architecture.** (Appears in 4 papers)
 - Describe MSP430 block diagram and CPU registers. (W25 - Q5a, 03 marks)
 - Sketch and Describe block diagram of MSP430 (S22 - Q5a, 03 marks)
 - Draw and explain the basic architecture and block diagram of MSP430. (W22 - Q5b OR, 04 marks)
 - (Implied in syllabus list) (Syllabus - Unit 7, NA)
3. **Describe the Clocking System / Clock sources in MSP430.** (Appears in 6 papers)
 - Describe clocking system in MSP430. Is it possible to drive all peripherals of MSP430 at master clock speed? Justify your answer. (W25 - Q5.1b, 04 marks)
 - Describe clocking system of MSP430. (S22 - Q3b, 04 marks)
 - Describe the four sources of clock in MSP430 processor. (S25 - Q4a, 03 marks)
 - Describe the four sources of clock in MSP430 processor (S23 - Q5b, 04 marks)
 - Describe the various sources of clock in MSP430 processor. (S24 - Q5b, 04 marks)
 - Explain the clocking system of MSP430. (W22 - Q5b, 04 marks)
4. **Describe the USCI module of MSP430.** (Appears in 2 papers)
 - Describe MSP430 USCI module and its modes. (S25 - Q3a OR, 03 marks)
 - Describe MSP430 USCI module and its modes. (W23 - Q5a, 03 marks)
5. **Describe the Multiplexing scheme for MSP430 port pins.** (Appears in 3 papers)
 - Describe multiplexing scheme in MSP430 processor for the port pins. (S22 - Q3a, 03 marks)
 - Explain the multiplexing scheme in MSP430 processor for the port pins. (W22 - Q5a, 03 marks)
 - Describe multiplexing scheme of MSP430 pins. (W23 - Q5a OR, 03 marks)
6. **Write a C-program for MSP430 to generate a waveform using Timer.** (Appears in 3 papers)
 - Describe MSP430 timer modes available for Timer- A. Write C- Program for MSP430 to generate 1KHz square wave on pin P1.0 using Timer- A. (S22 - Q3c, 07 marks)
 - Write a MSP430 C-program to transmit "GTU EXAM" continuously using UART at 9600 baudrate. Assume SMCLK = 1MHz (W25 - Q5c, 07 marks)
 - Write a C-program to generate square wave of 100Hz using timer-A. Assume SMCLK = 1MHz (W23 - Q5c, 07 marks)

Other Important Questions:

1. Enlist features of ADC10 block in MSP430. For MSP430, Why CPU temperature and power supply is converted in digital? (W25 - Q5.1a, 03 marks)
2. Sketch interfacing diagram to interface one switch at P1.3 and two LEDs at P1.0 and P1.6 with MSP430 board. Write C-program to do following [Table given - refer Question paper of W25] (W25 - Q5c, 07 marks)
3. Common cathode seven- segment and push- button is connected with MSP430. Sketch interfacing diagram and write C- code to count number of times switch is pressed (Use interrupt subroutine when switch is connected) (S22 - Q5c, 07 marks)
4. What are the key features of the MSP430 architecture? (W24 - Q3a, 03 marks)
5. MSP430 is having an orthogonal CPU architecture supported with RISC features. – Justify the statement. (S25 - Q4b, 04 marks)

6. MSP430 is having an orthogonal CPU architecture supported with RISC features. – Justify the statement. (S23 - Q5b OR, 04 marks)
7. Explain interrupt handling process in MSP430. (S23 - Q5c, 07 marks)
8. Explain the use of timer for generating Pulse Width Modulated waveform using MSP430. (S23 - Q5c OR, 07 marks)
9. List down various registers of MSP430 processor with their functions. (S24 - Q5c, 07 marks)
10. Explain how the timers of MSP430 can be configured for PWM generation. (S24 - Q5c OR, 07 marks)
11. Describe the interrupt feature associated with Timer in MSP430. (W22 - Q5c, 07 marks)
12. Explain a Timer module of MSP430 with various modes of operation associated with it. (W22 - Q5c OR, 07 marks)
13. Describe POR, PUC and BOR for MSP430. (S23 - Q5a OR, 03 marks)
14. Describe reset condition of MSP430: BOR, POR and PUC (W23 - Q5b OR, 04 marks)
15. Draw interfacing diagram to interface 8 LEDs with MSP430. Turn-ON LEDs in ring counter fashion. (S25 - Q5c, 07 marks)
16. Sketch interfacing diagram to interface 8 LEDs with MSP430. Turn-ON LEDs in ring counter fashion. (W23 - Q5c OR, 07 marks)
17. Explain the special features associated with GPIO port pins in MSP430 other than simple digital input output port pin characteristics. (S25 - Q4a OR, 03 marks)
18. Explain the special features associated with GPIO port pins in MSP430 other than simple digital input output port pin characteristics. (W22 - Q5a OR, 03 marks)
19. Motivation for MSP 430 Microcontrollers, MSP430 RISC CPU architecture, Compiler-friendly features, On-chip peripherals and programming for - Watchdog Timer, Basic Timer, Real Time Clock (RTC), ADC, Universal Serial Communication Interface (USCI), Low-power features of MSP430 (Syllabus - Unit 7, NA)
