

**EMBEDDED SYSTEM DESIGN
(VLSISD)**

Time : 3 hours

Max Marks : 60

Answer all **five** units. (5 x 12 = 60 Marks)

UNIT-I

1. (a) Explain the importance of architecture of an embedded system. List and explain the various challenges faced when designing a new Embedded system
- (b) Illustrate the memory hierarchy with relevant figure. Also explain the features of hardware Primary memory subsystem with a neat figure

OR

2. (a) Explain the various Application specific ISA models
- (b) Describe the features of various languages that may be used for programming a small microcontroller. Explain the various features of MSP430 which make them suitable for low-power and portable applications:

UNIT-II

3. (a) Illustrate the operation of stack in MSP430F2013 microcontroller with a neat figure and relevant example
- (b) What are vectored interrupts? Illustrate how the Interrupts are handled in MSP430 showing the steps taken by hardware to launch the ISR on the occurrence of Interrupt with an example

OR

4. (a) Illustrate the features and working of clock module of the MSP430F2xx with a neat figure of its block diagram
- (b) Explain the different Low-Power Modes of Operation in MSP430 controller

UNIT-III

5. (a) Explain the circuit of an Input/Output pin in MSP430 microcontroller and illustrate the operation of CMOS inverter for the three cases with neat figure
- (b) Illustrate the working of Timer_B with a neat figure showing the simplified block diagram of Timer_B

OR

6. (a) Explain the various circuits used to drive a heavier load than the MSP430 can supply directly with relevant figures
- (b) Illustrate the operation of a Basic Timer 1 with a neat figure of its block diagram and examine all the fields of basic Timer1 control Register BTCTL

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UNIT-IV

7. (a) Illustrate the SPI protocol concept with a neat figure showing the interface between master and slave and explain the various steps
- (b) Explain briefly the Format of Data for Asynchronous Transmission with relevant figure and an example

OR

8. (a) Interpret the need for an interface between the UART in the microcontroller and outside world? Examine the voltage specifications of RS232 and explain the various ways of implementing the external circuits connections to the RS232 port
- (b) Illustrate the features of I2C protocol. Explain its hardware and data transfer format over I2C protocol with relevant figure

UNIT-V

9. (a) Illustrate lighting the LED1 when button B1 is pressed for a MSP430 controller using two ways showing two flow diagrams and relevant programs for the same
- (b) Demonstrate the use of the Data Transfer Controller (DTC) to store a block of readings from the ADC10 in MSP430 controller by writing a C program. An LED should be turned on if the average reading is greater than 0.5VCC.

OR

10. (a) Illustrate the application of LCD for decimal display in embedded applications by writing a C program for implementing the function to display a signed, decimal word on the LCD.
- (b) Write a C program to light LED1 when button B1 is pressed using Interrupts and low-power mode 4 for a MSP430 controller with suitable explanation.
