P P SAVANI UNIVERSITY

Fifth Semester of B. Tech. Examination

December 2021

SEIT3022 Embedded System

06.12.2021, Monday **Time: 09:00 a.m. To 11:30 a.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1	Answer the following questions.	**[05]**
(i)	Define: Embedded System.	
(ii)	What is size of the SP register?	
(iii)	On power-up, the 8051 uses RAM locations _____ to _____ for registers R0-R7 of Register bank-0.	
(iv)	Enlist the features of 8051 microcontroller.	
(v)	Which registers are allowed to be used for register indirect addressing modes if the data is in on-chip RAM?	
Q - 2 (a)	Write difference between microprocessor and microcontroller.	**[05]**
Q - 2 (b)	Draw and explain the basic architecture of 8051 microcontroller.	**[05]**
	OR	
Q - 2 (a)	Explain memory architecture of 8051 in detail.	**[05]**
Q - 2 (b)	Write an assembly language program to transfer the block of 10 data from memory location 30H onwards to 50H onwards.	**[05]**
Q - 3 (a)	Draw and explain pin diagram of 8051 microcontroller.	**[05]**
Q - 3 (b)	Explain the various rotate instructions of 8051 microcontroller.	**[05]**
	OR	
Q - 3 (a)	Explain different addressing modes of 8051 in detail.	**[05]**
Q - 3 (b)	Explain the following instructions with suitable example: (i) MUL (ii) DJNZ (iii) MOV (iv) ANL (v) CPL	**[05]**
Q - 4	Attempt any one.	**[05]**
(i)	Draw interfacing diagram of 16x2 lines LCD with 8051 microcontroller. Write a program to display a message "HI" on the 16X2 LCD screen.	
(ii)	Draw the interfacing of external 16KB EPROM and 8KB RAM with the microcontroller.	

SECTION – II

Q - 1	Answer the following questions.	**[05]**
(i)	Why reset pin is required?	
(ii)	What are real-time embedded systems?	
(iii)	What is the use of Ultrasonic sensor?	
(iv)	What are the components of embedded systems?	
(v)	List out logical instructions in 8051 microcontroller.	
Q - 2 (a)	Explain Arduino Uno. Also Discuss its input and output function.	**[05]**
Q - 2 (b)	What is Timer? Explain different types of Timer in 8051.	**[05]**
	OR	
Q - 2 (a)	What is sensor? Explain Different types of sensor and their application.	**[05]**
Q - 2 (b)	Write program to copy a block of 8 bytes of data to RAM locations starting at 50H from RAM locations 30H.	**[05]**
Q - 3 (a)	Sketch interfacing diagram to interface Keypad and LCD to display Password with program.	**[05]**

Q - 3 (b)	Write program to send 44H to ports P1 and P2, using (a) their addresses (b) their names.	**[05]**

OR

Q - 3 (a)	Sketch interfacing diagram to interface Temperature Sensor with program.	**[05]**
Q - 3 (b)	Sketch interfacing diagram to interface DC motor with program.	**[05]**
Q - 4	Attempt any one.	**[05]**
(i)	Sketch interfacing diagram to interface common anode seven-segment display.	
(ii)	Sketch interfacing diagram for Bi directional visitor counter using ultrasonic sensor with program.	

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SECTION – I

Q - 1	Answer the following questions.	**[05]**
(i)	Number of I/O ports in the 8051 microcontroller?	
(ii)	Program counter stores what?	
(iii)	What is the bit size of the 8051 microcontroller?	
(iv)	Define direct and indirect addressing mode.	
(v)	List out logical instructions in 8051 microcontroller.	
Q - 2 (a)	Explain registers and Stack Pointer in 8051 with Suitable example.	**[05]**
Q - 2 (b)	Explain 8051 Microcontroller Architecture with suitable diagram.	**[05]**
	OR	
Q - 2 (a)	What is an Embedded System? Explain in details. And also list out its application.	**[05]**
Q - 2 (b)	Explain functionality of Accumulator and Program Counter with suitable example.	**[05]**
Q - 3 (a)	What is the difference between Microprocessor and Microcontroller?	**[05]**
Q - 3 (b)	Explain timer in 8051 microcontroller.	**[05]**
	OR	
Q - 3 (a)	Explain Rotate and Compare instructions of 8051 with suitable example.	**[05]**
Q - 3 (b)	Write Short notes on Arithmetic and Logical instructions in 8051.	**[05]**
Q - 4	Attempt any one.	**[05]**
(i)	Write assembly code to Read and test PI to see whether it has the value 45H. If it does, send 99H to P2; otherwise, it stays' cleared.	
(ii)	Write assembly code to find 2's complement of 95H.	

SECTION – II

Q - 1	Answer the following questions.	**[05]**
(i)	Write the applications of Arduino Uno in the domain of an Embedded systems.	
(ii)	Explain the use of Serial.print() and Serial.println() functions of Arduino.	
(iii)	How many analog and digital I/O pins are available on Arduino Uno?	
(iv)	Which pins provide functionality of PWM in Arduino Uno board?	
(v)	What is an Ultrasonic Sensor? Write its applications.	
Q - 2 (a)	Draw and explain architecture of Arduino Uno.	**[05]**
Q - 2 (b)	A switch is connected to Pin-11 and an LED is connected to Pin-12. Write a program to get the status of the switch and send it to LED. Also draw the interfacing diagram.	**[05]**
	OR	
Q - 2 (a)	Draw pin diagram of Atmega328p. Explain each pin in detail.	**[05]**
Q - 2 (b)	A switch is connected to Pin-9. Write a program to check the status of switch and perform the following. (1) If switch=0, send message "GOOD BYE" (2) If switch=1, send message "WELCOME"	**[05]**
Q - 3 (a)	Explain different arithmetic and comparison operators of Arduino.	**[05]**

Q - 3 (b)	Assume that Pin-11 is an input and represents the condition of an oven. If it goes high, it means that the oven is hot. Monitor the bit continuously. Whenever it goes high, send a high to low pulse to pin Pin-12 to turn on a buzzer. Also draw an interfacing diagram of Arduino and Buzzer.	**[05]**

OR

Q - 3 (a)	Explain the following Arduino functions: (i) digitalRead() (ii) digitalWrite() (iii) pinMode() (iv) analogRead() (v) analogWrite()	**[05]**
Q - 3 (b)	Draw an interfacing diagram of Arduino Uno and 7- segment LED. Write a program to display 0 to 5 on 7-segment LED. Assume common anode configuration for 7-segment LED.	**[05]**
Q - 4	Attempt any one.	**[05]**
(i)	With the neat sketch explain interfacing of Arduino and ultrasonic sensor. Also, write a program to measure the distance between object and Arduino.	
(ii)	Explain the Arduino sketch structure using an example.	

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