Reg. No. | | | | | | | | | | | | |

Question Paper Code : 66143

M.E. DEGREE EXAMINATION, DECEMBER 2015/JANUARY 2016

First Semester

Embedded Systems Technologies

ET 7102 : MICROCONTROLLER BASED SYSTEM DESIGN

(Common to M.E. Power Electronics and Driver M.E. Control and Instrumentation M.E. Electrical Drives and Embedded Control, M.E. Power Systems Engineering)

(Regulations – 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL Questions.

PART – A (10 × 2 = 20 Marks)

1. How is memory map of input-output technique useful to microcontroller ?
2. How many parallel ports are there in 8051? How many of them are bit addressable ?
3. Which register bank is used if we alter RSO and RSI of the PSW by the following two instructions ?

   SETB PSW.3

   SETB PSW.4

4. Show how to perform "77 × 34" in the 8051.
5. Compare any two differences between CISC architecture and RISC architecture.
6. What is an IDE ? Which IDE is used to write program for PIC microcontroller ?
7. What is advantage of indexed addressing in Microcontroller ?
8. Maximum how many devices can be connected using I^2C protocol ? How ?
9. Write briefly on how Task Control Block are useful in RTOS based system.
10. How does microcontroller measures logically the frequency of a signal ?

PART – B (5 × 13 = 65 Marks)

11. (a) (i) Draw the data memory structure of 8051 microcontroller and explain. (7)

(ii) What are the different addressing modes used in 8051 μc ? Give examples for each one of it. (6)

OR

(b) (i) With an example how to use timer 0 in 8-bit auto-reload mode ? (7)

(ii) What do the instructions PUSH 6, POP 0 & ACALL do ? Give examples for each instruction. (6)

12. (a) (i) Assume that bit P2.3 is an input and represents the condition of an oven. If it goes high it means that oven is hot. Monitor the bit continuously. Whenever it goes high, send a high-to-low pulse to port P1.5 to turn on a buzzer. Draw the circuit and write the suitable code for the same. (7)

(ii) Explain briefly on role of semaphore and messages in performance of RTOS. (6)

OR

(b) (i) Write an 8051 program to receive bytes of data serially and put them in P1. Set the baud rate at 4800, 8-bit data and one stop bit. (7)

(ii) Assume that the IE bit for external hardware interrupt EX0 is enabled and is low level triggered. Explain how this interrupt works when it is activated. How can we make sure that a single interrupt is not interpreted as multiple interrupts ? (6)

13. (a) (i) Draw the functional block diagram of PIC microcontroller and list the major features of PIC microcontroller. (7)

(ii) Explain the memory organization of PIC microcontroller. (6)

OR

(b) (i) With an example, explain different addressing modes of PIC microcontroller ? (7)

(ii) How to initialize the on-chip ADC of PIC microcontroller ? Explain it with necessary diagrams. (6)

14. (a) (i) How to transfer a byte of data from one microcontroller to another microcontroller ? Using I^2C protocol. Draw the data frame format for the same and explain. (7)

(ii) Compare the advantages and disadvantages of using EEPROM and Flash memory. (6)

OR

(b) (i) With the circuit diagram, explain how to interface a temperature sensor with PIC microcontroller ? Write the suitable code to display the temperature value. **(7)**

(ii) Explain the interrupt structure of PIC microcontroller. **(6)**

15. (a) (i) Draw the circuit diagram of 4 × 4 matrix keypad and explain how to interface the same with a microcontroller ? How a controller identifies the key press ? **(7)**

(ii) Explain how device drivers help easy interface in using a microcontroller. **(6)**

OR

(b) (i) How to interface a 230 V / 50 Hz electrical appliance with a microcontroller ? What are the parameters to be considered while interfacing ? **(7)**

(ii) Draw the circuit diagram to interface an LCD display with microcontroller and explain how to display a character using the same. **(6)**

PART – C (1 × 15 = 15 Marks)

16. (a) How to vary the speed and direction of rotation of a dc motor/stepper motor ? Draw the circuit diagram and write the suitable code for the same. **(15)**

OR

(b) Design a temperature monitoring and control system with the following specifications :

When the temperature goes above 24 °C the controller will switch on the air conditioning system until the temperature goes below 24 °C. Continuously monitor the temperature and display using LCD display. Draw the circuit diagram and write the suitable code for the same. **(15)**

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