Q.P. Code :17147

[Time: Three Hours] **[Marks:80]**

Please check whether you have got the right question paper.

N.B:
1. Question no 1 is compulsory.
2. Attempt any three from the remaining five questions.
3. Figures to the right indicate full marks.
4. Draw neat diagrams and assume data wherever necessary.

Q.1 Answer the following. **[20]**
- a) Define an embedded system and explain its design constrains.
- b) Explain the power saving and power down modes in 8051 microcontroller.
- c) Differentiate between MOVC and MOVX instructions.
- d) Draw the flowchart for scanning and identifying the key in a 4X4 matrix keyboard by the 8051 microcontroller.

Q.2 a) Explain with suitable instructions the various addressing modes of 8051 microcontroller. **[10]**

b) Draw and explain the architecture of 8051 microcontroller. **[10]**

Q.3 a) Explain various timer modes of 8051 microcontroller. **[10]**

b) Write a "C" program to toggle only bit P2.4 of 8051 microcontroller continuously without disturbing the rest of the bits of P2. **[05]**

c) Explain the concept of RTOS with suitable example. **[05]**

Q.4 a) Draw the diagram showing the 8051 microcontroller connection to DAC0808. Also, write a program to generate a square waveform at the output of the DAC0808. The program may be written in assembly or "C" language. **[10]**

b) Draw and explain I2C, USB and CAN bus protocol features. **[10]**

Q.5 a) Explain the interrupt structure of 8051 microcontroller. **[10]**

b) Write a 8051 microcontroller assembly language program to continuously transfer "BIOMED" serially at 4800 baud. Use 8 bit data, 1 start bit, 1 stop bit. Assume crystal freq = 11.0592 MHz. **[10]**

Q.6 Write short note on the following. (**Any Four**) **[20]**
- a) Scheduler
- b) PCON and SCON SFRs
- c) Components of embedded system hardware
- d) Power-on reset circuit
- e) PSW register of 8051 microcontroller.

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