

**Scheme – I**  
**Sample Question Paper**

**Program Name** : Diploma in Medical Electronics  
**Program Code** : MU  
**Semester** : Fourth  
**Course Title** : Microcontroller and Embedded System  
**Marks** : 70

22434

**Time: 3 Hrs.**

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**Instructions:**

- 1) All questions are compulsory.
- 2) Illustrate your answers with neat sketches wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- 5) Preferably, write the answers in sequential order.

**Q.1) Attempt any FIVE of the following.**

**10 Marks**

- a) Differentiate between microprocessor and microcontroller based on the following parameters.
  - i) Memory
  - ii) Timers/counters and Interrupts
- b) State two applications of embedded system
- c) Draw the format of SCON register
- d) List two advantages of embedded system.
- e) Draw interfacing diagram of relay with 89C51 microcontroller.
- f) Draw the format of synchronous and asynchronous data communication
- g) List the various serial and wireless communication protocols.

**Q.2) Attempt any THREE of the following.**

**12 Marks**

- a) List the software development tools in an embedded system and state the function of Compiler and Debugger.
- b) Develop an 89C51 C program to read the number 1 from Port 1, number 2 from Port 2 and then add them. Store the result and send it to Port 3.
- c) List alternate functions of Port 3 of 89C51 microcontroller.
- d) Develop 89C51 C program to blink the LED interfaced to pin P1.7

**Q.3) Attempt any THREE of the following.**

**12 Marks**

- a) State the logical operators of embedded C and give one example of each.
- b) Draw the interfacing diagram of DAC0808 with 89C51 microcontroller and write a 'program in embedded C to generate a square waveform
- c) Describe the function of the following pins of 89C51 microcontroller
  - i) PSEN
  - ii) RST
  - iii) INT0
  - iv) T0
- d) Write the following parameters of I2C protocol
  - i) Data transfer rate.
  - ii) Number of fields
  - iii) Addressing bits
  - iv) Application

**Q.4) Attempt any THREE of the following.**

**12 Marks**

- a) Write any four characteristics of an embedded system.
- b) Differentiate between assembly language program and embedded C with reference to the following points
  - i) Execution time
  - ii) Time for coding
  - iii) Hex file size
  - iv) Debugging
- c) Explain briefly selection factors of microcontroller.
- d) Find the contents of Accumulator after execution of the following code.
  - i) `ACC = 0x94 >> 5`
  - ii) `ACC = 0x5A << 2`
- e) Explain the need of multitasking and intertask communication in real time operating system

**Q.5) Attempt any TWO of the following.**

**12 Marks**

- a) Draw the interfacing diagram of 16x2 LCD display with 89C51 and state the function of
  - i) RS
  - ii) EN

iii) R/W

- b) State three features of Bluetooth and IrDA wireless communication.
- c) State any three features of RTOS. Explain intertask communication with reference to RTOS.

**Q.6) Attempt any TWO of the following.**

**12 Marks**

- a) Draw a diagram to interface a stepper motor to 89C51 and write a program in embedded C to rotate stepper motor in clockwise direction. Motor has step angle of 1.8 degree. Use stepper motor of 4 step pulse sequence.
- b) Develop 89C51 C program to toggle all the bits continuously with 60 msec delay in between. Use timer 0, mode 1 to generate the delay. The XTAL frequency is 11,0592 MHz. Calculate the value of the count which is to be loaded in timer register.
- c) How can the interrupt priority of 89C51 microcontroller be changed? Explain with one example.

**Scheme – I**  
**Sample Test Paper**

**Program Name** : Diploma in Medical Electronics  
**Program Code** : MU  
**Semester** : Fourth  
**Course Title** : Microcontroller and Embedded System  
**Marks** : 20

22434

**Time: 1 Hour**

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**Instructions:**

- 1) All questions are compulsory.
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- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- 5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks**

- a) List any four features of microcontroller.
- b) Name the SFRs which control the timers/counters and state the modes of timer.
- c) Draw the diagram to interface 4x4 matrix keyboard to 89C51 microcontroller
- d) State the logical operators of embedded C.
- e) Draw the format of SCON register and describe each bit in brief.
- f) Find the contents of port after execution of the following codes:
  - i)  $P2 = 0x74 \gg 3$
  - ii)  $P3 = 0x04 | 0x45$

**Q.2 Attempt any THREE.**

**12 Marks**

- a) Draw pin diagram of 89C51 microcontroller. Explain function of following pins
  - i) EA
  - ii) ALE
- b) State the interrupts used in 89C51. Give their priority and vector addresses.
- c) Develop an 89C51 C program to generate a square wave of frequency 5KHz on P3.5 pin of 89C51. Use timer mode 1 to generate delay. Assume XTAL=11.0592MHz.
- d) Develop an 89C51 c program to transfer “MU” serially at baud rate 9600 continuously. Use 8-bit data and 1 stop bit. Assume XTAL=11.0592MHz
- e) Differentiate 8031, 8052 and 8751 based on
  - i) Data and program memory
  - ii) Number of timers/counters.
  - iii) Crystal frequency.

**Scheme – I**  
**Sample Test Paper - II**

**Program Name** : Diploma in Medical Electronics  
**Program Code** : MU  
**Semester** : Fourth  
**Course Title** : Microcontroller and Embedded System  
**Marks** : 20

22434

**Time: 1 Hour**

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**Instructions:**

- 1) All questions are compulsory.
- 2) Illustrate your answers with neat sketches wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) Assume suitable data if necessary.
- 5) Preferably, write the answers in sequential order.

**Q.1 Attempt any FOUR.**

**08 Marks**

- a) Draw the Arduino Uno pin diagram.
- b) Write two features of USB protocol.
- c) State two advantages and disadvantages of embedded system.
- d) Draw labelled interfacing diagram seven segment display with 89C51 microcontroller.
- e) Draw the formats of synchronous and asynchronous data communication
- f) Describe the need of RTOS in embedded system.

**Q.2 Attempt any THREE.**

**12 Marks**

- a) Classify an embedded system. Describe any two types.
- b) Draw diagram to interface DAC 0808 with 89C51 and write a C program to generate a sawtooth waveform.
- c) State any four features of Bluetooth technology
- d) Differentiate RTOS with desktop OS.(Any four points)
- e) Explain I2C protocol with suitable diagram.