

# 17534

**21718**

**3 Hours / 100 Marks**

Seat No.

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- Instructions* –
- (1) All Questions are *Compulsory*.
  - (2) Answer each next main Question on a new page.
  - (3) Illustrate your answers with neat sketches wherever necessary.
  - (4) Figures to the right indicate full marks.
  - (5) Assume suitable data, if necessary.
  - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
  - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

- 1. a) Attempt any THREE of the following: **12****
- (i) Compare between microprocessor and microcontroller.  
(any four points)
  - (ii) Draw neat labelled block diagram of Von-neumann and Harvard architecture.
  - (iii) Describe power saving options of 8051 microcontroller.
  - (iv) Write the operation of the following instructions of 8051.
    - 1) CJNE A, direct, rel
    - 2) DAA
    - 3) DJNZ Rn, rel.
    - 4) SWAP A

P.T.O.

- (v) With control word register, explain Bit Set reset (BSR) mode of 8255.
- b) **Attempt any ONE of the following:** **6**
- (i) Write an ALP for 8051 microcontroller to find the average of ten 8 bit numbers stored in internal RAM location starting from 30 H to onwards store result at 60 H. (Assume suitable data)
- (ii) Sketch 8051 microcontroller interfacing diagram to interface 4 LEDs and 4 switches. Interface LEDs to port 0 upper nibble and switch to port 1. Write an ALP for 8051 to read status of switches and operate LEDs as per switch status.
2. **Attempt any FOUR of the following:** **16**
- a) Draw pin diagram of 8051 microcontroller.
- b) Which pins of 8051 microcontroller are used for external memory interfacing with 8051? State their functions.
- c) Draw and explain reset circuit used for 8051 microcontroller.
- d) Draw the format of PSW register of 8051  $\mu$ C and state the function of each flag.
- e) Explain the function of following registers of 8051  $\mu$ C.
- (i) Stack pointer
- (ii) DPTR
- (iii) Program counter
- (iv) Accumulator
- f) What is bus? Describe the function of address data and control bus.

**3. Attempt any FOUR of the following:****16**

- a) Explain the following directives with example.
  - (i) ORG
  - (ii) DB
  - (iii) EQU
  - (iv) END
- b) State any four addressing mode of 8051  $\mu$ C and explain each with example.
- c) Draw the software development cycle. State the function of editor, assembler and cross compiler.
- d) Write an ALP for 16 bit multiplication. Assume numbers to be stored in External RAM.
- e) List interrupt of 8051  $\mu$ C with their vector addresses and priorities.

**4. a) Attempt any THREE of the following:****12**

- (i) Classify the instruction set of microcontroller 8051. List one example of each.
- (ii) Draw and describe IE register of 8051  $\mu$ C.
- (iii) With the help of neat diagram, describe the timer modes of 8051  $\mu$ C.
- (iv) Write assembly language program for 8051 to generate square wave of 10 KHz on port pin P1.7. Assume XTAL, frequency = 12 MHz.

**b) Attempt any ONE of the following:****6**

- (i) Write an ALP for 8051  $\mu$ C to find smallest numbers from the array of ten numbers stored in External memory location 3000 H to onwards. Store result at 6000 H. (Assume suitable data).

- (ii) Draw the interfacing diagram of stepper motor with 8051 microcontroller. Write an assembly language program to rotate the stepper motor continuously in anticlockwise direction. Assume step angle is  $0.9^\circ/\text{step}$ .
- (iii) Draw interfacing diagram of 2 K byte EPROM and 2K byte RAM to 8051  $\mu\text{C}$ . Draw memory map.

**5. Attempt any FOUR of the following: 16**

- a) List the I/o ports of 8051 microcontroller and describe alternate function of port 0.
- b) State operating modes of serial port of IC 8051 microcontroller.
- c) Explain SBUF register used with serial-communication with 8051 microcontroller.
- d) Draw the format of TMOD and state the function of each bit.
- e) Draw and explain the format of IP register of 8051 microcontroller.

**6. Attempt any FOUR of the following: 16**

- a) Write ALP for 8051 microcontroller to transmit message 'WELCOME' serially at baud rate 9600, 8 bit data, 1 stop bit. Assume crystal frequency is 11.0592 MHz.
  - b) What is the role of SMOD bit in serial communication? Write instruction to set SMOD bit.
  - c) Describe the function of following handshaking signals of 8255.
    - (i) IBF
    - (ii)  $\overline{\text{STB}}$
    - (iii)  $\overline{\text{ACK}}$
    - (iv)  $\overline{\text{OBF}}$
  - d) Draw format of SFR SCON and explain each bit of same.
  - e) Describe selection factors of microcontroller.
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