

## Scheme – I

### Sample Question Paper

**Program Name** : Electrical Engineering Program Group

**Program Code** : EE/EP/EU

**Semester** : Fourth

**Course Title** : Digital Electronics and Microcontroller Applications

**Marks** : 70

**22421**

**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 (5X2)**

- (a) Draw the symbol and write the truth table of Universal Gates.
- (b) In a 3 variable K' Map if there are two quads, interpret the simplified output.
- (c) Define modulus of counter and write down the number of flips flops required to construct mod 7 counter
- (d) Construct OR gate using NOR gate.
- (e) Identify the addressing mode of the instruction: MOV A, @R<sub>0</sub> and DJNZ Rn, rel
- (f) Demonstrate with example the function of EQU directive.
- (g) Find the number of address lines required for:
  1. 2K RAM
  2. 16K ROM

#### Q.2) Attempt any THREE of the following :-

**12 Marks (3X4)**

- (a) Justify with the help of suitable diagrams ' NAND gate is a universal gate.'
- (b) Design Full Adder using K' map and truth table.
- (c) Explain with help of waveform the Race around condition in JK flip flop. Suggest a suitable method to overcome the drawback.
- (d) Compare TTL, CMOS and ECL on following points:
  1. Propagation delay

2. FAN IN
3. FAN OUT
4. Power Dissipation.

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

**12 Marks (3X4)**

- (a) List the various stages in software development cycle and explain importance of each stage.
- (b) Interface Stepper motor to 8051 and write an ALP to rotate Stepper motor in clockwise direction.
- (c) Simplify the following using K' Map and implement using NAND-NAND gates only:  
 $Y = \Sigma m(0,1,2,3,5,7,8,9,11)$
- (d) Draw the architecture of 8051 and label various blocks .

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

**12 Marks (3X4)**

- (a) Explain the meaning of following instructions:
  1. MOV A , FOH
  2. ADD A , R<sub>4</sub>
  3. SWAP A
  4. CJNE R<sub>1</sub> , #data , rel
- (b) Execute the following program and specify the contents of Accumulator and status of PSW after execution :  
 MOV A, #23H  
 MOV 0F0H, #02H  
 MUL AB  
 END
- (c) Identify the given circuit in Fig 1 and write its truth table:

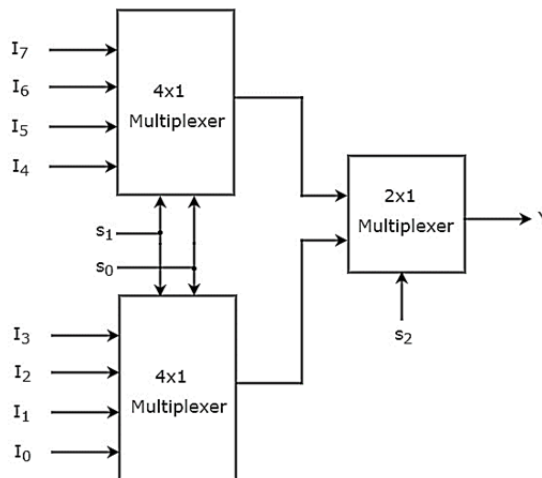


Fig 1

- (d) Apply Boolean rules to simplify the following:
  1.  $Y = A\bar{B} + \bar{A}B + AB + \bar{A}\bar{B}$
  2.  $Y = A\bar{B}C + \bar{A}BC + ABC$
- (e) Which pins of 8051 are used to perform the following functions:

1. Receive the serial data
2. Enable of external memory.
3. Multiplexing and de-multiplexing of address/ data lines.
4. Applying external interrupts.

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

**12 Marks (2X6)**

- (a) Develop an ALP to generate a square wave with ON time of 7 msec and OFF time of 3 msec.
- (b) Write an ALP to find average of ten, 8 bit numbers stored in internal memory location starting from 40H and store the result in 70 H location.
- (c) Explain the various power saving options of 8051.

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

**12 Marks (2X6)**

- a) Identify the special function registers(SFR ) to do the following:
  1. Change the priorities of various interrupts in 8051.
  2. Enabling and disabling of various interrupts in 8051.Explain bit functions of each bit of these SFRs.
- b) Develop an ALP to turn ON/OFF the relay. Draw suitable interfacing diagram
- c) Construct 3 bit asynchronous up counter using flip flop. Draw its timing diagram

## Scheme – I

### Sample Test Paper - I

**Program Name** : Electrical Engineering Program Group

**Program Code** : EE/EP/EU

**Semester** : Fourth

**Course Title** : Digital Electronics and Microcontroller Applications

**Marks** : 20

**Time:1 Hour**

<b>22421</b>
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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 (4X2)**

- a) Define the characteristics of logic families:
  1. Speed of operation.
  2. Power dissipation.
- b) Draw the symbol and write truth table of EX OR gates.
- c) State the cumulative and associative law for Boolean algebra.
- d) Write the excitation table for D flip flop.
- e) State the need of De-multiplexer.
- f) Define min-term and max-term.

#### Q.2 Attempt any THREE.

**12 Marks (3X4)**

- (a) Simplify using K' Map and implement using NOR- NOR gates only:  
 $f(A,B,C,D) = \sum m(0,2,6,7,8,10,12,14,15)$
- (b) Explain the operation of SR Flip Flop and draw its truth table.
- (c) Prove NOR gate as universal gate with suitable diagrams.
- (d) Implement mod 7 asynchronous down counter and draw suitable waveforms.

## Scheme – I

### Sample Test Paper - II

**Program Name : Electrical Engineering Program Group**

**Program Code : EE/EP/EU**

**Semester : Fourth**

**Course Title : Digital Electronics and Microcontroller Applications**

**Marks : 20**

**Time:1 Hour**

**22421**

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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 (4X2)**

- (a) List the functions of address and Data Bus.
- (b) Classify the following applications under Von-Neuman and Harvard Architecture:
  - i. Digital Signal Processing.
  - ii. 8051 Micro controller
- (c) Illustrate the functions of Editor and Compiler.
- (d) List the alternate functions of Port 3 of 8051.
- (e) Calculate size of memory if number of address lines for a memory chips are 12 and data bus width is of 8 bit
- (f) List any four addressing modes of 8051 with one example of each,

#### Q.2 Attempt any THREE.

**12 Marks (3X4)**

- a) Develop an ALP to find the largest number out of ten numbers stored from internal memory location 60H onwards and store the result at 70H memory location.
- b) Draw an interfacing diagram of 8 LEDs connected to port 2 of 8051 and write a program to toggle LEDs after 100 msec delay.
- c) Compare microcontroller with microprocessor on the basis of any four factors.
- d) Draw the interfacing diagram of Traffic light controller with 8051.