

## Scheme – I

### Sample Question Paper

**Program Name** : Electronics and Computer Engineering Program Group

**Program Code** : CO/CM/CW/DE/EJ/ET/EN/EX/IE/IS/IC/MU

**Semester** : Third

**Course Title** : Digital Techniques

**Marks** : 70

**22320**

**Time: 3 Hrs.**

#### 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) Write the base of the following number systems: Decimal, Binary, Octal, and Hexadecimal.
- b) Draw symbol and write the truth table of JK flip flop.
- c) State the necessity of multiplexer.
- d) Write excitation table of D flip flop.
- e) List any two specifications of IC- DAC 0808.
- f) Draw three variable K-map format.
- g) Define modulus of a counter? Write down the number of flip flops required for mod-5 counter?

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

**12 Marks**

- a) For the given figure No. 1, derive the Boolean expression of Y.

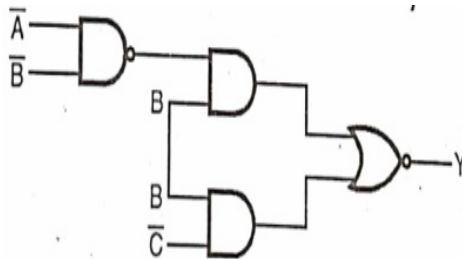


Figure No. 1

- b) Draw the circuit diagram of BCD to 7 segment decoder and write its truth table.
- c) Draw the block diagram of Programmable Logic Array.
- d) Minimize the following expression using K-map.  

$$f(P, Q, R, S) = \sum m(0, 1, 4, 5, 7, 8, 9, 12, 13, 15).$$

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

**12 Marks**

- a) Realize the following logic operations using only NAND gates: AND, OR, NOT.
- b) Compare TTL and CMOS logic families on the basis of following:
  - i) Propagation delay ii) Power dissipation iii) Fan-out iv) Basic gate
- c) Describe the operation of 4- bit universal shift register with the help of block diagram.
- d) Calculate analog output of 4 bit DAC for digital input is 1011. Assume  $V_{FS} = 5V$ .

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

**12 Marks**

- a) Draw the symbol and write logic expression and truth table of the two input universal logic gates.
- b) Describe function of full subtractor circuit with its truth table, K-map simplification and logic diagram.
- c) Design 1: 16 demultiplexer using 1: 4 demultiplexers.
- d) Describe the working of Master-Slave JK Flip-Flop with Truth Table and Logic diagram.
- e) The output of 8 bit DAC varies between +10V and -10V. Calculate the following:
  - i) Resolution ii) Percentage resolution.

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

**12 Marks**

- a) Design 3-bit synchronous counter and draw output waveform.
- b) Compare the following (Any three points) .
  - (i) Volatile with Non-Volatile memory.
  - (ii) SRAM with DRAM memory.
- c) Convert the following :
  - i)  $(5C7)_{16} = (?)_{10}$
  - ii)  $(2598)_{10} = (?)_{16}$
  - iii)  $(10110)_2 = (?)_{10} = (?)_{16}$

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

**12 Marks**

- Describe the procedure to design MOD-6 counter using IC 7490 in brief.
- Design a four bit BCD adder using IC 7483 and NAND gates only.
- Identify the circuit shown as figure no.2 and explain its working.

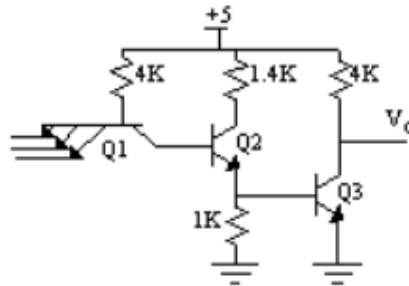


Figure No.2.

## Scheme – I

### Sample Test Paper - I

**Program Name** : Electronics and Computer Engineering Program Group  
**Program Code** : CO/CM/CW/DE/EJ/ET/EN/EX/IE/IS/IC/MU  
**Semester** : Third  
**Course Title** : Digital Techniques  
**Marks** : 20

**22320**

**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) Convert the following Binary number into Gray code.  
(i) 1111      (ii) 1101001
- b) Draw the Symbol and write the Truth Table of Universal Gates.
- c) Define following characteristics of logic families :  
i) Fan in      ii) Fan out
- d) State commutative and associative laws for the binary numbers.
- e) Draw the block diagram and write the Truth Table of Half Subtractor.
- f) Define 1's and 2's Complement of Binary Number with example.

#### Q.2 Attempt any THREE.

**12 Marks**

- a) Perform the following subtraction using 1's and 2's complement method:  
i)  $(52)_{10} - (65)_{10}$       ii)  $(101011)_2 - (11010)_2$
- b) State and prove De Morgan's Theorems.
- c) Reduce the following Boolean expression using Boolean laws.  
 $Y = AB + \bar{A}\bar{B} + A\bar{B} + \bar{A}B$
- d) Compare the parameters of TTL, ECL and CMOS logic families (any 4 points).
- e) Describe the operation of TTL logic circuit working as NAND gate.
- f) Design Full Adder using K-map and Truth Table.

## Scheme – I

### Sample Test Paper – II

**Program Name** : Electronics and Computer Engineering Program Group

**Program Code** : CO/CM/CW/DE/EJ/ET/EN/EX/IE/IS/IC/MU

**Semester** : Third

**Course Title** : Digital Techniques

**Marks** : 20

**22320**

**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 Block diagram of 4:1 Multiplexer and write its truth table.
- b) Explain the triggering methods used for digital circuits.
- c) Identify function of following ICs. (i) 74151(ii) 74155
- d) Draw symbol and write the truth table of JK flip flop.
- e) State any two applications of PLA's.
- f) Compare Static RAM and Dynamic RAM.

#### Q.2 Attempt any THREE.

**12 Marks**

- a) Realize the following function using demultiplexer :  
$$F1 = \Sigma m (1, 2, 5, 6, 7, 11, 14)$$
$$F2 = \pi M (0, 1, 2, 5, 6, 7, 8, 11, 12, 15)$$
- b) Describe the operation of 4 bit SISO shift register with the help of block diagram, truth table and timing diagram.
- c) Describe the operation of 3 bit synchronous up counter with Truth Table and Logic diagram
- d) Describe the working principle of Successive approximation type ADC with the help of block diagram.
- e) Design a four bit BCD adder using IC 7483 and NAND gates.
- f) Give the function of the following terminals of IC 7447.  
i) LT ii) RBI iii) BI iv) RBO