Scheme – E

Sample Question Paper

Course Name : Computer Engineering Group

Course Code : CO/CM/IF/CD

Semester : Third

12064

Subject Title : Digital Techniques

Marks : 100 **Time: 3 Hours**

Instructions: 1.All questions are compulsory.
2. Figures to the right indicates full marks.
3. Use of non-programmable calculator is permissible.

Q.1 Attempt any TEN of the following: **(10 x 2 = 20)**

a) Define Resolution, Linearity of ADC.

b) Define Fan-out & Figure of merit.

c) Convert the following Hex number to binary number i) 3FE4 H ii) 19BA H

d) Find out the 2's complement of following numbers i) 1101 ii) 10110

e) Draw logic symbol & truth-table for NAND gate.

f) Perform binary subtraction of following numbers $(10110)_2$ - $(01101)_2$

g) Explain positive and negative logic in TTL.

h) Draw truth table for Half adder and logic diagram.

i) Why flip-flop is called as a basic memory cell.

j) Give the classification of different types of semiconductor memories.

k) Draw the symbol and truth table for T & D flip-flop.

l) State two advantages of digital circuits.

Q.2 Attempt any FOUR of the following: **(4 x 4 = 16)**

a) Perform BCD addition for the following-

i) $(25)_{10} + (36)_{10}$

ii) $(99)_{10} + (11)_{10}$

b) Perform subtraction using 2's complement-

i) $(0101)_2 - (1000)_2$

ii) $(100011)_2 - (100101)_2$

c) For the following decimal numbers convert these to Octal no. and Hex nos.

i) 1024 ii) 66

d) Why NAND gate is called Universal gate? Implement XOR gate using only NAND gate.

e) Prove the following logic expression using Boolean algebra

AB + CD = (A + C) (A + D) (B + C) (B + D)

f) State and prove the De-Morgans theorem

Q.3 Attempt any FOUR of the following: (4 x 4 = 16)

a) Simplify following using K-map & realize using AND, OR, NOT.

(A, B, C, D) = Σm (1, 3, 7, 8, 10, 12, 13, 15)

b) Implement the following function using 16:1 MUX.

Y = ∑m (K1, 2,5,6,8,12)

c) Explain BCD to seven-segment decoder.

d) Draw block diagram of a 2 bit digital comparator accepts 2 words

A = a2 a1 and B = b2 b1 and gives three outputs G, E and L.

i) The output G is high when A > B

ii) The output E is high when A = B

iii) The output L is high when A < B

e) Convert the following Boolean functions into standard SOP form.

i) A + B + C

ii) AB + CD + AD

f) Describe the ALU 74181 with a neat diagram

Q.4 Attempt any FOUR of the following: (4 x 4 = 16)

a) Design MOD 5 asynchronous counter.

b) What is race around condition? How is it eliminated using Master-slave JK flip-flop.

c) Describe the function of 4-bit SISO shift register with the help of block diagram, truth-table, timing diagram.

d) Differentiate Synchronous & Asynchronous Counter (any four points).

e) Draw neat diagram of clocked SR flip-flop using NAND gates and write its truth table.

f) Explain 3-bit UP ripple (Asynchronous) counter.

Q.5 Attempt any FOUR of the following: (4 x 4 = 16)

a) Differentiate between static & dynamic RAM.

b) Draw neat diagram of R/2R ladder type DAC. Find its output expression.

c) Write a short note on EEPROM.

d) Compare volatile and non-volatile memory.

e) The LSB of 3bit DAC represent 0.2 V What value of voltage will be represented by following binary words

i) 011 ii) 110

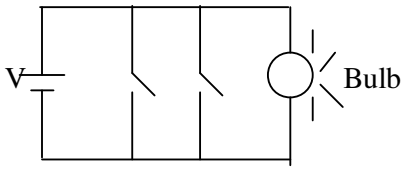
f) Draw the diagram of Successive approximation ADC and describe its operation

Q.6 Attempt any FOUR of the following: (4 x 4 = 16)

a) Solve POS expression using K-map

i) F (A, B, C, D)= Π M (2,8,9,10,11,12,14)

b) For the circuit shown below write the truth table.



c) Determine the frequency at the output of last (MSB) flip – flop for an input clock frequency of 2 MHz.

d) Explain the specifications of DAC (any four).

e) Write the advantages & disadvantages of dynamic RAM.

f) Explain Full Subtractor using its truth table and logic diagram.