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

Figure 22320
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.
\[ f(P, Q, R, S) = \Sigma m(0, 1, 4, 5, 7, 8, 9, 12, 13, 15) \]

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) Propogation 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

a) Describe the procedure to design MOD-6 counter using IC 7490 in brief.

b) Design a four bit BCD adder using IC 7483 and NAND gates only.

c) Identify the circuit shown as figure no.2 and explain its working.

Figure No.2.
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.
   \[ Y = AB + \overline{AB} + A\overline{B} + \overline{A\overline{B}} \]

b) 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        Time : 1 Hour

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 :
   \[ F1 = \sum m \{1, 2, 5, 6, 7, 11, 14\} \]
   \[ F2 = \Pi M \{0, 1, 2, 5, 6, 7, 8, 11, 12, 15\} \]
b) Describe the operation of 4 bit SISO shift register with the help of block diagram,
thruth 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

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