QUESTION 2006

1. Choose the correct answers from the given alternatives in each of the following questions:

a) The base of Hexadecimal Number System is

i) 8 ii) 2 iii) 10 ✓iv) 16

b) Which of the following two GATES are known as Universal GATES?

i) OR and AND ii) NAND and OR

✓iii) NAND and NOR iv) EX-OR and NOR

c) The Boolean theorem A + A is

i) 1 ii) $\overline{A}$ iii) 0 ✓iv) A

d) The addition of 3 bits is done by

i) Half Adder ii) Full Subtractor

✓iii) Full Adder iv) Half Subtractor

e) Multiplexer is combinational circuit which gives

i) several outputs ii) no output iii) 3 outputs ✓iv) 1 output

f) $(1 + XY + XY' + YZ + XZ)$ is equal to

i) $XY' + YZ$ ii) XYZ iii) 0 ✓iv) 1

g) A multiplexer is also known as

i) counter ii) decoder ✓iii) data selector iv) none of these

h) A simple flip-flop is

✓i) 2 bit memory ii) 1 bit memory

iii) 3 state logic gate iv) none of these

i) Number of AND gates with 2 input required for ABCD is

i) 4 ii) 2 ✓iii) 3 iv) 1

j) Which of the following is an example of volatile memory?

✓i) RAM ii) PROM iii) Hard Disk iv) EPROM

2. a) What is the basic difference between synchronous counter & asynchronous counter? Explain the method of frequency division in short.
b) Draw the block diagram, Boolean expression, logic symbol & truth table of X-OR gate.
c) Draw the logic diagram and truth table of J-K F/F. Why is J-K F/F much more versatile that S-R F/F?

a) See Topic: RESISTER & COUNTER, Short Answer Type Question No. 1.
b) See Topic: LOGIC GATES, Short Answer Type Question No. 5.
c) See Topic: FLIP-FLOP, Long Answer Type Question No. 5.

3. a) Draw the truth table for a three input adder. Explain clearly the meaning of the input and the output symbols in the truth table. Write the Boolean expressions for the sum and the carry.
b) Use a Karnaugh map to find the minimum sum of products for the expression

$$X = A'B'C' + AB'C' + A'BC' + ABC'.$$

c) List the applications of counters and registers.
d) Simplify the expression using Boolean algebra:

i) $\left[(A'+B')+(CD)'\right]'$ ii) $(AB'+A'B)'$

a) See Topic: ARITHMETIA CIRCUIT, Long Answer Type Question No. 2.
b) See Topic: KARNAUGH MAP, Short Answer Type Question No. 4.
c) See Topic: RESISTER & COUNTER, Short Answer Type Question No. 2.
d) See Topic: BOOLEAN ALGEBRA, Short Answer Type Question No. 4.

4. a) Explain the Race Around Condition in Flip-Flop.
b) Explain the working of Master-Slave Flip-Flop with suitable circuit diagram and truth table.
c) Write down the advantages of dynamic shift register over static shift register.

a) & b) See Topic: FLIP-FLOP, Long Answer Type Question No. 6.
c) See Topic: RESISTER & COUNTER, Short Answer Type Question No. 3.

5. a) Express the following 4-variable maxterm expression into minterm:

$$F = \Pi M(0, 3, 5, 6, 8, 9, 11, 12).$$

b) Write down the advantages of parallel carry over ripple carry in counters.
c) Discuss in brief the different modes of operation of a shift register.
d) Draw the logic diagram for MOD-3 counter using D Flip-Flops.

a) See Topic: LOGIC GATES, Short Answer Type Question No. 3.
b), c) & d) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 2.

6. a) Convert $(237)_8$ to binary, decimal and hexadecimal numbers.
b) Write down the 4-bit gray code in the ascending order of its decimal value.
c) Carry out hexadecimal subtraction using 2's complement method.

i) $34_{16} - 43_{16}$ ii) $8C_{16} - 3A_{16}$

See Topic: NUMBER SYSTEM, Long Answer Type Question No. 2.

7. Write short notes on any *three* of the following:
   a) Self complementing property of Excess-3 code
   b) De-multiplexer
   c) Ring counter
   d) UP/DOWN counter

a) See Topic: CODES, Long Answer Type Question No. 3(a).

b) See Topic: COMBINATIONAL CIRCUIT, Long Answer Type Question No. 14(a).

c) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 10(b).

d) See Topic: RESISTER & COUNTER, Long Answer Type Question No. 10(c).