DEPARTMENT OF PHYSICS
QUESTION BANK

CC-X, Digital Electronics

1. Find the binary sums:
    0000 1111+0011 0111
    0001 1000 1111 0110 + 0000 1111 0000 1000

2. Show the subtraction in binary form:
    47_{10} - 23_{10}
3.   Which are the universal logic gates? Why they are named so?
4. Explain Boolean algebra with law.
5. State and prove De-Morgan's theorem.
6. Simplify the following Boolean expression
    ((A'+B+C') (A'+B+C))'
7. Explain SOP (Sum of Product) and POS (Product of Sum) in Boolean function.
8. What do you understand by minterm and maxterm.
9. Simplify the following Boolean function-
    $F(A, B, C, D) = \sum m (0, 1, 2, 3, 7, 8, 10)$

10. What do you understand by don't care condition in Boolean function.
. 11. Given $f(p,q,r,s) = \Sigma m (0, 1, 2, 3, 7, 8, 10) + \Sigma d (5, 6, 11, 15)$, where d represents the don't-care condition in Karnaugh maps. Find a minimum sum of products (SOP) form of f(p,q,r,s)?
Implement the following Boolean function with NAND gate only:
$Y (A, B, C) = \sum m (0, 1, 3, 5)$
12.Write the truth Table for XOR and XNOR gates. Give the
circuit diagrams for each.

13Implement XNOR gate using NOR gates only.
14Simplify the following function using K – map,
    F = ABCD+AB'C'D'+AB'C+AB
 Realize the SOP using only NAND gates.
15.Prove the following identity
*   AB + A (B + C) +B (B + C) = B +AC
*   AB + A'B +A'B' = A' +B
*   AB'C + A'BC + ABC = AC +BC

16.Explain combinational circuit in detail.
17.Differentiate between combinational circuits and sequential circuits.
18.What is binary adder? Explain different types.
19.Explain half adder circuit diagram and its truth table.
20.Explain full adder with block diagram using half adder
21.Explain half subtractor with circuit diagram and block diagram.
22.What do you understand by code converter? How it is used.
23.Explain binary to BCD converter with truth table.
24.Design a combinational logic circuit that has four inputs and one output. The output produced is 1 when input is greater than 1000.
25.What is decoder?
26.What do you understand by decoder expansion? Explain with an example.

27. What is multiplexer? Construct a 16x1 multiplexer with two 8x1 and one 2x1 line multiplexer.

28.   Show Karnaugh map for the equation
 F (A, B, C) =∑m (1,2,3,6, 7)
29.   Show Karnaugh map for the equation
30.: F (A, B, C, D) =∑m (1,2,3,6,8,,9,10,12,13,14)

31. What is a full adder?Implement a full adder circuit with multiplexer.

32. What do you understand by BCD to 7(seven) segment display decoder?

33. Explain the working of 8x3 line encoder.
34. Explain de-multiplexer in detail.
35. What is Encoder? Explain with example.
36.

A	B	C	D	Y
0	0	0	0	0
0	0	0	1	1
0	0	1	0	1
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	1
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	0
1	1	1	1	0

Draw the Karnaugh map for the table given in question no.36. Encircle all the octets, quads, and pairs you can find. Draw the simplified circuit after Karnaugh simplification.

37. Explain Memory hierarchy with suitable diagram.
38. Explain the functionality of RAM.
39. Why RAM is called volatile.
40. Explain the functionality of ROM. Define its types.

41. How many 32K x 1 RAM chips are needed to provide a memory capacity of 256K-bytes?

42. Draw and explain block structure of ROM.
43. Explain the functionality of magnetic disk and magnetic tape.

44. Write a short note on Compact Disk (CD).

45. Differentiate between internal memory and external memory.
46. What do you understand PLA.
47 What do you understand by floppy disks?
48. Define Hard disk in detail.
49. Describe RAM organization.
50. Design a logic construction of 32x4 ROM.

51. Differentiate between asynchronous sequential circuits and synchronous sequential circuits.
52. Explain design procedure for Asynchronous sequential logic circuits.

53. What is counter? Explain its classification.
54. Explain ring counter in detail.
55. Explain 3 bit up down Asynchronous counter?
56. What is modulus counter? Design 3-bit asynchronous counter using flip flop.
57. Design a Mod 7 binary counter. Draw its state diagram and circuit.
58. Design a counter that has repeated sequence of six states 0, 1, 2, 4, 5, 6 using JK flip flop.
59. What are Shift Registers? Discuss various types of Shift Registers
60. Differentiate between Serial-Input-Serial-Output(SISO) and Serial-Input-Parallel-Output(SIPO) register
61. Draw a block diagram for 4-bit bi-directional shift registers with parallel load and explain its operation.
62. Differentiate between static and dynamic RAM.
63. What is memory unit? Is memory essential for computer systems?
64. Discuss auxiliary memory and write some example of auxiliary memory.
65. Write down the advantages and disadvantages of associative memory.
    Discuss cache memory and its level. How cache memory is useful?
66. What are different cache mapping techniques? Discuss.
67. Explain advantages of cache memory.
68. What do you understand by virtual address in virtual memory?
69. Explain the general scheme of virtual memory? Also explain advantages of virtual memory.
70. Explain different types of registers. Classification according memory.