

Part 1: Checklist of topics to be done:

Topic 1: Number system: Mathematical conversion and programming.

1. Decimal to binary.
2. Decimal to octal.
3. Decimal to hexadecimal.
4. Binary to decimal.
5. Binary to octal.
6. Binary to hexadecimal.
7. Decimal fraction to binary.
8. Binary fraction to decimal.

Topic 2: Boolean

1. Boolean operators, their truth table and gates symbol.
2. Making truth tables.
3. Making logic circuit diagrams.
4. 15 Laws (including principles and theorems) of Boolean algebra.
5. Simplifying Boolean expressions.
6. Universal Gates.

Topic 3: Propositional Logic

1. Basic terms.
2. 5 connectives and their working.
3. 5 Rules with truth table proof.

Topic 4: Data structures and others.

1. A simple array Stack program.
2. A simple array Queue program.
3. Searching and sorting programs (as in class X)
4. Polish Notation.

Part 2: 10 Short Practice Papers to test yourself.

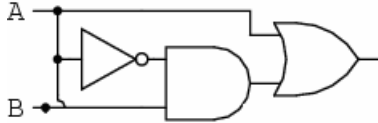
Note: Should be done after you have revised the whole syllabus. They are for practice; do not mistake them for important questions.

Paper 1

- Q1. Convert 101011_2 to octal.
- Q2. Simplify $(AD + AD') + AC + C$
- Q3. Design a truth table for $X + Y' \oplus Z$
- Q4. Show conjunction and its similarity to a Boolean operator.
- Q5. Convert to prefix $A+B/D$.
- Q6. Write a function to convert a decimal integer to a binary string.

Paper 2

- Q1. Verify if $10_8 = 8_{10}$
- Q2. Show how is NAND a universal gate.
- Q3. Write an expression for



- Q4. Define Association.
- Q5. Find the dual of $A + 1 \cdot B'$
- Q6. Write a class to implement an array stack.

Paper 3

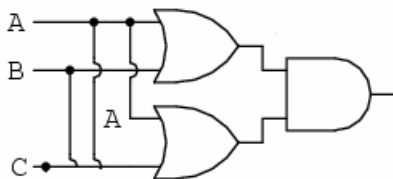
- Q1. Convert $A/B + C * D$ to prefix notation.
- Q2. Simplify $X + XY' + XYZ'$
- Q3. State and prove the De Morgan's theorems using induction.
- Q4. Define involution.
- Q5. Find the complement of $A'B + A'B'$
- Q6. Write a function which accepts an array of integers and sorts it.

Paper 4

- Q1. Convert 5.25_{10} to a binary fraction.
- Q2. State and prove the absorption law.
- Q3. Design a truth table for $((A' + B') \cdot C)'$
- Q4. State the distributive law.
- Q5. Define (i) overflow (ii) peek
- Q6. Define functions to check for (i) overload and (ii) underflow and (iii) reset in a queue.

Paper 5

- Q1. Show the sum of 25 to the base 8 and to the base 16 in decimal.
- Q2. Simplify: $XY + X(Y + Z) + Y'(Y' + Z)$
- Q3. Write an expression for



- Q4. Explain duality.
- Q5. Define Bi conditional Elimination with example.
- Q6. Define functions to check for (i) overflow and (ii) underflow in a stack.

Paper 6

- Q1. Convert $A - B + C^D$ to postfix notation.
- Q2. Check if $A' \cdot (A + C) + C = C$.
- Q3. Verify if $X \oplus Y = X'Y + XY'$.
- Q4. Define Transposition.

Q5. Define Conditional Elimination

Q6. Write a program to display a string in reverse using a stack (First push all the characters and then pop and display).

Paper 7

Q1. State the largest possible octal value which can be represented in 3 digits.

Q2. Show how is NOR a universal gate.

Q3. Draw a truth table and a logic gate diagram for the XNOR gate.

Q4. State the meaning of a contingency.

Q5. Find the complement of the algebraic equivalent of propositional implication.

Q6. Write a class to implement an array queue.

Paper 8

Q1. Convert 1001.11_2 to decimal.

Q2. Simplify $A + A'B + AB'$

Q3. Draw circuit diagrams for AND using minimum number of NAND gates.

Q4. Explain the commutative law.

Q5. Find the dual of $X' \cdot 1 + (B' + 0.1)'$

Q6. Write a function which returns (i) the size/length of a stack (ii) The capacity of a stack.

Paper 9

Q1. Convert 1_2 , 10_2 , 100_2 , 1000_2 to decimal and comment on the progression of the series.

Q2. State and prove the De Morgan's theorems algebraically.

Q3. Express in algebraic form



Q4. Explain Modus Ponens with a Truth table proof.

Q5. Convert to postfix $A/B * C^D$

Q6. Write a function which accepts a sorted array of some names & a string value to be searched. Returns true/false depending on its presence.

Paper 10

Q1. Express the ASCII code of the character 'A' in hexadecimal.

Q2. Simplify $A' \cdot (A + B)$

Q3. Design a Logic circuit and truth table for the expression $(X \oplus Y \oplus Z)'$

Q4. State complementarity.

Q5. Define (i) Contingency (ii) Assertion

Q6. Define a function which returns the sum of values stored in a queue of integers.

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