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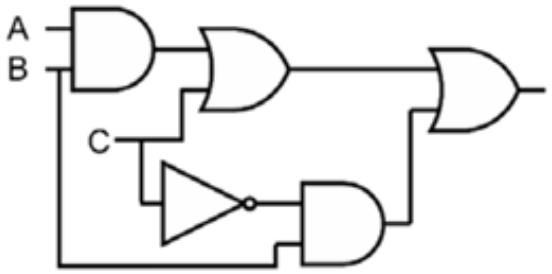
අධ්‍යයන පොදු සහතික පත්‍ර (උසස් පෙළ) විභාගය, 2027
கல்விப் பொதுத் தராதரப் பத்திர (உயர் தர)ப் பரீடசை, 2027
General Certificate of Education (Adv. Level) Examination, 2027

තොරතුරු හා සන්නිවේදන තාක්ෂණය I தகவல், தொடர்பாடல் தொழினுட்பவியல் I Information & Communication Technology I	20 E I	පැය දෙකයි இரண்டு மணித்தியாலம் Two hours

Instructions:

- *Answer **all** the questions*
- *Write your **Full Name** in the space provided in the answer sheet.*
- *In each of the questions 1 to 50, pick one of the alternatives from **(1), (2), (3), (4), (5)** which is **correct** or **most appropriate** and **mark your response on the answer sheet** with a cross **(X)** in the answer sheet provided.*
- *Use of calculators is **not allowed**.*
- *Provide only the **answer sheet** to **correct**, keep the question paper in the **Revision File**.*

01. What is the output of given logic circuit?



1) A
2) B
3) C
4) A + B
5) B + C

02. What is the simplified expression of the Boolean expression (x+y)' . (x. y)'

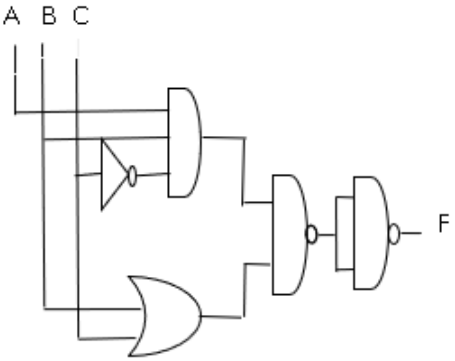
1) x 2) (x.y) 3) (x+y)' 4) (x. y)' 5) x+y

03. What is the most simplified answer of $\overline{(A + B)}$ + $\overline{B}$ + C. $\overline{B}$ after simplifying using Boolean algebraic laws?

1) A.B 2) A 3) A + B 4) $\bar{A}$ + B 5) $\overline{B}$

04. What is the output of F of the logic circuit given below.

A. ((A.B.C'.B +C)')'
B. (A .B .C') . (B +C)'
C. (A .B .C') . (B + C)
D. (A.B.C') + (B.C)"



Which of the above is/are correct expression(s) of the logic circuit?

1) A & C only 2) A only 3) B & D only
4) B only 5) C & D only

See Page 2

05. What is the Simplified expression of F= Σ(0,1,2,3,8,9,10,11)?

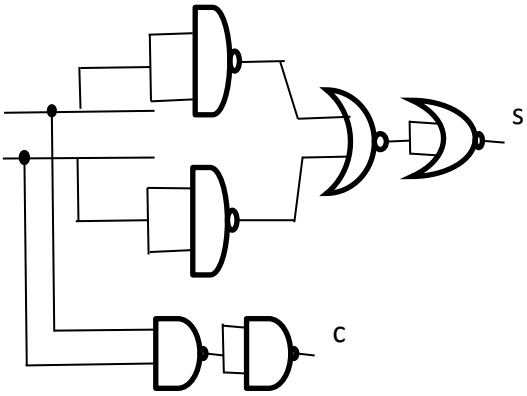
1) F= A,B,C,D,J,K,L,M
2) F= A,B,C,D,E,F,G,H
3) F= A'
4) F= A' + B
5) F= B

06. Which of the following is the simplified form of the Boolean Expression $(A + \overline{B})\ (AB + \overline{A}) + (AB)$?

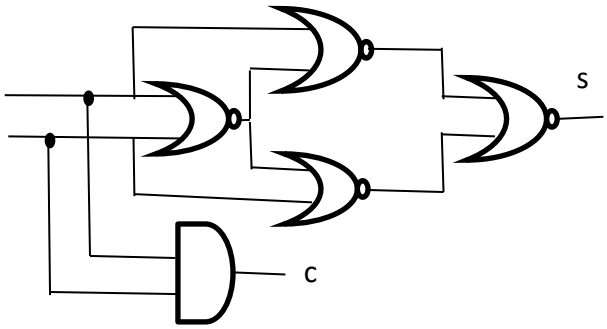
1) $A + \overline{B}$
2) $B + \overline{A}$
3) $AB + \overline{B}$
4) A + B
5) $AB + \bar{A}$

07. Which of the following logic circuit(s) is/are correctly represent a half adder?

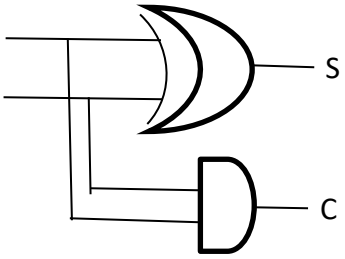
A



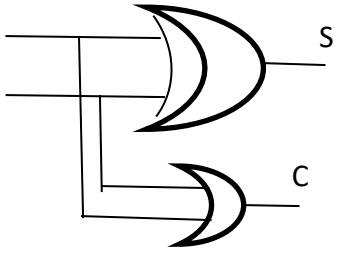
B



C.



D.



1) A,B,C & D all
2) C only
3) D only
4) B,C only
5) A,C only

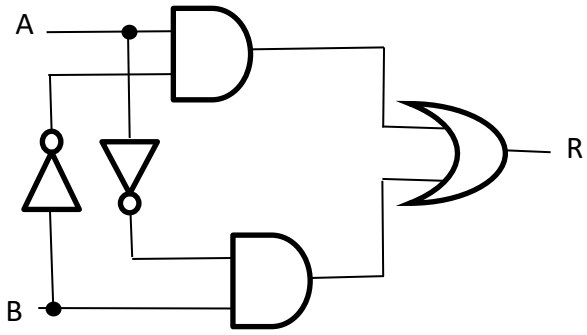
08. Which boolean expression is similar to the XNOR truth table?

1) (A+B) . (A'+B')
2) ((A'.B')'. (A.B)')'
3) ((A+(A+B)')' + (B+(A+B)')')'
4) ((A.(A.B)')' . (B.(A.B)')')'
5) ((A'.(A+B) + B'.(A+B))')'

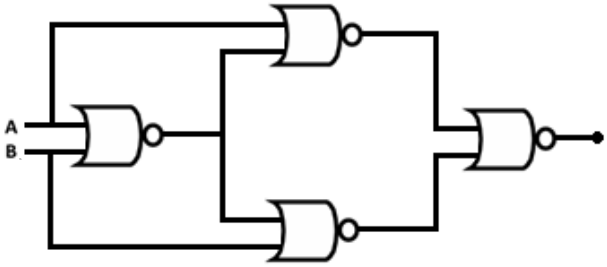
See Page 3

09. The equivalent logic gate for resultant R of the following logic circuit is

1) XOR
2) AND
3) OR
4) NOT
5) NAND



10. The output of logic circuit given below represents _____ gate.



1) OR
2) NOR
3) NAND
4) XOR
5) XNOR

12. What is the most simplified answer for the following Boolean expression?

F=A'B'+A'BC+A'BD+AB'C'D'

1) A'B'+A'C+A'D+AB'C'D'
2) A'B'+A'C+A'BD+B'C'D'
3) A'B'+A'C+A'D+B'C'D'
4) A'B'+B'C'D'+A'BD+A'BC
5) A'B'+A'C+A'BD+A'BCD

13. Using only NAND gates, how many NAND gates are required to implement the Boolean expression (A'.B) + (A.B'), given that the circuit should have 2 inputs?

1) 4
2) 5
3) 3
4) 6
5) 2

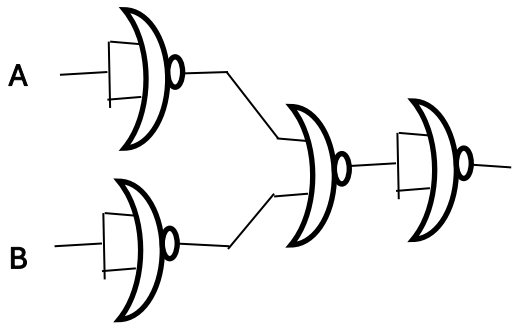
14. Find the correct statement regarding the K-Map given.

CD \ AB	00	01	11	10
00	1	0	1	1
01	1	1	1	1
11	1	0	0	1
10	1	0	1	1

1) Most Simplified SOP expression has 4 minterms.
2) Most Simplified POS expression has 3 maxterms.
3) Most Simplified SOP is A'B'+AB'+C'D+AC'+ACD'
4) Most Simplified SOP is B'+C'D+AC'+AD'
5) All the above are incorrect.

See Page 4

15. What is the output of the following logic circuit



1) (AB)'
2) A+B
3) (A+B)'
4) AB
5) A

16. The simplified result of the Boolean expression $\overline{(\bar{A} + \mathrm{B}) + \mathrm{A} + \mathrm{B} + \mathrm{C}}$ would be.

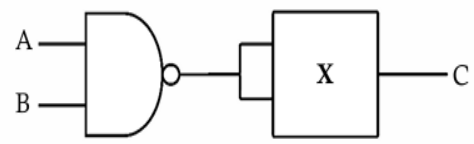
1) 1 2) 0 3) A 4) B 5) C

17. Select the POS expression that is equivalent to the SOP expression below.

ABC+AB'C'+AB'C+ABC'+A'B'C

1) (A+B+C)(A+B'+C')(A+B'+C)(A+B+C')
2) (A+B'+C')(A' +B'+C)(A'+B+C')
3) (A+B+C)(A+B'+C)(A+B'+C')
4) (A+B')(A'+B +AC')(A+B+C)
5) (A'+B'+C')(A+B+C)(A+B+C')(A'+B+C)

18. Consider the following logic circuit in which X indicates a two-input logic gate.



Which of the following should X be so that when A = 1 and B = 0, the output C would be 1?

I – OR gate **II** – XNOR gate **III** – AND gate

1) I only 2) I and II only 3) II and III only 4) I and III only 5) All I, II, and III

19. What values should be assigned to the following expression A'+B+C'+D in order to make the whole expression equals to 0.

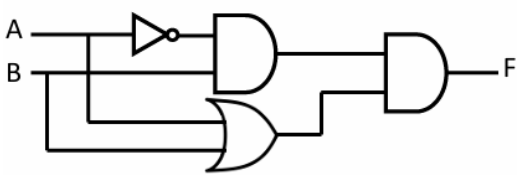
1) A = 1, B = 0, C = 0, D = 0
2) A = 0, B = 1, C = 0, D = 0
3) A = 1, B = 0, C = 1, D= 0
4) A = 1, B = 0, C = 1, D = 1
5) None of the above

20. Which of the following shows an invalid value in S-R flip flop (NOR gate)

1) S = 0, R = 0 2) S = 0, R = 1 3) S = 1, R = 0
4) S = 1, R = 1 5) All of the above

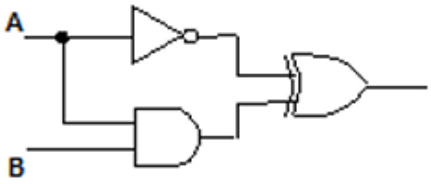
See Page 5

21. The true statement about the inputs A and B to get output as 1 in the given circuit diagram



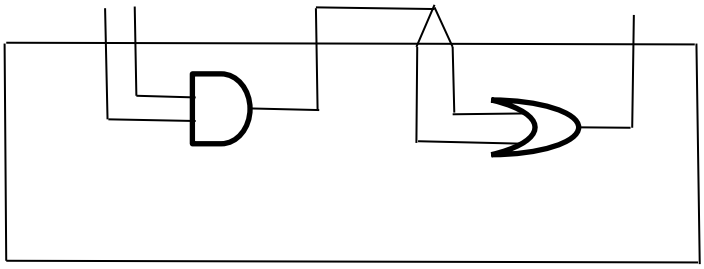
(1) A=1 is sufficient
(2) A=1 and B=1
(3) A=0 and B=1
(4) A=0 and B=0
(5) Should be B=0

22. What will be the output of the given circuit, if A=0 and B = 0 ?



1) 1 2) A' 3) B 4) 0 5) A

23. What is the logic gate represented by the integrated circuit .



1) Or gate 2) And gate 3) Nand gate 4) Xor gate 5) Not gate

24. Steps of designing a digital circuit to solve a real world problem are given below

A- K-maps are used to simplify the equations
B- The truth table is developed
C- Implemented using logic gates
D- The problem is analyzed
E- Identify input variables and output variables

Choose the accurate order of execution.

1) A,C,E,B,D 2) D,E,B,A,C 3) A,C,B,D,E
4) B,D,E,C,A 5) D,A,B,E,C

25. Q = A'B + AB + ABC'
Select the correct statement about the boolean expression given below

1) This is not a standard SOP expression, So that it cannot simplify using a K- map
2) K- map simplification is possible for this SOP expression and simplified expression can be obtained using only one logic gate.
3) This is a POS expression and it can be simplified using a k map
4) It is not possible to identify minterms and maxterms of this expression
5) The most simplified expression of this expression is "B"

See Page 6

26. Select incorrect statement about flipflops `

1) In asynchronous circuits, the output depends only on the inputs at any given time

2) S-R flip-flops are nothing but a single bit memory storage

3) Only two types of flip flops are available and their output always depend on current Inputs

4) In synchronous circuits, the output can change only at specific instances determined by a clock signal.

5) Flip flops are examples for sequential circuits and used to create a memory

27. P and Q are the inputs of following truth table.

P	Q	(PQ)'	(P+Q)'
0	0		
0	1		
1	0		
1	1		

What are the conditions in order to get an equal value for both the outputs.

A. The value must be “0” in both the inputs of P and Q.

B. The Value must be “1” in both the inputs P and Q.

C. The input values of P and Q must be unequal.

1) A, B only 2) C only 3) A, C only
4) All A, B and C 5) None of above

28. The Carry Out (C_{out}) equation for a full adder is:

1) A XOR B XOR C_{in}
2) AB + BCin + AC_{in}
3) (A + B) C_{in}
4) A + B + C_{in}
5) A XOR B XOR C

29. A 4-bit ALU performs the following operation:

$$A-B = A + B' + 1$$

Which logic circuit is responsible for handling the complementation and addition?

1) Full Adder with XOR gates 2) Subtractor with AND gates 5) Full Adder with OR Gates
3) Multiplexer with OR gates 4) Half Adder with NOR gates

See Page 7

30. Which of the following statements about arithmetic circuits is/are incorrect?

A) A full adder can be constructed using two half adders and an OR gate.
B) A half adder can handle carry-in (C_{in}) and carry-out (C_{out}).
C) A 4-bit binary subtractor can be implemented using two's complement addition.

1. A only
2. B only
3. A, B, and C only
4. B and C only
5. A, and C only