Mt Kenya University

INSTRUCTIONS

Answer Question One And Any Other Two

Q1. A) Draw the truth table for the following Boolean expression $Z=A.B+\bar{A}\bar{B}$ (5mks)

   b) Simplify $\bar{A}.B+\bar{A}.B$ by using demorgans law and rules of Boolean algebra (4mks)

   c) let A={1,2,3,4}

      B={3,4,5,6,7}

      C={2,3,5,7}

   Find (i) AUB

     (ii) AnC   (4mks)

   d) which of the following statements are true

   (i) 1+2=3

   (ii) I am ugly and you are clever

   (iii) All those over 2 meters tall are over 200yrs old.   (3mks)

e) In hockey a match can be won, draw or lost. If a team play 5 matches how many different sequences of results are possible?   (4mks)

f)Using induction method prove that $1+2+3+4+…..+n=n(n+1)/2$
(5mks)

g) 3 boys A,B and C are throwing a ball among themselves such that A always throws the ball to B, but B and C are just as likely to throw the ball to A as they are to each other. Illustrate the information given above in form of a graph and show the probabilities on the arcs (5mks)

Q2. A) complete the following truth table

p	q	-p	-q	-p∧-q	-p∨-q	-p∨q	-(p∧-q)

(10mks)

   b) construct a switchingcicuit to meet the requirements of the Boolean expression Z=A.Q+A.P+A.P.Q. hence construct the truth table for this circuit.
(10mks)

Q3. A) design a circuit with four switches A,B,C and D according to the following table.

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

(10mks)

   b) Verify that the proposition (p∧q)∧-(p∨q) is a contradiction   (5MKS)

   c) Show that h∨ - (h∧m)   is a tautology   (5mks)

Q4. A) In a survey of 60 people, it was found that 25 read Nation, 26 read times, and 26 read fortune. Also 9 read both Nation and times, 8 read both times and fortune, and 8 read none of the magazines.

   (i) Find the number of people who read all the 3 magazines
   (ii) Draw the Venn diagram to represent the above information.
   (iii) Determine the number of people who read exactly one magazine (14MKS)

(b) Show that A={2,3,4,5} is a proper subset of C={1,2,3,4,5,…..8,9}   (3mks)

(c) Show that A={2,3,4,5} is not a subset of B={X:xεN, x is even}   (3mks)

Q5 (a) Prove by induction that $1^3 + 2^3 + 3^3 + …….. + n^3 = \frac{1}{4}n^2(n+1)^2$ (5mks)

(b) 9 players are available to play for a tennis team of 4 players. In how many ways can the team be selected if 2 of the players are brothers and must either both be included or both be excluded, and if two other players have recently quarreled and should not both play in the team (12mks)

(c) How many different signals, each consisting of eight flags hung in vertical line, can be formed with 4 indistinguishable red flags, 3 indistinguishable white flag, and a blue flag? (3mks)