CCS 4102 DISCRETE STRUCTURES
CAT1 /ASSIGNMENT 1
BTIT/SEPT2020/JAN2021, BSIT/SEPT2020/JAN2021, BSCS/SEPT2020/JAN2021, BBIT/SEPT2020/JAN2021

Instructions

- *Attempt all questions. Submit by Friday 9th July 2021. Should be handwritten. Crying is allowed but should be done quietly.*

a) Evaluate: $^{10}P_6$

b) Use a directed graph to represent the relationship R = {(1, 1), (1, 3), (2, 1), (2, 3), (2, 4), (3, 1), (3, 2), (4, 1)}.

c) Find the Cartesian product A x B given that A = {1,2,3,4} and B = {x,y,z}. Hence, show that the product B x A is not same as B x A.

d) Define the following terms:

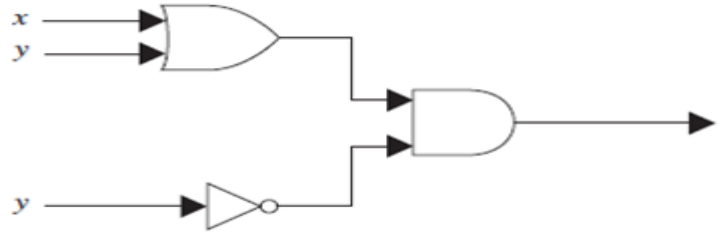
i. Tautology
ii. Logic gate
iii. Power set
iv. Logical equivalence

e) Find the negation of the statement "I will have an exam today."

f) Define the term "Bit String". Hence find the bitwise AND of 11110000 and 10101010.

g) i) Show that the propositions ¬ (p V q) and ¬p Λ ¬q are logically equivalent.

ii) Find the output of the circuit:



h) Find the power set of the set {1,2,3}.

i) Edward, the IT manager ABC company Ltd stays at a hostel for three days. Her menu for breakfast each day is a choice of one of 3 types of egg dish, or one of 2 two types of meat or one type of fish. In how many ways can he arrange his breakfasts if he does not have any egg two days running nor repeat any dish.

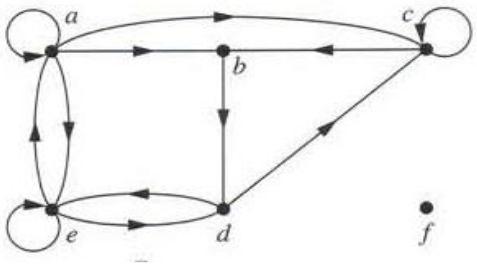
j) The computer department of firm a personal code number to its employees. A code consists of 2 letters, then a digit, then another letter. I and O as letters and 1 and 0 as numbers are not used. How many codes are available?

k) A research team consists of 8 engineers, 6 physicists and 4 mathematicians. Members of the team are selected to form a committee. How many committees can be formed out these, consisting of :

i) All four engineers ?

ii) At least two physicists are among the four?

l) Find the in-degree and out-degree of each vertex in the graph with directed edges as shown.



b) Draw a graph with the adjacency matrix as:

$$\begin{bmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

m) Evaluate F(x,y,z)= $\overline{(xy)}$ + (y⊕z), given that x = 1, y = 0 and z = 0.

n) Construct a logic circuits that produces the output: $(x + y)x$

Reference

Kenneth H. R. (2019). Discrete Mathematics and Its Applications (Eighth Edition). New York : McGraw-Hill Education. ISBN: 9781259676512.