NDIIT

DISCRETE MATHEMATICS

ASSIGNMENT 1

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BCA 2nd Year

QUESTION 1

Write the general term $(n^2 - y)^6$.

ANSWER 1

Given: -

=) $(x^2 - y)^6$

=) $[x^2 + (-y)]^6$

General term in the expansion is: -

=) $T_r + 1 = {}^6C_r\ (x^2)^{6-r}\ (-y)^r$

=) ${}^6C_r\ (x^{12-2r}\ (-y)^r$.

QUESTION 2

Find the coefficient of X^5 in $(x + 3)^9$.

ANSWER 2

For general term of expansion $(x + 3)^9$: -

=) Putting $a = x, b = 3, n = 9$

=) $T_r + 1 = {}^9C_r x^{9-r} 3^r \quad -1$

Now we need to find the coefficient of X^5.

=) So, $x^{9-r} = x^5 \quad -2$

On comparing we get,

$=) 9 - r = 5$

$=) r = 4$

Adding r=4 in 1 equation, we get: -

$=) T_{4+1} = {}^{9}C_4 x^{4-4} 3^4$

$=) \frac{9!}{4!\ 5!} x^5 \times (3 \times 3 \times 3 \times 3)$

$=) \frac{9 \times 8 \times 7 \times 6 \times 5!}{4!\ 5!} \times x^5 \times (3 \times 3 \times 3 \times 3)$

$=) 10,206\ x^5$

Hence, the coefficient of $x^5 = 10{,}206$.

QUESTION 3

Write all possible subset of A = {5,6}.

If A = {2,3,4,5} and B = {3,5,6,7} and

(i) A u B
(ii) A n B.

ANSWER 3

Given: -

A = {5,6}, n=2

The no of possible subsets are $2^n = 2^2$

$=) 4.$

$A = \{Q\}, \{5\}, \{6\}, \{5,6\}.$

(i) $A \cup B = \{2, 3, 4, 5, 6, 7\}$
(ii) $A \cap B = \{3, 5\}$

QUESTION 4

The truth value of given statement is '4+3=7 or 5 is not prime'.

a) True
b) False

ANSWER 4

The answer to the following question is 'True' because: -

Compound statements with 'or' is true when either of the statement is true.

QUESTION 5

What is the value of x after this statement, assuming initial value of x is 5?

'If x equals to one then x=x+2 else x=0'.?

ANSWER 5

The answer is x=0, because: -

If condition is false, so value decided according

to else condition.

QUESTION 6

Boolean algebra can be used_____?

ANSWER 6

Boolean Algebra is used to analyse and simplify the digital (logic) circuits. It uses only the binary numbers i.e. 0 and 1. It is also called a primary Algebra or Logical algorithm.

QUESTION 7

What is the maximum number of edges in a bipartite graph on 14 vertices?

ANSWER 7

No. of given vertices (n) =14

=) Both the set unit contain 7 vertices and every vertex of first set unit have an edge to every other vertex of the second set.

Hence, The total no. of edges or maximum no. of edges = 7x7 = 49.

QUESTION 8

What is the number of vertices in an undirected connected graph with 39 edges, 7 vertices of degree 2, 2 vertices

of degree 5 and remaining of degree 6?

ANSWER 8

We know that, sum of degree of all the vertices is 2x no. of edges.

So, $2 \times 7 + 5 \times 2 + 6 \times x = 39 \times 2$

$=) 14 + 10 + 6x = 78$

$=) 34 + 6x = 78$

$=) 6x = 78 - 24$

$=) 6x = 54$

$=) x = 9$

Hence, the no. of vertices are: - $7+2+9 = 18$.

QUESTION 9

An n-vertex graph has _____ edges.?

ANSWER 9

- A complete graph has an edge between any two vertices.
- We can get edges by picking up any two vertices.
- So, if there are n vertices, there are $(n2) = \frac{n(n-1)}{2}$ edges.

QUESTION 10

What is a star tree?

ANSWER 10

In graph theory, a star is the complete bipartite graph. A tree with one internal node and k leaves (but no internal nodes and K=1 leaves no internal nodes and K+1 leaves when $k \leq 1$).

Vertices = K+1

Edges = K

Diameter = minimum of (2, k+1).

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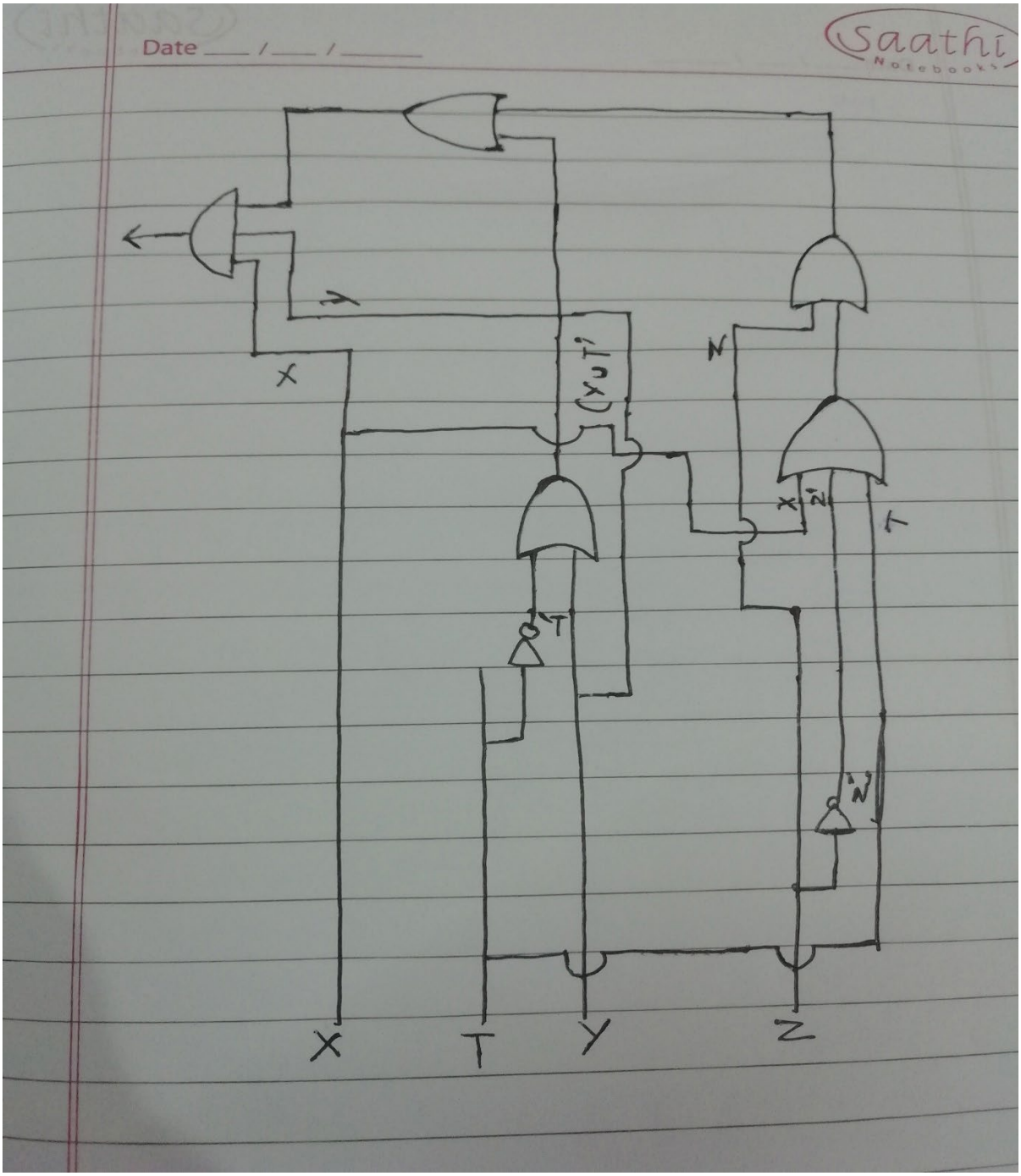
ASSIGNMENT 2

QUESTION 1

Draw the circuit which realise the function,

if(X,Y,Z,T)= X^[(Y v T') v (Z v (X v T v Z'))] ^ Y.

ANSWER 1



QUESTION 2

Hamiltonian path and circuits?

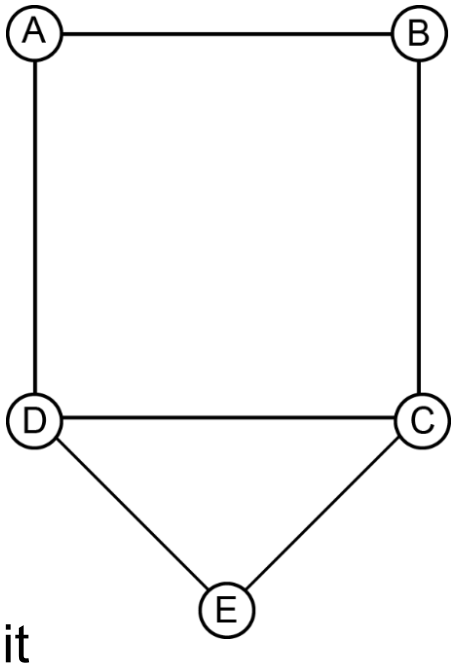
ANSWER 2

Hamiltonian Path

- If there exists a walk in the connected graph that visits every vertex of the graph exactly once repeating the edges then such a walk is called Hamiltonian Path.
- In this, all the edges may or may not be covered but edges must not repeat.

Examples of Hamiltonian Path are: -

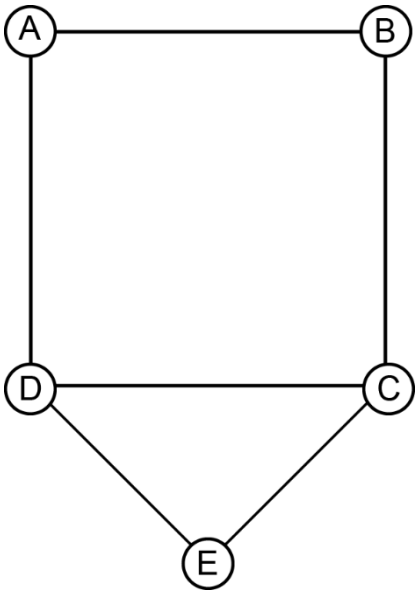
HAMILTONIAN PATH→→→→



Hamiltonian Circuit

- It is also known as Hamiltonian Cycle.
- A Hamiltonian Path which starts and ends at the same vertex is called as a Hamiltonian Circuit.
- If there exists a cycle in the connected graph that contains all the vertices of the graph that cycle is called Hamiltonian Circuits.

Examples of Hamiltonian Path are: -



←←←←HAMILTONIAN CIRCUITS

QUESTION 3

Define the limit point of a set S of real numbers. Determine the limit points of the following sets:

(a) The set Q of all rational numbers

(b) The set Z of all integers.

ANSWER 3

Limit points of a set of 5 real numbers.

- Any Points on the boundary of the circle is a limit of a sequence of points inside the circle.
- In R, every real number is a limit point of the subset Q of rationals.
- Every real number can be app arbitrarily closely by a sequence of rationals. (by truncating the decimal explanation, say).

a) Set Q of all rational numbers.

- Define
  - For every point of a set of rational number, we can average construct a sequence in rational number which will coverage to that point.
  - So derived set will be full of R.

b) The set Z of all Integers

- Define
  - The Integers have no limit points in the reals since all integers are isolated, that is, each integer has a neighbourhood that does contain any other integer, to see that Z contain no limit points.