

16U115

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Name : .....

Reg. No:.....

**FIRST SEMESTER B C A DEGREE EXAMINATION, NOVEMBER 2016**

(Regular/ Supplementary/ Improvement)

(CUCBCSS - UG)

**CC15UBCA1C02 – DISCRETE MATHEMATICS**

(Mathematics - Complementary course)

(2015 Admission onwards)

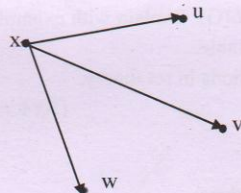
**Time: 3 Hours**

**Max Marks: 80 Marks**

**PART A**

*Answer all questions*

1. Give an example of a relation such that the relation is asymmetric.
2. Write the symbolic form of 'Erik reads Manorama or Mathrubhumi, but not Hindu'
3. Define a partial order relation.
4. Does there exist a tree with 10 vertices and 12 edges.
5. Draw  $K_4$ . Check whether  $K_4$  is bipartite or not.
6. Draw a forest with three trees.
7. Find the cut-sets of  $K_5$ .
8. Define pendant vertex and isolated vertex.
9. Define edge connectivity.
- 10.



Find in degree and out degree of each vertex.

**(10x1 = 10 marks)**

**PART B**

*Answer all questions*

11. Show that a)  $p \rightarrow q \Leftrightarrow \neg p \vee q$   
b)  $\neg(p \vee q) \Leftrightarrow \neg p \wedge \neg q$
12. Let  $A = \{1,2,3,4,12\}$ , consider the partial order on  $A$  as,  $a \leq b$  iff  $a$  divides  $b$ . Draw the Hasse diagram of the poset  $(A, \leq)$ .
13. Draw a pair of isomorphic graphs.
14. Define chromatic number. Give an example of 2-chromatic graph.

15. Let  $Q(x)$  be the statement  $x < 2$ . What is the truth value of the quantification  $\forall x Q(x)$ , where the universe of discourse consists of all real numbers.

(5x2 = 10 marks)

**PART C**

Answer any five questions

16. Explain the concept of tautology, contradiction with example.  
 17. Test the validity of the argument  
 If it rains, Erik will be sick  
It did not rain  
 Erik was not sick  
 18. Find all spanning trees of  $K_5$ .  
 19. Draw the dual of the graph G,



G

20. Write the concept of union of two graphs.  
 21. Write the relationship between  $\kappa(G)$ ,  $\lambda(G)$  and  $\delta(G)$ . Explain with example.  
 22. Explain conjunction and disjunction with truth table.  
 23. Define the concept of relation and types of relations in set theory.

(5x4 = 20 marks)

**PART D**

Answer any five questions

24. State and prove Euler's formula.  
 25. Explain whether the following are equivalence relations or not  
 a)  $xRy$  if  $|x| = |y|$   
 b)  $xRy$  if  $x - y \geq 0$   
 c)  $xRy$  if  $x - y$  is a multiple of 2.  
 26. Determine whether  $(\neg p \wedge (p \rightarrow q)) \rightarrow \neg q$  is a tautology?  
 27. Determine the truth value of each of these statements if the domain for all variables consists of all integers.  
 a)  $\forall n \exists m (n + m = 0)$   
 b)  $\exists n \forall m (nm = m)$



28. Explain Kruskal's algorithm with example.

29. Define tree and explain its properties.

30. a) Draw a Graph having incidence matrix

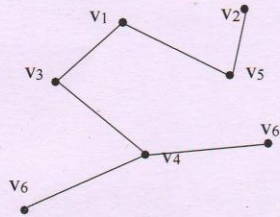
$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 0 & 2 & 1 \\ 0 & 2 & 0 & 0 \\ 1 & 1 & 0 & 1 \end{bmatrix}$$

b) Draw a graph having adjacency matrix

$$\begin{bmatrix} 2 & 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 \end{bmatrix}$$

31. Explain the concepts of distance, eccentricity, radius, diameter and center of a Graph.

Also find all of these for the given graph



(5x8 = 40 marks)

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