LNMIIT
The LNM Institute of
Information Technology

THE LNM INSTITUTE OF INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING
DISCRETE MATHEMATICAL STRUCTURE(CSE219)
END TERM EXAMINATION

Maximum Marks: 40

Time: 180 minutes

Date: 29/04/2017

COs	1	2	3	4	5
Question No.	1(a), (b),6(a,b), 3(a)	2,7	3(b)	–	4,5, 8
% of marks	32.5	25	5	0	37.5

1. (a) There are 3 bags. The first bag contains 2 white and 3 red balls, the second bag contains 1 white and 4 red balls, and the third beg contains 4 white and 6 red balls. A bag is chosen at random and a ball is selected, the ball turns out to be white . Find the probability that the ball is selected from the first bag. [3]

   (b) A fair coin is tossed 3 times. Find the expected number of heads. [2]

2. Consider these following statements: [5]

   • "All hummingbirds are richly colored."
   • "No large birds live on honey."
   • "Birds that do not live on honey are dull in color."
   • "Hummingbirds are small."

   The first three statements are considered as premises and fourth is a valid conclusion. Express these statement using logical operators, predicates and quantifiers.

3. (a) Prove that $\forall x(P(x) \vee Q(x)) \Rightarrow \forall x P(x) \vee \exists x Q(x)$ $\forall n P(n) \vee \exists n Q(n)$ [3]

   (b) Using Mathematical Induction, prove that for any integer $n \geq 1$, prove that [2]

   $$1 + \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{3}} \cdots \frac{1}{\sqrt{n}} \geq \sqrt{n}$$

4. Find the adjacency matrix of the following graphs G and H. Show that these graphs are isomorphic. [5]
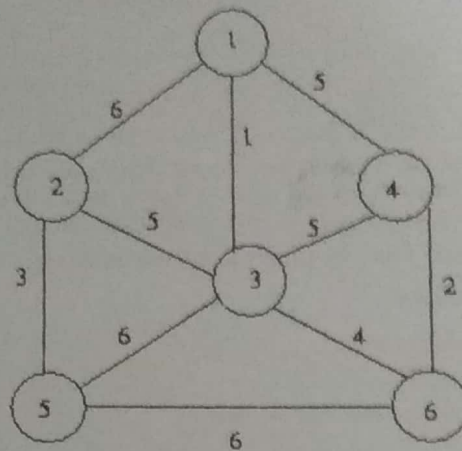

G   H
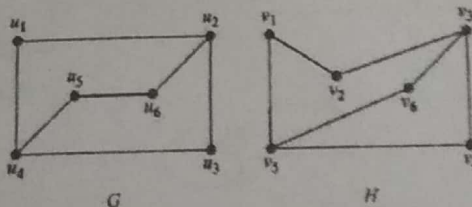
5. Use Prims algorithm to find a minimum spanning tree in the following weighted graph. Use alphabetical order to break ties. [5]
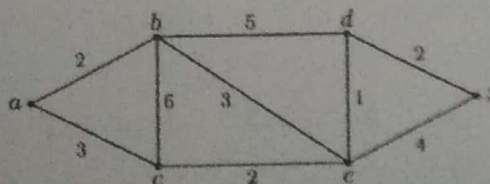
OR

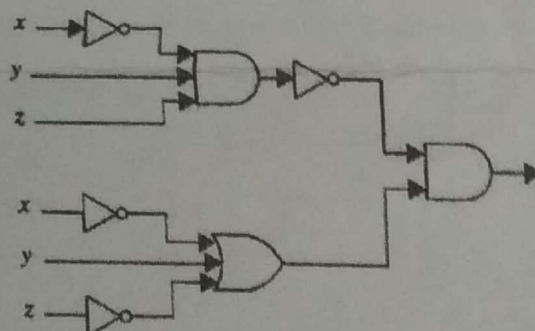Find the minimal spanning tree of the following weighted graph applying Kruskal's algorithm.

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6. (a) Construct the circuits from inverters, AND gates and OR gates to produce the outputs [3]
$$\overline{(\overline{x} + z)(y + \overline{z})}$$

(b) Find the output of the given circuit. [2]

7. A box contains 10 items of which 2 are defective, 4 items are chosen at random, If X denotes the number of defective items in the selection, then find the probability of distribution for X. [5]

8. Which of the following simple graphs have a Hamilton circuit or, if not, a Hamilton path? [5]

G_1

G_2

G_3

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