

**4E2917**

Roll No. \_\_\_\_\_

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**4E2917**

**B. Tech. IV Semester (Main/Back) Examination - 2012**  
**Computer Science & Information Technology**  
**4CS3 Discrete Mathematical Structures**

Time : 3 Hours

Maximum Marks : 80

Min. Passing Marks : 24

**Instructions to Candidates:**

*Attempt any five questions. Selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated Clearly).*

**Unit - I**

1. a) Explain Quantifiers (4)  
b) State the converse of each of the following implications  
i) If  $2 + 2 = 4$ , then I am not the Queen of England  
ii) If I am not president of US, then I will walk to work  
iii) If I am late, then I did not take the train to work.  
iv) If I have time and I am not too tired then I will go to the store (12)

**OR**

1. a) Explain converse, Inverse and contrapositive of implications (8)  
b) Using propositional Logic, prove the validity of the argument.  
 $[(p \vee \sim q) \Rightarrow r] \wedge (r \Rightarrow s) \wedge P \Rightarrow S$  (8)

**Unit - II**

2. a) Prove by contradiction there is no rational number  $p/q$  whose square is 2 (8)  
b) Let  $n$  be an integer. Prove that if  $n^2$  is odd, then  $n$  is odd (Indirect Method)(8)

**OR**

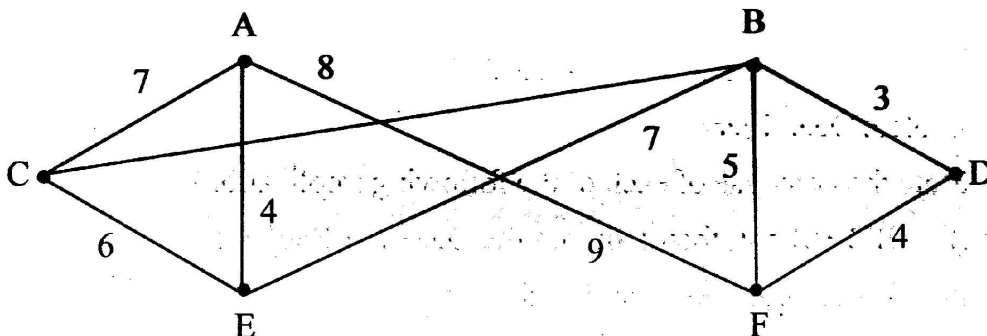
2. a) Prove that any amount of postage greater than or equal to 8 rupees can built using only 3 rupees and 5 rupees stamps. (8)  
b) Test the Liner search algorithm for partial correctness. (8)

### Unit - III

3. a) Write short note on (any two) : (8)
- Bipartite and complete bipartite graph
  - Eulerian and Hamiltonian Graphs
  - Kuratowskis Theorem
  - Isomorphic Graphs.
- b) Show the total number of odd degree vertices of a  $(p, q)$ , graph (graph with  $p$  vertices and  $q$  edges) is even. (8)

OR

3. a) Explain the Minimal Spanning Tree. Also write the Kruskal Algorithm for find Minimal Spanning tree. (8)
- b) Given the Graph in following figure. Apply Prim's algorithm to obtain the minimal spanning tree (8)



### Unit - IV

4. a) In the Survey of 60 people it was found that 25 read News week, 26 read Time and 26 read the magazine fortune. Also 9 read both News weak and Fortune, 11 read News week and Time and 8 read both time and fortune If 8 read none of the three magazines, determine the number of people who read exactly one magazine. (8)
- b) What is the Pigeonhole principle and the Extended Pigeonhole principle also prove both. (8)

OR

4. Let  $f:A \rightarrow B$  and  $g:B \rightarrow C$  be two invertible then (16)
- $g \circ f$  is invertible and
  - $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$

**Unit - V**

5. a) What is the transitive closure. Also write the Warshall's algorithm for that (8)
- b) Let  $A = \mathbb{Z}$  set of integers relation  $R$  defined in  $A$  by  $aRb$  as 'a is congruent to  $b \pmod{2}$ '. Show that  $R$  is an equivalence relation. (8)

**OR**

5. a) Let  $R$  be an equivalence relation on  $A$ , and let  $p$  be the collection of all distinct equivalence classes  $[a]$  for  $a \in A$ . Then show that  $P$  is a partition of  $A$  and  $R$  is the equivalence relation determine by  $P$ . (8)
- b) In the set of natural number  $N = \{1, 2, \dots\}$  show that the relation defined as  $a R b \Leftrightarrow a = b^k$  for  $a, b, k \in N$  is a partial order relation. (8)
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