POKHARA UNIVERSITY

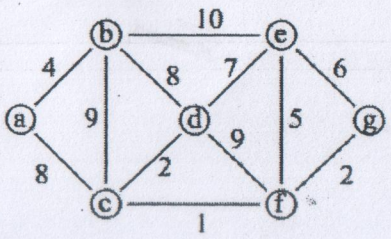
Level: Bachelor Semester: Spring Year : 2018
Programme: BE Full Marks: 100
Course: Mathematical Foundation of Computer Science Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

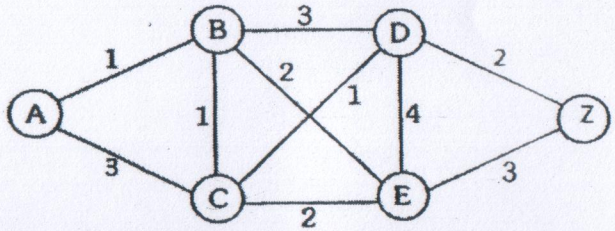
The figures in the margin indicate full marks.

Attempt all the questions.

1. a) Define tautology, show that **$[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$** is a tautology. 7
   b) Define conditional statement. Write inverse, converse & contrapositive of conditionals with truth table. 8
2. a) Prove the validity of the following argument "If I get the job and work hard, then I will get promoted. If I get promoted, then I will be happy. I will not be happy." Therefore "either I will not get job or I will not work hard." 7
   b) Use direct proof to prove "if x is odd than x^2" is also odd. Show by giving a proof by contradiction that if 100 balls are placed in 9 boxes some box contains 12 or more balls. 8
3. a) What are regular expression? Design a DFA which accepts the string with even number of a's and b's over {a,b}. 7
   b) How can you convert NFA in to DFA explain with suitable example. 8
4. a) Define the terms: Multigraph, Pseudo graph, bi-partite graph and regular graph with suitable example. 8
   b) What is minimum spanning tree? Find the minimum spanning tree of the graph using Prim's algorithm. 7



5. a) Show that for a complete graph with n vertices, the number of edges is given by n(n-1)/2. 7
   b) Find the shortest path from a to z using Dijkstra's Algorithm. 8



6. a) Define linear homogeneous recursion relation of degree K with constant coefficient with suitable examples. What is the solution of the recurrence relation $a_n = a_{n-1} - 2a_{n-2}$ with initial conditons $a_0 = 2$ and $a_1 = 7$ 8
   b) Solve the recurrence relation: $2a_n = 7a_{n-1} - 3a_{n-2} + 2^n$ 7
7. Write short notes on: **(Any two)** 2×5
   a) FSM Properties
   b) Bipartite graph
   c) Euler cycle vs Hamilton cycle