Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/M.TECH(CSE)/SEM-1/MCSE-101/2011-12

2011

GRAPH THEORY AND COMBINATORICS

*Time Allotted* : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

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

*Question Nos. **1** & **2** are compulsory. Attempt any **five** from the rest.*

1. A young pair of rabbits is placed on an island. A pair of rabbits cannot breed until they are 2 months old. After they are 2 months old, each pair of rabbits can produce another pair each month. Find the no. of rabbits on the island after 1 year assuming that no rabbit died during this period.   5

2.
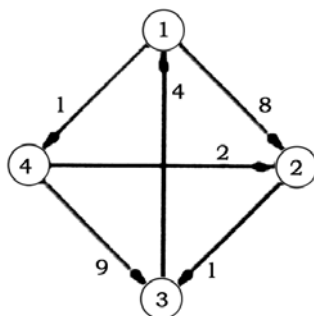
Write down the Floyd's Algorithm and hence find the shortest path between the nodes 4 & 2 for the given graph.   15

40121   [Turn over

3. There is 35% chance that it rains on a particular day, what is the probability that there is at least one raining day per week ? Given that there is at least one rainy day, what is the probability that there are at least two rainy days ? 10

4. The probability that John hits a target is 1/3, he fires 5 times, find the probability that he hits the target

   a) exactly two times

   b) more than four times

   c) at least once. 10

5. State the classical definition of probability and the Axiomatic definition of probability. Prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$. 10

6. Find the product and sum of the following two graphs : the vertices of the first graph are u_1, u_2 & u_3 and the vertices of the second graph are v_1 and v_2. 10
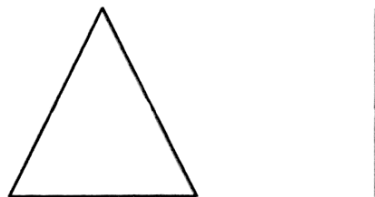
7. Use the Ford-Fulkerson's algorithm to find out the flow pattern of the following graph (from source to sink). 10
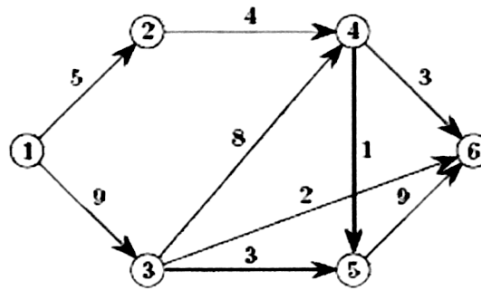
8. Define Euler graph, Euler circuit, Hamiltonian graph and Hamiltonian circuit and give examples of each of them. 10

9. Write short notes on any *two* of the following : 10

   a) Bi-partite graph and its application

   b) Complement and Fusion of graphs

   c) Dual of a graph with an example.

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