Seat No: _____   Enrollment No: _____

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech. Winter 2019 - 20 Examination

Semester: 1   Date: 16/12/2019
Subject Code: 203202101   Time:10:30 am to 01:00 pm
Subject Name: Mathematical Foundations of Computer Science   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 A) The letters of the word 'failure' are arranged at random. Find the probability that constants may occupy only odd positions.   **(05)**

B) Define complete graph and complete bipartite graph.   **(05)**

C) What is the difference between classification and clustering?   **(05)**

Q.2 **Answer the following questions**. (Attempt any three) (Each five mark)   **(15)**

A) A purse contains 2 silver and 4 copper coins. A second purse contains 4 silver and 3 copper coins. If a coin is pulled out at random from one of the two purses. What is the probability that is a silver coin?

B) What do you mean by isomorphic graphs?

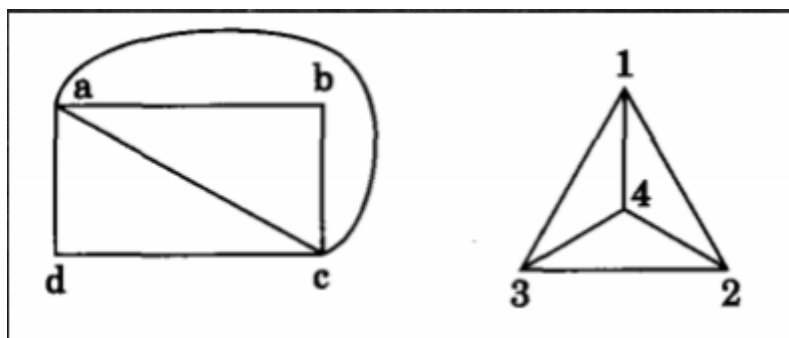C) Prove that a simple graph G is Hamiltonian if and only if it's closure C(G) is Hamiltonian.

D) Explain the Applications of operating system and software engineering

Q.3 A) State and prove five-colour theorem.   **(07)**

B) Write the rules for constructing Hamiltonian paths and cycles?   **(08)**

OR

B) Determine whether the following graphs are isomorphic. If yes, justify your answer.   **(08)**

A) A jar contains 10 marbles, 7 black and 3 white. Two marbles are drawn without replacement, which means that the first one is not put back before the second one is drawn.

Q.4
   a) What is the probability that both marbles are black?   **(07)**
   b) What is the probability that exactly one marble is black?
   c) What is the probability that at least one marble is black?

OR

A) Explain "the characteristics of the normal distribution"?   **(07)**

B) A discrete random variable X has the following probability distribution:

x	-1	0	1	4
P(x)	0.2	0.5	a	0.1

Compute each of the following quantities.

    a) a=?   **(08)**
    b) P(0)
    c) $P(X > 0)$.
    d) $P(X \geq 0)$.
    e) $P(X \leq -2)$.
    f) The mean μ of X.
    g) The variance σ^2 of X.
    h) The standard deviation σ of X.