

BACHELOR OF COMPUTER APPLICATIONS (C.B.C.S.) (2014 COURSE)
B.C.A. Sem-V :SUMMER- 2022
SUBJECT : COMBINATORICS & GRAPH THEORY

Day : Tuesday
Date : 14-06-2022

S-11053-2022

Time : 10:00 AM-01:00 PM
Max. Marks : **100**

N.B.:

- 1) Attempt **ANY FOUR** questions from Section-I. Each question carries **15** marks.
- 2) Attempt **ANY TWO** questions from Section-II. Each question carries **20** marks.
- 3) Use of non-programmable **CALCULATOR** is allowed.

SECTION-I

Q.1 From a group of 4 men, 3 women and 5 children, 4 persons are selected at random. Find the probability that the selected group contains.

- a) 2 men, 1 woman and 1 child.
- b) At least 2 women.
- c) At most 2 men.

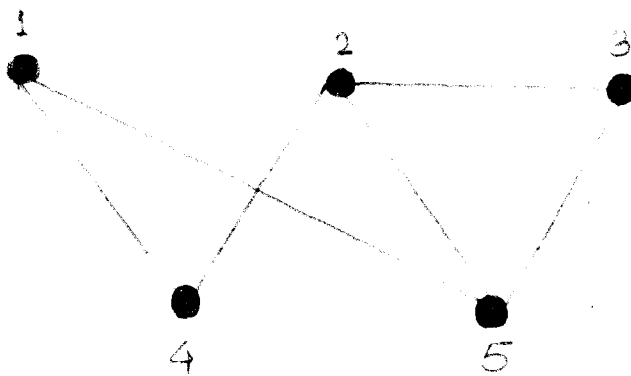
Q.2 Explain the following graphs with suitable examples.

- a) Isomorphic graph.
- b) Homomorphic graph.
- c) Multigraph.

Q.3 Two fair dice are thrown. Find the probability that,

- a) The total score is 8.
- b) The sum of the scores is a prime number.
- c) The sum of the scores is a perfect square.

Q.4 What is an Incidence Matrix? Represent the given graph using an incidence matrix.



P.T.O.

- Q.5** A husband and wife appeared in an interview for two vacancies in an office. The probability of husband's selection is $1/7$ and that of wife's selection is $1/5$. Find the probability that,
- Both of them are selected.
 - Only one of them is selected.
 - None of them is selected.

- Q.6** Write short notes on **ANY THREE** of the following:

- Inclusion exclusion principle
- Probability density function of continuous random variable
- Travelling salesmen problem
- Weighted Graph

SECTION-II

- Q.7** Explain the following graph algorithms with examples.

- Dijkstra's Algorithm.
- Breadth-First Search Algorithm.

- Q.8** A product is manufactured by a company for which it has three machines A, B and C. Machine A produces 60%, machine B produces 30% and machine C produces 10% of the total production. Past experience shows that machine A produces 2% defectives, machine B produces 3% defectives and machine C produces 4% defectives. At the end of a day from the total production, 1 unit of production is selected at random and is found to be defective. What is the chance that,

- Machine A has produced it?
- Machine C has produced it?

- Q.9** a) Explain Hamiltonian and Eulerian graphs with suitable examples.
- b) The mean and variance of a Binomial Distribution are 3 and 2 respectively. Find the probability that the variate takes values at most 2.

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