

BACHELOR OF COMPUTER APPLICATIONS (C.B.C.S.) (2014 COURSE)

B.C.A. Sem-V : WINTER- 2022

SUBJECT : COMBINATORICS & GRAPH THEORY

Day : Saturday

Time : 10:00 AM-01:00 PM

Date : 24-12-2022

W-11053-2022

Max. Marks : 100

N.B.:

- 1) Attempt **ANY FOUR** questions from Section – I and **ANY TWO** questions from Section – II.
- 2) Answers to both the sections should be written in **SEPARATE** answer books.
- 3) Figures to the right indicate **FULL** marks.

SECTION – I

- Q.1 a)** Two unbiased dice are thrown simultaneously and the numbers appearing on the upper faces are considered as scores. Find the probability that: [07]
- i) the total score on upper faces is a perfect square.
 - ii) the total score on upper faces is a prime number.

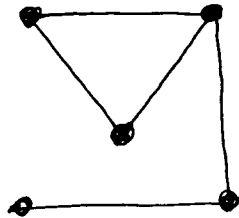
- b)** If $P(A) = \frac{1}{3}$, $P(B) = \frac{3}{4}$, $P(A \cup B) = \frac{2}{3}$, find: [08]
- i) $P(A \cap B)$ if A and B are dependent variables .
 - ii) $P(A' \cap B')$ if A and B are independent variables.

- Q.2 a)** Find the number of ways of forming a committees of 4 persons from 7 students, 3 teachers and 2 clerks such that the committee consists of: [07]
- i) exactly two teachers.
 - ii) atleast one clerk.

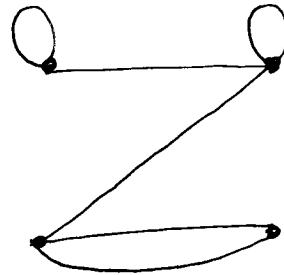
- b)** Explain breadth-first search algorithm. [08]

- Q.3 a)** Represent the following graphs by using any of the matrix method. [07]

i)



ii)



- b)** Explain utilities problem by using graph. [08]

- Q.4 a)** The probability that a person hits a target is $\frac{1}{4}$. He fires 6 times. Find the probability that he hits the target: [07]

- i) exactly two times.
- ii) more than four times.

- b)** Explain traveling salesman problem by using graph. [08]

P.T.O.

- Q 5** Write short notes on **ANY THREE** of the following: [15]
- Total probability theorem
 - Multigraphs with one example
 - Colouring of graphs
 - Types of graphs

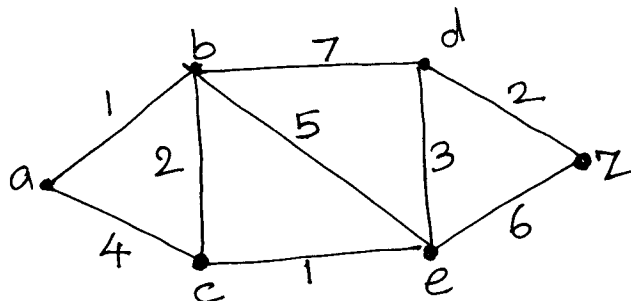
SECTION – II

- Q.6 a)** Box A contains five red marbles and three blue marbles whereas box B contains three red and two blue marbles. A marble is drawn at random from each box. [10]
- Find the probability that both marbles are of different colors.
 - Find the probability that both marbles are of same color.

- b)** Draw a planer graph of each of the following graph if exists: [10]



- Q.7** Write Dijkstra's shortest path algorithm. Use it to find shortest path from vertex a to vertex z from the following graph. [20]



- Q.8 a)** There are three machines A, B and C in a factory. 60%, 30% and 15% total of the bolts are manufactured on machine A, machine B and machine C respectively. The chances that the manufactured bolts are defective on these machines are 3%, 2% and 3% respectively. A bolt is chosen at random from a lot of manufactured bolts. What is the probability that the bolt is manufactured on: [10]
- machine A?
 - machine B?

- b)** Explain whether following graphs are isomorphic: [10]

