

9. (a) Write short notes on the following : **10**
- (i) Euler graph
 - (ii) Isomeric graph.
- (b) How many ways are there to arrange the seven letters in the word SYSTEMS ? **5**

Roll No.

Total Pages : 04

CCMTE/D-23

24055

**MATHEMATICAL FOUNDATIONS OF
COMPUTER SCIENCE**

MT-CSE-20-11

Time : Three Hours]

[Maximum Marks : 75]

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

(Compulsory Question)

1. (a) How does multivariate analysis different from univariate analysis ?
- (b) By illustrate an example, define Statistical Inference.
- (c) Define and explain planar graphs with examples.
- (d) How variance and standard deviation are related ?
- (e) What is the significance of central tendency ?

5×3=15

Unit I

2. (a) Consider the Markov chain with three states, $S = \{1, 2, 3\}$, that has the following transition matrix :

$$P = \begin{bmatrix} 1/2 & 1/4 & 1/4 \\ 1/3 & 0 & 2/3 \\ 1/2 & 1/2 & 0 \end{bmatrix}.$$

Draw the state transition diagram for the given chain. **10**

(b) Define probability distribution function. **5**

3. (a) Find the cumulative distribution function of $Y = X^3$ in terms of F_X , the distribution function for X . **10**

(b) Explain the properties of conditional expectation. **5**

Unit II

4. Define Chi-square and obtain its sampling distribution. Obtain the mean and the variance of the Chi-square distribution. **15**

5. (a) Let x_1, x_2, \dots, x_n be a random sample from $N(\mu, \sigma^2)$ population. Find sufficient estimators for μ and σ^2 . **10**

(b) Write the importance of mathematics in the modern world in the field of information technology. **5**

Unit III

6. (a) What is Correlation ? Explain regression with example. **10**

(b) List out the various properties of regression coefficients. **5**

7. Define the problem of overfitting. How has this problem come and how it can be resolved ? Explain the different techniques in detail. **15**

Unit IV

8. A committee of k people is to be chosen from a set of seven women and four men. How many ways are there to form the committee if : **15**

- (i) The committee consists of three women and two men.
- (ii) The committee can be any size but must have equal numbers of women and men ?
- (iii) The committee has four people and one of them must be Mr. Baggins ?
- (iv) The committee has four people and at least two are women ?
- (v) The committee has four people, two of each sex, and Mr. and Mrs. Baggins cannot both be on the committee ?