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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 19EC5PE1PS **Max Marks: 100**
Course: Probability and Statistics **Date: 03.03.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) Two ballpoint pens are selected at random from a box that contains 3 blue pens, 2 red pens, and 3 green pens. If X is the number of blue pens selected and Y is the number of red pens selected, find **10**

i) The joint probability function f(x, y).
ii) Find the covariance of X and Y.

b) The random variable X represent the number of automobiles that are used for official business purposes on any given workday. The probability distribution for company A is, **10**

x	1	2	3
$f(x)$	0.3	0.4	0.3

and that for company B is:

x	0	1	2	3	4
$f(x)$	0.2	0.1	0.3	0.3	0.1

Show that the variance of the probability distribution for company B is greater than that for company A.

UNIT - II

2 a) Consider a sinusoidal process $X(t)= Cos2\pi f_c t$ where fc is constant and the amplitude A is uniformly distributed: **10**

$$f_A(a) = \begin{cases} 1, & 0 \le a \le 1 \\ 0, & \text{otherwise} \end{cases}$$

Determine whether or not this process is strictly stationary

b) Describe in detail the classification of Random Process. **10**

UNIT - III

3 a) Explain the principle of least squares with example. **10**

b) Find the list square straight line for the following data and estimate y at x=4 and x at y=4. **10**

x	y
1	6
2	4
3	3
4	5
5	4
6	2

OR

4 a) Define correlation? Explain the different types of correlation with example. **10**

b) What is regression and lines of regression? Write the comparison between correlation and regression? **10**

UNIT - IV

5 a) If a certain machine makes electrical resistors having a mean resistance of 40 ohms and a standard deviation of 2 ohms, what is the probability that a random sample of 36 of these resistors will have a combined resistance of more than 1458 ohms? **10**

b) Two independent experiments are run in which two different types of paint are compared. Eighteen specimens are painted using type A, and the drying time, in hours, is recorded for each. The same is done with type B. The population standard deviations are both known to be 1.0. Assuming that the mean drying time is equal for the two types of paint, find P($\overline{X}_A - \overline{X}_B > 1.0$) where $\overline{X}_A$ and $\overline{X}_B$ are average drying times for samples of size $n_A = n_B = 18$. **10**

OR

6 a) Consider a random event of rolling die 20 times the outcomes are listed in the table below, **10**

Face	1	2	3	4	5	6
Observed values	20	22	17	18	19	21

Using the appropriate testing method find if the Die is tampered.

b) The television picture tubes of manufacturer A have a mean lifetime of 6.5 years and a standard deviation of 0.9 year, while those of manufacturer B have a mean lifetime of 6.0 years and a standard deviation of 0.8 year. What is the probability that a random sample of 36 tubes from manufacturer A will have a mean lifetime that is at least 1 year more than the mean lifetime of a sample of 49 tubes from manufacturer B? **10**

UNIT - V

7 a) Describe hypothesis test with an example. **10**

b) Consider a random sample x1,x2,…..,xn from a normal distribution N(μ,σ). Find the maximum likelihood function for μ and σ^2 **10**

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