Stanley College of Engineering & Technology for Women (A)

B.E (IT) - III Semester (Main) Examinations-January-2023

Probability & Statistics

Time: 03Hours

Max. Marks-60

Note: i. First Question is Compulsory. Answer any Four out of remaining Six questions.
ii. Answer to each question must be written at one place only and in the same
order as they occur in the Question paper.
iii. Missing data, if any, may be suitably assumed.

Part-A

6X2=12M

1. a) A Random Variable X has the following probability distribution

X	1	2	3	4
P	1/10	2/10	3/10	4/10

Then find (i) $E(X)$ (ii) $V(X)$ [2M CO1 BTL1]

b) Determine the B.D for which mean 4 and variance 3. [2M CO2 BTL2]

c) For an F-distribution determine the following
(i) $F_{0.05}$ With $v_1 = 7$ and $v_2 = 15$ ii) $F_{0.01}$ with $v_1 = 24$ and $v_2 = 19$. [2M CO3 BTL2]

d) Solve $\frac{dy}{dx} = x + y$, $y(1) = 0$ numerically using Taylor's series method up to x= 1.1
with h = 0.1 [2M CO4 BTL2]

e) Define Linearly Independent and dependent vectors in Vector spaces. [2M CO5 BTL2]

f) Find the singular values of the matrix A = $\begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ [2M CO5 BTL2]

Part-B

4X12=48M

2. a) In a bolt factory machines A, B, C manufacture 20%, 30%, 50% of the total of their output
and 6%, 3%, 2% are defective. A bolt is drawn at random and found to be defective. What is
the probability that it is manufactured by machines A, B and C? [6M CO1 BTL2]

b) If probability density function $f(x) = \begin{cases} kx^3, if\ 0 \le x \le 3 \\ 0\ ,\ else\ where \end{cases}$

Find the probability between $x = \frac{1}{2}$ and $\frac{3}{2}$. [6M CO1 BTL2]

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3. a) Calculate the first four moments of the following distribution about the mean

x	0	1	2	3	4	5	6	7	8
f	1	8	28	56	70	56	28	8	1

[8M CO2 BTL3]

And also calculate β_1, β_2

b) For the discrete probability distribution

X	0	1	2	3	4	5	6
F	0	2K	2K	3K	K^2	$2K^2$	$7K^2 + K$

Find (i) K (ii) Mean (iii) Variance
[4M CO2 BTL3]

4. a) Find the equation of the least fitting line y = ax + b for the following data

x	5	10	15	20	25
y	16	19	23	26	30

[6M CO3 BTL3]

b) Find the Regression Co-efficient from the following data

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

[6M CO3BTL4]

$(y - \bar{y}) = \sigma xy \frac{?}{?}(x - \bar{x})$

5. a) Using Runge - Kutta method of fourth order find y(0.1) and y(0.2) given that

$$\frac{dy}{dx} = 1 + xy , y(0) = 2.$$ [12M CO4 BTL4]

6. a) Prove that the set S = {(1, −1, 0),(1, 1, 0),(1, 1, 1)} is a basis of R³ [6M CO5 BTL5]

b) Find the singular values of the matrix $A = \begin{pmatrix} 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 0 & 0 \end{pmatrix}$ [6M, CO5, BTL5]

7. a) Fit a second degree parabola y = ax² + bx + c to the following data

x	0	1	2	3	4
y	1	5	10	22	38

[6M, CO3, BTL3]

b) Given, $\frac{dy}{dx} = x^3 + y , y(0) = 1.$, compute y(0.2) by Euler's Method taking h = 0.01
[6M CO4 BTL 4]

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