

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA)



Department of AERONAUTICAL ENGINEERING



PROBABILITY & STATISTICS

QUESTION BANK

Prepared by:

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Code No: R20A0024 MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY (Autonomous Institution – UGC, Govt. of India) II B.Tech II Semester Supplementary Examinations, January 2024

Probability and Statistics

(EEE, ME & AE)										
Roll No										

Time: 3 hours

Max. Marks: 70

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

СТІ	\mathbf{O}	N-	T

- SE Define Continuous Random Variable with example. 1 A [2M] B A Random variable X has the following probability distribution [12M] Х 1 2 3 4 5 6 7 8 3K P(X)Κ 2K 4K 5K 6K 7K 8K Find the value of (i). K (ii). $P(X \le 2)$ (iii). $P(2 \le X \le 5)$ OR 2 Suppose that the error in the reaction temperature in $0^{\circ}C$ for a [4M] A controlled laboratory experiment is a continuous variable X having probability density function $f(x) = \begin{cases} \frac{x^2}{2}, -1 < x < 2\\ 0, else where \end{cases}$ Verify that f(x) is a density function. B The joint probability density function is given by [10M] $f(x,y) = \begin{cases} 10xy^2, \end{cases}$ 0 < x < y < 1elsewhere 0, a) Marginal probability density function of X b) Marginal probability density function of Y c) Conditional probability density function of X given Y d) Conditional probability density function of Y given X **SECTION-II** 3 Prove that mean and variance of a poisson distribution are same A [7M] If 'X' is a normal variate with mean 30 and standard deviation 5. Find B [7M] the probabilities that (i). $26 \le X \le 40$ (ii). $X \ge 45$ OR 4 Write the chief characteristics of Normal Distribution. [**4M**] A B In a normal distribution,8 % of the items are under 35 and 90 % of the [10M] items are under 63. Determine the mean and variance of the distribution. **SECTION-III** 5
 - A If $\sigma_x = \sigma_y = \sigma$ and the angle between two regression lines is [7M] $Tan^{-1}\left(\frac{4}{3}\right)$. Find 'r'
 - **B** Find the mean values of the variables 'X' and 'Y' and correlation [7M] coefficient from the following regression equations. 2Y - X = 50 and 3Y - 2X = 10

- 6 A Write the properties of correlation coefficient.
 - **B** A random of 5 college students is selected and their marks in mathematics and Statistics are found to be

Mathemat	85	60	73	40	90
ics					
Statistics	93	75	65	50	80

Calculate rank correlation coefficient.

SECTION-IV

- 7 *A* Define Type-I and Type-II errors.
 - **B** A sample of 400 items is taken from a population whose standard [12M] deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 90% confidence interval for the population.

OR

- 8 A Explain the procedure for testing of Hypothesis.
 - *B* The means of two large samples of sizes 1000 and 2000 members are [7M]67.5 inches and 68 inches respectively. Can the samples be regarded as drawn from the same population of S.D 2.5 inches.

SECTION-V

A Write the applications of t-distribution. [4M] *B* In a sample 500, form a village in Telanagana 280 is found to be rice eaters and rest of them wheat eaters. Can we assume that both articles are equally popular?

OR

10 *A* Write the properties of Chi-Square ?

9

B The measurements of the output of two units have the following [7M] results. Assuming that both samples have been obtained from the normal populations at 10% significant level, test whether the two populations have the same variance.

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1

[4M] [10M]

[2M]

[7M]

[**7M**]

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(Autonomous Institution – UGC, Govt. of India)

II B.Tech II Semester Regular/Supplementary Examinations, July 2023

Probability and Statistics (FFF MF & AF)

(EEE, NIE & AE)										
Roll No										

Time: 3 hours

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Note: This question paper Consists of 5 Sections. Answer FIVE Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks. ***

								_		
	P(x) :	K	3K	5K	7K	9K	11K			
	Determine	e i. K	ii. Mean	iii. P((x >3)					
				OR						
4	The joint pr	obability o	lensity fu	nction is	s given by	y				
		$10xy^{2}$,	0 < x	< y < 1						
	$f(x,y) = \{$		0. el	sewhere	2					
	a) Marg	ginal proba	bility dens	sity functi	ion of X					
	b) Marg	ginal proba	bility dens	sity functi	ion of Y					
	c) Cond	ditional pro	bability d	ensity fun	nction of X	K given Y				
	d) Condi	tional pro	bability d	ensity fu	inction of	f Y giver	n X			
B	Given that $f(x) = \frac{kx}{2}$, if x=1,2,3,4 is a probability distribution of a random variable									
	X Find K.	-								
					-					

SECT	ION	-11

3	\boldsymbol{A}	Derive the mean of a Poisson Distribution.	[6M]
	B	Ten coins are thrown simultaneously. Find the probability of getting :	[8M]
		i) At least one head ii) At most seven heads	
		OR	
4	A	Write the properties of Normal Distribution	[4M]
	В	In a normal distribution, 7% of the items are under 35 and 89% of the items are under 63. Determine the mean and variance of the distribution. SECTION-III	[10 M]
5	\boldsymbol{A}	Write the properties of correlation coefficient.	[4M]

SECTION-I

- Define Discrete Random Variable and Continuous Random Variable. 1 A
 - B A random variable X has the following distribution

			0			
X:	1	2	3	4	8	9
P(x) :	K	3К	5K	7K	9K	11K
Determine	i. K	ii. Mean	iii. P(x >3)		

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Marks [4M]

Max. Marks: 70

[10M]

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	B Calculate the coefficient of correlation from the following data [1]											[10M]
		Х	12	9	8	10		11		13	7	
		Y	14	8	6	9		11		12	3	
					OR							
6		Find the two lines of regression between the two variables										[14M]
		X: 50	50 55	60 6	5 65	65	60	60	60			
		Y: 11	13 14	16 1	6 15	15	14	13	13			
				SEC	TION-IV							
7	A	<u>Define (i) Null Hypothesis (ii) Alternative Hypothesis</u>										
,	D	A nonulatio	n consist		umbore 2	2 6 9 on		Consid	or of	1 nogoih	la complac	
	D	of size two which can be drawn with replacement from this population. Find										
		i)The mean of the population										
	ii) The mean of the sampling distribution of means											[3N]
												[3M]
		iv) Standard deviation of the sampling distribution of means.										
		iv) Standare		ii oi the s	OR	Stributi	11 01 1	incuns.				
8	\boldsymbol{A}	Define Sample and population.										[2M]
	R	Sample of 400 men and 600 women were asked whether they would like to have a										[12M]
	D	Sample of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favour of the										
		proposal Test the hypothesis that proportions of men and women in favour of the										
		proposal are	e same, at	5% level.	inde propor					111 14 100	ii oi uiic	
		F - F	~,	SEC	CTION-V							
9	A	Write the pr	operties o	of t-distri	bution.							[4M]
	B	A random s	ample of	10 boys h	ad the foll	owing I	.Q's: ′	70, 120	, 110), 101, 8	5, 83, 95,	[10M]
		98, 107 and	100. Do	these data	a support th	ne assun	nption	n of a po	pula	ation me	an I.Q of	
		100?			11			1	1			
					OR							
10	\boldsymbol{A}	Write the ap	plication	s of chi-s	quare distr	ibution.						[4M]
	B	Two horses	'A' and	'B' wer	e tested ac	cording	to th	ne time	(in	seconds) to run a	[10M]
		particular tr	ack with t	he follow	ving results	5:						
		Horse 'A'	28	30	32	33		33	29	9	34	
		Horse 'B'	29	30	30	24		27	29	9		

Test whether the two horses have the same running capacity.

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Probability	& Statistics
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(MEX AE)										
Roll No										

Time: 3 hours

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*** <u>SECTI</u>ON-I

1a. Given that $p(x) = \frac{kx}{2}$, if x = 1,2,3,4 is a probability distribution of a random [7M] variable 'X' then find the value of 'K'

1	A 1 1 1 (37)	1 (1 (2)1) (1 (2)1) (1 (2)
b	A random variable 'X'	has the following distribution

X:	1	2	3	4	8	9
P(x) :	K	3K	5K	7K	9K	11K
Determine	e i). K	ii). Mean				

OR

2 Is $f(x) = x^2 e^{-x}$ when $x \ge 0$ can be regarded as a probability function for a [14M] continuous random variable? If so find Mean and Variance of the random variable.

SECTION-II

- **3a** If a random variable has a Poisson distribution such that P(1) = P(2),[7M]find (i). Mean of the distribution (ii). P (4)
- **b** Define Poisson Distribution and derive the mean of a Poisson Distribution. [7M] OR
- 4 In a Normal Distribution 31% of the items are under 45 and 8% of the items are [14M] over 64. Find the mean and variance of the distribution.

SECTION-III

5 Heights of fathers and Sons (in inches) are given in the following table

Heights of father	65	66	67	67	68	69	71	73
Heights of Son	67	68	64	68	72	70	69	70

Form the two lines of regression and calculate the expected average heights of the Son when the height of the father is 67.5

					OR			
6	Find th	ne rank corr	relation coe	efficient fo	r the follo	wing data.		[14M]
	Х	50	60	65	54	69	65	
	Y	68	49	62	61	58	61	
				SEC	TION-IV	,		

[7M]

7a A random population has a mean of 0.1 and standard deviation of 2.1 find the

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[7M]

Max. Marks: 70

[14M]

probability that mean of a sample of size 900 will be negative.

b A random sample of size 64 is taken from an infinite population having the mean [7M] 45 and standard deviation 8. What is the probability that 'x' will be between 46 and 47.5

OR

- 8 A population consists of five numbers 2,3,6,8 and 11. Consider all possible [14M] samples of size two which can be drawn with replacement from the population. Find
 - (i). The mean of the population.
 - (ii). The Standard Deviation of the population.
 - (iii). The mean of the sampling distribution of means and
 - (iv). The Standard Deviation of the sampling distribution of means.

SECTION-V

9 Random samples of 400 men and 200 women in a locality were asked whether **[14M]** they would like to have a bus stop to their residence. 200 men and 40 women were in favour of the proposal. Test the significance between the difference of two proportions at 5% level.

OR

A random sample of 10 bags of pesticides is taken whose weights are 50, 49, 52, [14M] 44, 45, 48, 46, 45, 49, 45 (in kgs) Test whether the average packing can be taken to be 50 kgs.

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Probability & Statistics												
	(]	ME	& A]	E)								
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Roll No

Time: 3 hours

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*	*	*	

SECTION-I

1 A random variable X has the following distribution

X:	1	2	3	4	8	9
P(x) :	K	3K	5K	7K	9K	11K
Determin	ne i). K	ii). Mean	iii). $P(x > 3$	3)		

OR

2 Is $f(x) = x^2 e^{-x}$ when $x \ge 0$ can be regarded as a probability function for a [14M] continuous random variable? If, so find Mean and Variance of the random variable

SECTION-II

- **3a** Ten coins are thrown simultaneously. Find the probability of getting :[7M]i) At least one head ii) At least four heads
- b Define Binomial Distribution and derive the mean of Binomial Distribution. [7M] OR
- 4 In a normal distribution, 7% of the items are under 35 and 89% of the items are [14M] under 63. Determine the mean and variance of the distribution.

SECTION-III

5 Calculate the coefficient of correlation between the two variables 'x' and 'y' [14M]

Х	2	3	8	11	4	5	9	7	5	7
Y	21	42	102	130	52	57	105	85	62	90

OR

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F1 4N 41

[14M]

Max. Marks: 70

[14M]

SECTION-IV

- 7a Define (i). Population (ii). Sample (iii).Parameter (iv).Statistic [8M]
 b When a sample is taken from an infinite population, what happen to the standard error of the mean if the sample size is decreased from 800 to 200. OR
 8 A population consists of five numbers 2,3,6,8 and 11. Consider all possible [14M] samples of size two which can be drawn with replacement from the population. Find
 - (i). The mean of the population.
 - (ii). The Standard Deviation of the population.
 - (iii). The mean of the sampling distribution of means and
 - (iv). The Standard Deviation of the sampling distribution of means.

SECTION-V

9 A sample of 400 items is taken from a population whose standard deviation is **[14M]** 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population.

OR

10 Two samples are drawn from two normal population's .Test whether the two **[14M]** samples have the same variance at 5% level.

Sample-I	60	65	71	74	76	82	85	87	-	-
Sample-II	61	66	67	85	78	63	85	86	88	91
