VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. IV-Semester Main & Backlog Examinations, July-2022
Probability & Statistics
(I.T.)

Time: **3 hours** Max. Marks: **60**

Note: 1. Answer all questions from **Part-A** and any FIVE from **Part-B**
2. Provide normal, t, f and Chi-square tables

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Illustrate with an example the difference between mutually exclusive and independent events.	2	1,2	1	1,2
2.	If A and B are two independent events such that $P(A)=0.4, P(B)=k$ and $P(A\cup B)=0.6$, then find k.	2	1,2	1	1,2
3.	Distinguish between Probability mass function and probability density function.	2	1,2	2	1,2
4.	Find the mean of the probability distribution given by $f(x)=\dfrac{1}{n}$, $x=1,2,3,\dots,n.$	2	1,2	2	1,2
5.	Define null and alternative hypothesis.	2	1,2	3	1,2
6.	Compare and contrast between one tailed and two tailed tests.	2	1,2	3	1,2
7.	Define t-statistic. List the applications of t – distribution.	2	1,2	4	1,2
8.	Suppose there are two small samples to be tested, then what are the tests that can be applied and also mention their test statistics.	2	1,2	4	1,2
9.	Find the normal equations to fit a straight line $y=ax+b$ to the following data.	2	1,2	5	1,2
10.	The two lines of regression are $8x-10y+66=0$, $40x-18y=214$. Find the mean values of x and y.	2	1,2	5	1,2

Table for Q. 9:

x:	1	2	3	4	6	8
y:	2.4	3	3.6	4	5	6

Part-B (5 × 8 = 40 Marks)

11. a)	An urn contains 10 white and 3 black balls while another urn contains 3 white and 5 black balls. Two balls are drawn from the first urn and put into the second urn and then a ball is drawn from the latter. Find the probability that it is a white ball.	4	3	1	1,2
b)	State and prove Baye's theorem.	4	2	1	1,2
12. a)	Discuss whether f(x) = 3e^{-3x}; x>0, is a proper probability distribution or not. Evaluate its mean and variance.	4	2	2	1,2
b)	Evaluate the probabilities, P(26 ≤ X ≤ 40) and P(X ≥ 45), when X follows normal distribution with mean 30 and Standard deviation 5.	4	2	2	1,2
13. a)	A sample of 400 items is taken from a population whose standard deviation is 10.The mean of the sample is 40.Test whether the sample has come from a population with mean 38.	4	4	3	1,2

			M	L	CO	PO

b)	A sample of 900 chips has a mean length of 3.4 cms. and Standard deviation of 2.61 cms. Test whether the sample drawn is from a large population with mean 3.25 cms and Standard deviation of 2.61 cms.	4	2	3	1,2

14. a) The following data pertaining to the number of accidents that occurred during the six days of the week. Test whether the accidents are uniformly distributed over the week.   4   2   4   1,2

Days	Mon	Tue	Wed	Thurs	Fri	Sat
No. of Accidents	16	20	14	13	17	16

b) Test whether the two populations have the same mean at 5% level of significance, when five measurements of the output of two units have given the results in kilograms of material per one hour of operation, by assuming that both the samples have been obtained from normal populations.   4   2   4   1,2

Unit A	14	10	15	13	17
Unit B	13	14	12	15	16

15. a) Define correlation. Mention the properties of Correlation coefficient. Also give the measures of correlation coefficient.   4   2   5   1,2

b) Calculate the coefficient of correlation between x and y to the following data: 4   3   5   1,2

x :	1	3	4	5	7	8	10
y :	2	6	8	10	14	16	20

16. a) State and prove addition law of probability.   4   2   1   1,2

b) A discrete random variable X has the following probability distribution.   4   3   2   1,2

x :	1	2	3	4	5	6	7	8
$P(x)$:	k	2k	3k	4k	5k	6k	7k	8k

Find (a) the value of k and (b) variance of the distribution.

17. Answer any *two* of the following:

a) A random sample of 1000 men from Northern India gives their mean wage to be Rs. 30 per day with a S.D. Rs.1.50. A sample of 1500 men from Southern India gives a mean wage of Rs.32 per day with S.D. of Rs.2. Discuss whether the mean rate of wages varies between the two regions.   4   4   3   1,2

b) The daily wages in rupees of skilled workers in two cities are as follows: 4   4   4   1,2

City	Size of sample	S.D. of wages in the sample
A	16	25
B	13	32

Test at 5% level the equality of variances of the wage distribution in the two cities.

c) Fit a parabola of 2nd degree to the following data: 4   3   5   1,2

x :	0	1	2	3	4
y :	1	1.8	1.3	2.5	6.3

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1 & 2	50%
ii)	Blooms Taxonomy Level – 3 & 4	50%

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