Hall Ticket Number:

Code No. : 14663 N/O

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. IV-Semester Main & Backlog Examinations, July-2023

Probability & Statistics

(I.T)

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

Note: Tables of Area under the normal curves, t-test, F-test & Chi-square test will be provided

*Answer all questions from **Part-A** and any **FIVE** from **Part-B***

Part-A (10× 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Define mutually exclusive events. Give an example.	2	1	1	1,2,12
2.	State multiplication law of probability.	2	1	1	1,2,12
3.	Define Discrete and continuous random variable.	2	1	2	1,2,12
4.	If $X \sim N(\mu = 12, \sigma^2 = 16)$, then find $P(0 \leq X \leq 12)$.	2	2	2	1,2,12
5.	Define type-I and type-II errors.	2	1	3	1,2,12
6.	Write about one tailed and two tailed tests.	2	1	3	1,2,12
7.	A hypothesis is rejected at 5% level of significance. Is it rejected at 1% level of significance? Explain.	2	2	4	1,2,12
8.	Write the applications of t-distribution.	2	2	4	1,2,12
9.	Write the principle of least squares and the normal equations to fit the parabola.	2	2	5	1,2,12
10.	Define positive and negative correlation.	2	1	5	1,2,12
	Part-B (5×8 = 40 Marks)				
11. a)	A box A contains 2 white and 4 black balls. Another box B contains 5 white and 7 black balls. A ball is transferred from the box A to the box B. Then a ball is drawn from the box B. Find the probability that it is white.	4	3	1	1,2,12
b)	State and prove Baye's theorem.	4	2	1	1,2,12
12. a)	A random variable X has the following probability distribution.	4	2	2	1,2,12

$X=x_i$	1	2	3	4	5
P(X=xi)	c	c	$3c$	$c^2 + c$	$6c^2$

Find the value of c. Evaluate $P(X < 3)$ and $P(1 < X < 4)$.

b)	In a distribution which is exactly normal, 12% of the items are under 30 and 85% are under 60. Find the mean and standard deviation of the distribution.	4	3	2	1,2,12
13. a)	Two industries A and B manufacture textile machines. In a sample of 300 workers from the industry A, it was found that average weekly salary is Rs.1500 with standard deviation Rs.500. From a sample of 325 workers from the industry B, it was found that average weekly salary is Rs.1550 with standard deviation Rs.510. Are the average weekly wages in industry B higher than the average weekly wages in industry A? Test at 5% level of significance.	4	3	3	1,2,12

Contd... 2

Code No. : 14663 N/O

b)	A sample of 400 electric fuses is taken from a big lot of electric fuses. The mean life of the fuses in this sample is found to be 265 days. Can we assume that this sample has come from a population of fuses with mean life 280 days and variance 900 days? Test at 5% level of significance.	4	3	3	1,2,12
14. a)	A random sample of 10 boys had the following I.Q.: 70, 120, 110, 101, 88, 83, 95, 98, 107, and 100. Do these data support the assumption of a population mean I.Q. of 100? Test at 5% level of significance.	4	3	4	1,2,12
b)	Two random samples of sizes 7 and 6 have the following values of the variable Sample 1: 12 16 18 22 19 28 21 Sample 2: 10 15 14 19 24 22 At 5% level of significance, do the estimates of population variances differ significantly?	4	3	4	1,2,12
15. a)	Fit a straight line $y = a + bx$ to the following data using the method of least squares.	4	2	5	1,2,12

x	2	4	6	8	10
y	3.07	12.85	31.47	57.38	91.29

b)	Find Karl Pearson's coefficient of correlation from the following data:										4	3	5	1,2,12

x	101	101	102	102	100	99	97	98	96	95
y	98	99	99	97	95	92	95	94	90	91

16. a)	Three machines A, B, C produce respectively 60%, 30% and 10% of the total number of items of a factory. The percentage of respective outputs of these machines is respectively 2%, 3% and 4%. An item is selected at random and is found to be defective. Find the probability that the item was produced by machine C.	4	3	1	1,2,12
b)	If X is a continuous random variable with probability density function given by $f(x) = \begin{cases} kx, 0 \le x < 2 \\ 2k, \ 2 \le x < 4 \\ -kx + 6k, 4 \le x < 6 \end{cases}$, then find k and mean of X.	4	3	2	1,2,12
17.	Answer any ***two*** of the following:				
a)	Define (i) Null hypothesis, (ii) Alternative hypothesis, (iii) Level of significance and (iv) Confidence limits.	4	1	3	1,2,12
b)	Fit a Poisson distribution for the following data and test the goodness of fit at 5% level of significance.	4	3	4	1,2,12

x	0	1	2	3	4	5
f(x)	30	100	110	85	60	20

c)	Obtain the least squares approximation of the form $y = ae^{bx}$ to the following data	4	2	5	1,2,12

x	0.5	1.0	2.0	2.5	3
y	0.57	1.46	5.10	7.65	9.20

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

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	30%
iii)	Blooms Taxonomy Level – 3 & 4	50%

*****