Hall Ticket Number:

Code No. : 14644 AS

VASAVI COLLEGE OF ENGINEERING *(AUTONOMOUS)*, HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (I.T.) IV-Semester Advanced Supplementary Examinations, September-2022

Probability & Statistics

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.	From a pack of 52 cards, one card is drawn at random. Find the probability of getting of a king.	2	2	1	1,2
2.	State addition theorem of probability for three events.	2	1	1	1,2
3.	A continuous random variable has the p.d.f. $f(x)=\begin{cases} k\,xe^{-x}, & x\geq 0 \\ 0 & \text{otherwise} \end{cases}$. Determine the value of k.	2	2	2	1,2
4.	Can you design a proper probability distribution from the following data? Hence calculate its average.	2	2	2	1,2
5.	Define level of significance.	2	1	3	1,2
6.	Explain briefly one tailed test.	2	1	3	1,2
7.	Define a small sample and write the t- test statistic to test of significance for a single mean of a small sample.	2	1	4	1,2
8.	Mention any two applications of Chi-square test.	2	1	4	1,2
9.	Explain why two lines of regression are to be constructed.	2	2	5	1,2
10.	State principle of least squares.	2	1	5	1,2

X	1	2	3	4	5	6
P(X = x)	k	3k	5k	7k	9k	11k

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.	In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.	8	3	2	1,2

Contd... 2

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13. a)	Explain the large sample test of significance for testing the difference between the means.	3	2	3	1,2
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. Also construct the confidence interval for population mean, when it is unknown at 95% level of significance.	5	3	3	1,2
14.	When the first proof of 100 pages of a book of 5000 pages were read. The distribution of printing mistakes were found to be as follows.	8	4	4	1,2

No. of mistakes in a page	0	1	2	3	4	5
No. of pages	12	63	20	3	1	1

Fit a poisson distribution to the data and test for goodness of fit at 5% level of significance.

15.	The profit of a certain company in the X^{th} year of its life is given by:	8	3	5	1,2

X^{th} year	1	2	3	4	5
Profit	1250	1400	1650	1950	2300

How would you explain the fitting of a parabola to the above data and also to estimate the profit of the company for the 7^{th} year.

16. a)	Define conditional probability. If $P(A) = p_1$, $P(B) = p_2$, $P(A \cap B) = p_3$; where $p_1, p_2, p_3 > 0$. Evaluate the following probabilities: (i) $P(\overline{A \cup B})$, (ii) $P(\overline{A} \cap \overline{B})$ and (iii) $P(B \mid \overline{A})$.	4	2	1	1,2
b)	If the probability density function $f(x) = Kx^3$; $1 \leq x \leq 3$. What is the main idea used to find the value of K and also obtain the expectation of X.	4	2	2	1,2
17.	Answer any ***two*** of the following:				
a)	What do you think about the concept of testing of hypothesis and critical region?	4	2	3	1,2
b)	The incomes (in thousands per month) of a random sample of engineers in industry A are Rs. 63, 65, 68, 69, 71 and 72 and that of incomes in industry B are Rs. 61, 62, 65, 66, 69, 69, 70, 71, 72 and 73. Discuss the validity of the suggestion that industry A pays its engineers much better than Industry B.	4	3	4	1,2
c)	The equations of two regression lines obtained in a correlation analysis are $6X + 24Y = 38$ and $6X + 18Y = 92$. How would you design the way to obtain (i) Coefficient of correlation and (ii) Mean values of X and Y.	4	3	5	1,2

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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