VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD
B.E. (I.T. : CBCS) IV-Semester Main Examinations, January-2021
Probability & Statistics

Time: **2 hours**

Max. Marks: **60**

Note: Answer any NINE questions from Part-A and any THREE from Part-B

Part-A (9× 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Write the probability for a leap year to have 52 Mondays and 53 Sundays	2	1	1	1,2
2.	State Baye's theorem	2	2	1	1,2
3.	If $f(x) = \begin{cases} kx^2, for\ 0 < x < 3 \\ 0, elsewhere \end{cases}$ is a probability density function, then find k?	2	1	2	1,2
4.	Define median for a continuous probability distribution	2	1	2	1,2
5.	A normal population has a mean of 0.1 and SD of 2.1. Find the probability that the mean of a sample of size 900 drawn from this population will be negative.	2	2	3	1,2
6.	Define Null and alternative hypothesis	2	1	3	1,2
7.	What is meant by degrees of freedom?	2	1	4	1,2
8.	For an F-Distribution, find $F_{0.05}$ with $v_1 = 7, v_2 = 15$	2	1	4	1,2
9.	State the principle of least squares and write the normal equations for $y=ae^{bx}$	2	2	5	1,2
10.	Write the relation between correlation and regression coefficients	2	1	5	1,2
11.	Define conditional probability	2	1	1	1,2
12.	Define discrete random variable with an example	2	1	2	1,2

Part-B (3 × 14 = 42 Marks)

13. a)	A, B, C are aiming to a shoot a balloon, A will succeed 4 times out of 5 attempts. The chance of B to shoot the balloon is 3 out of 4 and that of C is 2 out of 3. If the three aim the balloon simultaneously, then find the probability that at least two of them hit the balloon.	7	2	1	1,2
b)	In a certain college, 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student body. (a) What is the probability that mathematics is being studied? (b) If a student is selected at random and is found to be studying mathematics, find the probability that the student is a girl? (c) a boy	7	3	1	1,2
14. a)	Probability density function of a random variable X is $$f(x) = \begin{cases} \frac{1}{2} sinx, for\ 0 \le x \le \pi \\ 0, elsewhere \end{cases}$$ Find the mean, mode and median of the distribution and also find the probability between 0 and $\pi/2$	7	1	2	1,2
b)	In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution	7	2	2	1,2
15. a)	A simple sample of the height of 6400 Englishmen has a mean of 67.85 inches and a S.D of 2.56 inches while a simple sample of heights of 1600 Australians has a mean of 68.55 inches and S.D. of 2.52 inches. Do the data indicate the Australians are on the average taller than the Englishmen? (Use α as 0.01)	7	3	3	1,2

b)	A sample of 100 students is taken from a large population. The mean height of the students in this sample is 160 cm. Can it be reasonably regarded that, in the population, the mean height is 165 cm, and the SD is 10 cm?	7	4	3	1,2
16. a)	A random sample of size 16 values from a normal population showed a mean of 53 and a sum of squares of deviations from the means equal to 150. Can this sample be regarded as taken from the population having 56 as mean? Obtain 95% confidence limits of the mean of the population	7	3	4	1,2
b)	Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9pumpkins, show the sample standard deviations of their weights as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test the hypothesis two variances are equal.	7	3	4	1,2

17. a) Fit a second degree polynomial to the following data by the method of least squares : | 7 | 3 | 5 | 1,2

X	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

b) Obtain the rank correlation coefficient for the following data | 7 | 2 | 5 | 1,2

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

18. a) Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each draw. Find the probability that | 7 | 1 | 1 | 1,2

    (i)   Both are white

    (ii)   First is red and second is white.

b) A continuous RV X has a pdf $f(x) = kx^2e^{-x}$; $x \geq 0$. Find k, mean and variance | 7 | 3 | 2 | 1,2

19. Answer any *two* of the following:

a) The mean and standard deviation of a population are 11,795 and 14,054 respectively. What can one assert with 95% confidence about the maximum error if $\bar{x}$=11,795 and n=50. And also construct 95% confidence interval for the mean. | 7 | 2 | 3 | 1,2

b) 4 coins were tossed 160 times and the following results were obtained. | 7 | 2 | 4 | 1,2

No. of Heads	0	1	2	3	4
Observed Frequencies	17	52	54	31	6

Under the assumption that coins are balanced, find the expected frequencies of 0,1,2,3 or 4 heads, and test the goodness of fit (α=0.05)

c) Price indices of cotton and wool are given below for the 12 months of a year, Obtain the equations of lines of regression between the indices. | 7 | 3 | 5 | 1,2

Price index of cotton(X)	78	77	85	88	87	82	81	77	76	83	97	93
Price index of wool(Y)	84	82	82	85	89	90	88	92	83	89	98	99

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

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	60%
2	Knowledge on application and analysis (Level-3 & 4)	40%
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	0

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