

SRI VASAVI ENGINEERING COLLEGE (Autonomous)
B.Tech III Semester Regular Examinations – Oct – 2019

Probability & Statistics

(Common to CSE ,CE & ME)

Time: 3 Hrs

Model Paper-II

Max. Marks: 60

Answer All the Questions
All Questions Carry Equal Marks

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			OR																														
	B.	i.	Find the expected gain of the player if a player tosses 3 fair coins & he wins Rs. 500 if 3 heads appear, Rs 300 if 2 heads appear, Rs 100 if 1 head appears. On the other hand he loses Rs 1500 if 3 tails occur.								CO2-K3(5M)																						
		ii	Calculate the probability that an IC chip will work properly (i) less than 8 years (ii) Beyond 8 years (iii) Between 5 to 7 years (iv) Anywhere from 2 to 5 years if the trouble shooting capability of an IC chip in a circuit is a random variable X where distribution function is given by $f(x) = \begin{cases} 0, & \text{for } x \leq 3 \\ 1 - \frac{9}{x^2}, & \text{for } x > 3 \end{cases}$								CO2-K3(5M)																						
3											10 M																						
	A.	i.	Find the mean number of success and standard deviation in eight throws of a die, 5 or 6 is Considered as success.								CO3-K3(5M)																						
		ii	Show that the mean and the variance the Poisson distribution are same and equal to λ .								CO3-K3(5M)																						
			OR																														
	B.	i.	Calculate (a) How many students got marks above 90%. (b) What was the highest mark obtained by the lowest 10% of the students. (c) With in what limits did the middle of 90% students lie. If the marks obtained in mathematics by 1000 students is normally distributed with mean 78% & standard deviation 11%.								CO3-K3(5M)																						
		ii	Show that the mean and variance of Gamma distribution are $\alpha\beta$ and $\alpha\beta^2$ respectively.								CO3-K3(5M)																						
4											10 M																						
	A.	i.	Find Karl Pearson's coefficient of correlation from the following data. <table border="1"><tr><td>Height's of fathers (x)</td><td>65</td><td>66</td><td>67</td><td>67</td><td>68</td><td>69</td><td>70</td><td>72</td></tr><tr><td>Heights of son's (y)</td><td>67</td><td>68</td><td>65</td><td>68</td><td>72</td><td>72</td><td>69</td><td>71</td></tr></table>								Height's of fathers (x)	65	66	67	67	68	69	70	72	Heights of son's (y)	67	68	65	68	72	72	69	71	CO4-K3(5M)				
Height's of fathers (x)	65	66	67	67	68	69	70	72																									
Heights of son's (y)	67	68	65	68	72	72	69	71																									
		ii	Use the method of least squares to fit an exponential curve $y = ae^{hx}$ to the data given below. <table border="1"><tr><td>X</td><td>1</td><td>5</td><td>7</td><td>9</td><td>12</td></tr><tr><td>Y</td><td>10</td><td>15</td><td>12</td><td>15</td><td>21</td></tr></table>								X	1	5	7	9	12	Y	10	15	12	15	21	CO4-K3(5M)										
X	1	5	7	9	12																												
Y	10	15	12	15	21																												
			OR																														
	B	i)	Calculate the rank correlation coefficient after making adjustments for tied ranks from the following data. <table border="1"><tr><td>X</td><td>48</td><td>33</td><td>40</td><td>9</td><td>16</td><td>16</td><td>65</td><td>24</td><td>16</td><td>57</td></tr><tr><td>Y</td><td>13</td><td>13</td><td>24</td><td>6</td><td>15</td><td>4</td><td>20</td><td>9</td><td>6</td><td>19</td></tr></table>								X	48	33	40	9	16	16	65	24	16	57	Y	13	13	24	6	15	4	20	9	6	19	CO4-K3(5M)
X	48	33	40	9	16	16	65	24	16	57																							
Y	13	13	24	6	15	4	20	9	6	19																							

ii Find the regression line of Y on X and hence predict Y if X=10 for given bi-variate data.

X	1	5	3	2	1	1	7	3
Y	6	1	0	0	1	2	1	5

5

10 M

A. i Construct 95% confidence interval for the mean if a sample size of 300 was taken whose mean is 54 and variance is 225.

CO5-K2(5M)

ii Find the probability that \bar{x} will be between 75 and 78 if a random sample of size 100 is taken from an infinite population having the mean $\mu = 76$ and the variance $\sigma^2 = 256$.

CO5-K3(5M)

OR

B. i Estimate the maximum error with 99% confidence if a sample of size 10 was taken from a population Standard deviation of sample is 0.03.

CO5-K2(5M)

ii Find (i) The population mean
(ii) the population Standard Deviation.
(iii) The mean of the sampling distribution of means
(iv) The S.D of the sample distribution of means.

CO5-K3(5M)

If a population consists of five numbers 3,6,9,15 and 27 and consider all sample of size three that can be drawn without replacement from this population.

6

10 M

A. i. Examine the significance at 0.05 level that an ambulance service claims that it takes on the average less than 10 minutes to reach destination in emergency calls and given that a sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes.

CO6-K3(5M)

ii Examine the significance at 0.05 level that the average life time of the bulbs produced by the company is 1600 hours given that the mean life time of a sample of 25 fluorescent light bulbs produced by a company is 157 has with a Standard deviation of 120 hours.

CO6-K3(5M)

OR

B i Apply Chi-square test, would you say that the dice are fair at 0.05 level of significance if a pair of dice are thrown 360 times and the frequency of each sum is indicate below.

CO6-K3(5M)

Sum	2	3	4	5	6	7	8	9	10	11	12
frequency	8	24	35	37	44	65	51	42	26	14	14

ii Use F-test to check whether the two samples came from the same normal population for the data

Sample	Size	Sample mean	Sum of squares of deviation taken from Mean
1	10	15	90
2	12	14	108

CO6-K3(5M)

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Probability & Statistics

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Time: 3 Hrs

Model Paper-I

Max. Marks: 60

Answer All the Questions
 All Questions Carry Equal Marks

1.											10 M
A.	i.	Estimate the mean, median and mode for the following data								CO1-K2(5M)	
		Marks	6	4	16	7	8	2			
		No.of Students	20	9	25	50	40	80			
	ii.	Find the standard deviation and variance to the data given below								CO1-K3(5M)	
		Class	30-40	40-50	50-60	60-70	70-80	80-90	90-100		
		Frequency	3	7	12	15	8	3	2		
		OR									
B.	i.	Identify the mode for the following data.								CO1-K2(5M)	
		x	0-10	10-20	20-30	30-40	40-50	50-60			
		f	12	18	27	20	17	6			
	ii.	Find the Skewness & Kurtosis if the number of bacteria in 1 ml of blood from 5 persons are 2,3,7,8,10.								CO1-K3(5M)	
2.										10 M	
A.	i.	Find (i) the value of K (ii) $P(x < 6)$, $P(x \geq 6)$ (iii) $P(0 < x < 5)$ if the random variable X has the following probability function.								CO2-K3(5M)	
		X	0	1	2	3	4	5	6	7	
		P(X)	0	K	2K	2K	3K	K^2	$2K^2$	$7K^2 + K$	
	ii.	Find (i) $E(X)$, $E(X^2)$ and $V(X)$ of the density function of a random variable 'X' is $f(x) = \begin{cases} e^{-x}, & x \geq 0 \\ 0, & \text{otherwise} \end{cases}$								CO2-K3(5M)	
		OR									
B.	i.	Find (i) K (ii) mean (iii) variance of a continuous random variable which has the probability density function, $f(x) = \begin{cases} Kxe^{-\lambda x}, & x \geq 0, \lambda > 0 \\ 0, & \text{otherwise} \end{cases}$								CO2-K3(5M)	

		ii. Prepare the distribution function, for the random variable 'X' which denotes the sum of the two numbers that appear when a pair of dice is tossed. Also find mean, variance of the distribution.	CO2-K3(5M)																
3.			10 M																
A.	i.	Find the value of 'n' and $p(x \geq 7)$, $p(1 \leq x \leq 6)$, if the mean of Binomial distribution is 3 and the variance is $9/4$.	CO3-K3(5M)																
	ii.	Find the following (a)How many students score between 12 and 15? (b)How many score above 18? (c)How many score below 18? When a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5 assume the distribution to be normal.	CO3-K3(5M)																
		OR																	
B.	i.	Use recurrence formula to find the probabilities when $x=0,1,2,3,4$, and 5, if the mean of the poisson distribution is 3.	CO3-K3(5M)																
	ii.	Show that the mean of the Binomial distribution is np and variance of the Binomial distribution is npq .	CO3-K3(5M)																
4.			10 M																
A.	i.	Apply least square method to fit the straight line $y=a+bx$ for the following data. <table><tr><td>X</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>y</td><td>14</td><td>27</td><td>40</td><td>55</td><td>68</td></tr></table>	X	1	2	3	4	5	y	14	27	40	55	68	CO4-K3(5M)				
X	1	2	3	4	5														
y	14	27	40	55	68														
	ii.	Calculate the coefficient of correlation between age of cars and annual maintenance cost and comment on it. <table><tr><td>Age of Cars (years)</td><td>2</td><td>4</td><td>6</td><td>7</td><td>8</td><td>10</td><td>12</td></tr><tr><td>Annual Maintenance</td><td>1600</td><td>1500</td><td>1800</td><td>1900</td><td>1700</td><td>2100</td><td>2000</td></tr></table>	Age of Cars (years)	2	4	6	7	8	10	12	Annual Maintenance	1600	1500	1800	1900	1700	2100	2000	CO4-K3(5M)
Age of Cars (years)	2	4	6	7	8	10	12												
Annual Maintenance	1600	1500	1800	1900	1700	2100	2000												
		OR																	
B.	i.	Apply the method of least squares to fit a second degree polynomial to the following data. <table><tr><td>X</td><td>10</td><td>12</td><td>15</td><td>23</td><td>20</td></tr><tr><td>y</td><td>14</td><td>17</td><td>23</td><td>25</td><td>21</td></tr></table>	X	10	12	15	23	20	y	14	17	23	25	21	CO4-K3(5M)				
X	10	12	15	23	20														
y	14	17	23	25	21														
	ii.	Find the rank correlation coefficient for the following data. <table><tr><td>Mathematics</td><td>85</td><td>60</td><td>73</td><td>40</td><td>90</td></tr><tr><td>Statistics</td><td>93</td><td>75</td><td>65</td><td>50</td><td>80</td></tr></table>	Mathematics	85	60	73	40	90	Statistics	93	75	65	50	80	CO4-K3(5M)				
Mathematics	85	60	73	40	90														
Statistics	93	75	65	50	80														
5.			10 M																
A.	i.	Construct the 95% confidence interval for mean if the mean and the S.D of a population are 11.795 and 14.054 respectively where $n=50$.	CO5-K2(5M)																
	ii	Find (a) The mean of the population (b) The standard deviation of the population (c)The mean of sampling distribution of means (d) The S.D of sampling distribution of means when a population consists of five numbers 2,3,6,8 and 11.	CO5-K3(5M)																

		Consider all possible samples of size 2 that can be drawn with replacement from this population.															
		OR															
	B.	i. Estimate the maximum error with 95% confidence when a random sample of size 100 has a Standard Deviation of 5.	CO5-K2(5M)														
		ii. Calculate the probability that four batteries are connected in a series will have a combined voltage of 60.8 or more when the mean voltage of a battery is 15 and S.D is 0.2.	CO5-K3(5M)														
6.			10 M														
	A.	i. Examine whether the die is unbiased at a level of significance of 0.01 if a die is tossed 960 times and it falls with 5 upward 184 times.	CO6-K3(5M)														
		ii. Examine that both Rice and wheat are equally popular in Karnataka state at 1% level of significance if in a sample of 1000 people, 540 are rice eaters and the rest are wheat eaters.	CO6-K3(5M)														
		OR															
	B.	i. Use Chi-square test if the following frequencies in agreement with the belief that accident conditions were same during this ten week period if the number of accidents per week in a certain city are as follows:12,8,20,2,14,10,15,16,9,4.	CO6-K3(5M)														
		ii. Apply F-Test, to check the two samples came from same normal population if the nicotine contents in milligrams in two samples of tobacco were found to be as follows.	CO6-K3(5M)														
		<table border="1"> <tr> <td>Sample A</td> <td>24</td> <td>27</td> <td>26</td> <td>21</td> <td>25</td> <td>-</td> </tr> <tr> <td>Sample B</td> <td>27</td> <td>30</td> <td>28</td> <td>31</td> <td>22</td> <td>36</td> </tr> </table>	Sample A	24	27	26	21	25	-	Sample B	27	30	28	31	22	36	
Sample A	24	27	26	21	25	-											
Sample B	27	30	28	31	22	36											
		* * *															