V.V.P. Engineering College

Department of Applied Sciences and Humanities

Assignment – 1

AY. 2020-21 (Odd)

Semester: 3rd

Subject: Probability and Statistics

Subject Code: 3130006

Sr. No.	Question/Task	Marks	CO	CL
1	Calculate (i) mean, (b) Standard deviation, (c) Variance, (d) Coefficient of Variation, (e) Range, (f) Median, for the following data of blood pressure measurements: 100, 98, 101, 94, 104, 102, 108, 108.	7	CO3	A
2	Compute the arithmetic mean, geometric mean and harmonic mean of the following set of the data: 3, 5, 7, 11, 14, and 57.	4	CO3	A
3	Find the standard deviation of the intelligence quotient (IQ) of 50 boys from the following table:	5	CO3	A

I.Q.	0-20	20-40	40-60	60-80	80-100	100-120	120-140	140-160
No. of boys	3	4	3	4	13	12	8	3

4	Calculate the mean and standard deviation of the following table giving the age distribution of 542 members:	5	CO3	A

Age (in Years)	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of members	3	61	132	153	140	51	2

5 The wickets taken by a bowler in 10 cricket matches are as follows:2, 6, 4, 5, 0, 2, 1, 3, 2, 3. Find the mode of the data. 3 CO3 A

6 A survey conducted on 20 household in a locality by a group of students resulted in the following frequency table for the number of family members in a household: Find the mode of the data. 4 CO3 A

Family size	1-3	3-5	5-7	7-9	9-11
No. of family	7	8	2	2	1

7 An analysis of monthly wages paid to workers in two firms A and B belong to the same industry gave the following results. 5 CO3 A

	Firm A	Firm B
No. of wages earners	986	548
Average monthly wages	Rs. 52.5	Rs. 47.5
Variance of distribution of wages	100	121

(a) Which firm pays out large amounts as wage bill?

(b) In which firm there is greater variability in individual wages?

8 Calculate the first four moments about the mean for the following data. 4 CO3 A

x	2	3	4	5	6
f	1	3	7	3	1

9 Find Karl Peorson's coefficient of skewness for the following data. 4 CO3 A

x	0-10	10-20	20-30	30-40	40-50	50-60	60-70

f	10	15	24	25	10	10	6

10 Calculate mean, median, mode, standard deviation and variance for the following data. 5 CO3 A

10.2, 9.5, 8.3, 9.7, 9.5, 11.1, 7.8, 8.8, 9.5, 10

11 Goal scored by two teams A and B in a football season were as follows: 7 CO3 A

No. of goals scored in a match	0	1	2	3	4
No. of matches played by team A	27	9	8	5	4
No. of matches played by team B	17	9	6	5	3

Find out which team is more consistent.

Course Outcome	**Student will be able to**
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Assignment – 2

AY. 2020-21 (Odd)

Semester: 3rd

Subject: Probability and Statistics

Subject Code: 3130006

Sr. No.	Question/Task	Marks	CO	CL
1	By the method of least squares, find the straight line that best fits the following data: | X | 1 | 2 | 3 | 4 | 5 | | Y | 14 | 27 | 40 | 55 | 68 |	4	CO5	A
2	If P is the pull required to lift a load W by means of pulley block, find a linear law of the form P = m W + C connecting P and W using following data : | P | 12 | 15 | 21 | 25 | | W | 50 | 70 | 100 | 120 | Where P and W are taken in kg-wt. Compute P when W = 150 kg.	7	CO5	A
3	Obtain the least squares straight line fit to the following data : | X | 0.2 | 0.4 | 0.6 | 0.81 | | Y | 0.447 | 0.632 | 0.775 | 0.8941 |	5	CO5	A
4	Fit a second degree parabola $y = ax^2 + bx + c$ in the least square sense for the following data and hence estimate y at x = 6.	7	CO5	A

X	1	2	3	4	5
Y	10	12	13	16	19

5 Fit a second degree curve of the form $2y = bx + ax^2$ to the following data by the method of least squares. 7 A CO5

X	1	2	3	4	5
Y	1.8	5.1	8.9	14.1	19.8

6 Fit a curve of the form $y = ax^b$ for the data and hence find the estimation for y when x = 8. 5 A CO5

X	1	2	3	4	5	6	7
Y	87	97	113	129	202	195	193

7 Fit a curve of the form $y = Ce^{bx}$ for the data points: 4 A CO5

(0, 1.5), (1,2.5),(2,3.5),(3,5.0),(4,7.5).

8 Fit a curve of the form $y = ab^x$ for the following data: 5 A CO5

X	50	450	780	1200	440	4800	5300
Y	28	30	32	36	51	58	69

9 The following are the data on the drying time of a certain varnish and the amount of an additive that is intended to reduce the drying time? 7 A CO5

Amount of Varnish additive(gm) "X"	0	1	2	3	4	5	6	7	8
Drying time(hr) "Y"	12	10.5	10	8	7	8	7.5	8.5	9

(i)Fit a second degree polynomial by the method of least square.

(ii)Use the result of (i) to predict the drying time of the Varnish when 6.5 gm of the additive is being used.

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Assignment – 3

AY. 2020-21 (Odd)

Semester: 3rd

Subject: Probability and Statistics

Subject Code: 3130006

Sr. No.	Question/Task	Marks	CO	CL
1	What is correlation? Give methods to measure it.	3	CO3	R
2	Ten competitors in a music competition are ranked by three judges in the following order	7	CO3	A

1stjudge	1	6	5	10	3	2	4	9	7	8
2nd judge	3	5	8	4	7	10	2	1	6	9
3rd judge	6	4	9	8	1	2	3	10	5	7

3	What is regression coefficients and give its properties.	4	CO3	R
4	The following data give the experience of machine operators and their performance rating as given by the number of good parts turned out per 100 pieces	7	CO3	A

Operator	1	2	3	4	5	6
Performance rating (x)	23	43	53	63	73	83
Experience (y)	5	6	7	8	9	10

Calculate the regression line of performance rating on experience and also estimate the probable performance if an operator has 11years experience.

5 The following table gives the number of blind per lakh of population in different age groups. Find out the correlation coefficient between age and blindness. 7 A CO3

Age (in years) (x)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of blind per lakh (y)	55	67	100	111	150	200	300	500

6 A sample of 12 fathers and their eldest sons gave the following data about their height in inches: Calculate coefficient of rank correlation. 7 A CO3

(x)	65	63	67	64	68	62	70	66	68	67	69	71
(y)	68	66	68	65	69	66	68	65	71	67	68	70

7 Obtained the equation of two lines of regression for the following data. Also, obtained the estimate of X for Y = 70. 4 A CO3

X	65	66	67	67	68	69	70	72
Y	67	68	65	68	72	72	69	71

8 In a partially destroyed laboratory, record of an analysis of correlation data, the following results only are legible: Variance of X = 9. Regression equation 8X – 10Y + 66 =0

40X – 18Y = 214. What are (i) the mean values X and Y (ii) the correlation coefficient between X and Y (iii) the standard deviation of Y? 5 A CO3

9 Obtained the regression of Y on X, and X on Y from the following table and estimate the blood pressure when the age is 45 years 7 A CO3

Age (in years) (X)	56	42	72	36	63	47	55	
Blood Pressure (Y)	147	125	160	118	149	128	150	

38	42	68	60	
115	140	152	155	

10 Suppose the observations on X and Y are given as 7 A CO3

X	59	65	45	52	60	62	70	55	45	49

Y	75	70	55	65	60	69	80	65	59	61

Where N =10 students, and Y = marks in Maths, X = marks in Economics. Compute the least square regression equations of X on Y and Y on X. If a student gets 61 marks in Economics, what would you estimate his marks in Maths to be?

11 Obtain the line of regression of monthly sales (Y) on advertisement expenditure (X) and estimate the monthly sales when the company will spend Rs.50, 000 on advertisement, if thedata on Y and X are as follows: 7 A CO3

X	74	76	60	68	79	70	71	94
Y	43	44	36	38	47	40	41	80

12 Compute the coefficient of correlation between X and Y using the following data: 4 A CO3

X	2	4	5	6	8	11
Y	18	12	10	8	78	5

13 Obtain two lines of regression for the following data: 7 A CO3

Sales(No. of tablets)	190	240	250	300	310	335	300
Advertising expenditure(Rs.)	5	10	15	20	20	30	30

14 Find the regression equation showing the capacity utilization on production from the following data: 7 A CO3

	Average	S.D.
Production (in lakh unit)	35.6	10.5
Capacity Utilization(in %)	84.8	8.5
Correlation coefficient	r=0.62	

Estimate the production when capacity utilization is 70%.

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Assignment – 4

AY. 2020-21 (Odd)

Semester: 3rd

Subject: Probability and Statistics

Subject Code: 3130006

Sr. No.	Question/Task	Marks	CO	CL
1	How many different "words" are possible using all letters of POSSIBLE?	3	CO1	R
2	A club has 14 male and 16 female members. A committee composed of three men and three women is formed. In how many ways can this be done?	4	CO1	A
3	A five figure number is formed by the digits 0, 1,2,3,4 without repetition. Find the probability that the number formed is divisible by 4.	3	CO1	A
4	A person is known to hit the target in 3 out of 4 shots, whereas another person is known to hit the target in 2 out of 3 shots. Find the probability of the target being hit at all when they both try.	4	CO1	A
5	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. What is the probability that it is a white ball?	4	CO1	A

6	A mathematics professor assigns two problems for home work and known that the probability of a student solving the first problem is 0.75, the probability of solving the second is 0.45 and the probability of solving both is 0.20. (i) What is the probability that a student solves the first problem, given that he/she has solved the second ? (ii) What is the probability that a student solves the second problem, given that he/she has solved the first?	5	CO1	A
7	A company has two plants to manufacture hydraulic machine. Plat I manufactures 70% of the hydraulic machines and plant II manufactures 30%. At plant I, 80% of hydraulic machines are rated standard quality and at plant II, 90% of hydraulic machines are rated standard quality. A machine is picked up at random and is found to be of standard quality. What is the chance that it has come from plant I?	5	CO1	A
8	A company has four production sections viz., S1, S2, S3 and S4 which contribute 30%, 20%,28% and 22% respectively to the total output. It was observed that these sections respectively produced 1%, 2%,3% and 4% defective units. If a unit is selected at random and found to be defective, what is the probability that the unit so selected has come from either section one or section four?	4	CO1	A
9	Of three persons the chances that a politician, a businessman, or an academician would be appointed the vice chancellor (VC) of a university are 0.5, 0.3, 0.2 respectively. Probabilities that research is promoted by these persons if they are appointed as VC are 0.3, 0.7, 0.8 respectively. (i) Determine the probability that research is promoted. (ii) If research is promoted, what is the probability that the VC is an academician?	5	CO1	A
10	Stores A, B and C have 50. 75 and 100 employees and, respectively 50, 60 and 70	4	CO1	A

percent of these are women. Resignation is equally likely among all employees, regardless of sex. One employee resigns and this is a woman. What is the probability that she works in store C ?

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Assignment – 5

AY. 2020-21 (Odd)

Semester: 3rd

Subject: Probability and Statistics

Subject Code: 3130006

Sr. No.	Question/Task	Marks	CO	CL
1	A random variable X has the following probability function: X: 0 | 1 | 2 | 3 | 4 P(X=x): K | 3k | 5k | 7k | 9k Find (i) k (ii)P(X<3) (iii)P(X ≥ 3) (iv)P(0<X<4), and (v) distribution function of X.	5	CO1	A
2	From a lot of 10 items containing 3 defectives, a sample of 4 items is drawn at random. Let the random variable X denote the number of defective items in the sample. Find the probability distribution of X.	3	CO1	A
3	A discrete random variable can take all integer values from 1 to k each with the probability of 1/k. Show that its mean and variance are $\frac{k+1}{2}$ and $\frac{k^2-1}{12}$ respectively.	4	CO1	A
4	A six faced dice is tossed. If a prime number occurs, Anil wins that number of rupees but if	4	CO1	A

a nonprime number occurs, he loses that number of rupees. Determine whether the game is favorable to the player.

5 The following is the distribution function F(x) of a discrete random variable X: — 5 — A — CO1

X	-3	-2	-1	0	1	2	3
F(X)	0.08	0.2	0.4	0.65	0.8	0.9	1

Find (i) the probability distribution of X (ii) P(-2≤X≤ 1), and

(iii)P(X ≥ 1)

6 The troubleshooting capacity of an IC chip in a circuit is a random variable X whose distribution function is given by — 7 — A — CO1

$$F(x)=\begin{cases}0 & , x\le 3\\ 1-\frac{9}{x^2} & , x>3\end{cases}$$

where x denotes the number of years. Find the probability that the IC chip will work properly (i) less than 8 years (ii) beyond 8 years (iii) between 5 to 7 years, and (iv) anywhere from 2 to 5 years

7 Find the value of k and the distribution function F(x) given the probability density function of a random variable X as — 4 — A — CO1

$$f(x)=\frac{k}{1+x^2}\ ,\ -\infty<x<\infty$$

.

8 The probability density function of a random variable X is — 4 — A — CO1

$$f(x)=\frac{1}{2}\sin x\ ,\ 0\le x\le\pi$$
$$=0 \quad ,\ otherwise$$

Find the mean, mode, median of the distribution and also, find the probability between o and $\frac{\pi}{2}$

9	A random variable X has the pdf $f(x) = \frac{k}{1+x^2}$, $-\infty < x < \infty$ Determine (i)k (ii)P(X $\geq$ 0) (iii)mean, and (iv) variance	7	CO1	A
10	A continuous random variable X has the probability density function given by $f(x) = 2ax + b$, $0 \leq x \leq 2$ $= 0$, $otherwise$. If the mean of the distribution is 3, find the constant a and b.	7	CO1	A

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Assignment – 6

AY. 2020-21 (Odd)

Semester: 3rd

Subject: Probability and Statistics

Subject Code: 3130006

Sr. No.	Question/Task	Marks	CO	CL
1	Seven unbiased coins are tossed 128 times and the number of heads obtained is noted as given below: No. of heads: 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 Freq.: 7 | 6 | 19 | 35 | 30 | 23 | 7 | 1 Fit a binomial distribution to the data:	4	CO2	A
2	An irregular 6 – faced die is thrown such that the probability that it gives 3 even numbers in 5 throws is twice the probability that it gives 2 even numbers in 5 throws. How many sets of exactly 5 trials can be expected to give no even number out of 2500 sets?	5	CO2	A
3	A manufacturer of cotter pins knows that 5% of his products are defective. If he sells cotter pins in boxes of 100 and guarantees that not more than 10 pins will be defective, what is the approximate probability that a box will fail to meet the guaranteed quality?	5	CO2	A
4	A manufacturer, who produces medicine bottles, finds that 0.1% of the bottles are	5	CO2	A

defective. The bottles are packed in boxes containing 500 bottles. A drug manufacturer buys 100 boxes from the producer of bottles. Using Poisson distribution, find how many boxes will contain (i) no defective bottles and (ii) at least 2 defective bottles?

5 Assuming that the typing mistake per page committed by a typist follows a Poisson distribution, find the expected frequencies for the following distribution of typing mistakes: 7 CO2 A

No. of mistake per page	0	1	2	3	4	5
Number of pages	40	30	20	15	10	5

6 It is known that 0.5% of ball pen refills produced by a factory are defective. These refills are dispatched in packaging of equal numbers. Using a Poisson distribution, determine the number of refills in a packing to be sure that at least 95% of them contain no defective refills. 4 CO2 A

7 If X is a normal variate with a mean of 30 and a SD of 5, find the probabilities that (i) $26 \leq X \leq 40$, (ii) $X \geq 45$. 3 CO2 A

8 Find the mean and SD in which 7% of items are under 35 and 89% are under 63. 3 CO2 A

9 A manufacturer knows from his experience that the resistance of resistors he produces is normal with mean 100 ohms and SD 2 ohms. What percentage of resistors will have resistance between 98 ohms and 102 ohms? 4 CO2 A

10 A random variable X has pdf $f(x) = k\,e^{-2x} \;\; for \; x > 0$. Find (i) P(X > 2) (ii) $P(X < \frac{1}{k})$ 5 CO2 A

11 The average time it takes to serve a customer at a petrol pump is 6 minutes. The service time follows exponential distribution. Calculate the probability that 7 CO2 A

(i) A customer will take less than 2 minutes to complete the service.

	(ii) A customer will take between 4 and 5 minutes to get the service. (iii) A customer will take more than 10 minutes for his service.			
12	Consumer demand for milk in a certain locality, per month, is known to be a general gamma random variable. If the average demand is 'a' liters and the most likely demand is 'b' liters (b < 0), what is the variance of the demand?	4	CO2	A
13	Given a gamma random variable X with r=3 and λ=2. Compute (i)E(X) (ii) Var(X) (iii)P(X≤ 1.5 years)	7	CO2	A
14	Given a gamma random variable X with r=6 and λ=2. Compute (i) E(X) (ii)Var(X).	5	CO2	A

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Assignment – 7

AY. 2020-21 (Odd)

Semester: 3rd

Subject: Probability and Statistics

Subject Code: 3130006

Sr. No.	Question/Task	Marks	CO	CL
1	A dice is tossed 960 times and it falls with 5 upwards 184 times. Is the dice unbiased at a level of significance of 0.01?	3	CO4	A
2	The fatality rate of typhoid patients is believed to be 17.26%. In a certain year 640 patients suffering from typhoid were treated in a metropolitan hospital and only 63 patients died. Can you consider the hospital efficient at 1% level of significance?	4	CO4	A
3	A machine produced 20 defective articles in a batch of 400. After overhauling it produced 10 defective articles in a batch of 300. Has the machine improved?	4	CO4	A
4	An ambulance service claims that it takes on the average 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the claim at 0.05 level of significance.	5	CO4	A
5	The mean height of 50 male students who participate in sports is 68.2 inches with a S.D. 0f 2.5 inches. The mean height of 50 male students who have not participated in sports	7	CO4	A

is 67.2 inches with S.D. of 2.8 inches. Test the hypothesis that the height of students who have participated in sports is more than the students who have not participated in sports.

6	Ten objects are chosen at random from a large population and their weights are found to be in grams: 63, 63, 64, 65, 66, 69, 69, 70, 70, 71. Discuss the suggestion that the mean weight is 65g?	5	CO4	A
7	Samples of two types of electric bulbs were tested for length of life and the following data were obtained.	5	CO4	A

	Size	Mean	SD
Sample 1	8	1234hr	36hr
Sample 2	7	1036hr	40hr

Is the difference in the means sufficient to warrant the type 1 bulbs are superior to type 2 bulbs?

8	A random sample of 10 nations gives correlation coefficients of 0.5 between literacy rate and political stability. Is the relation significant?	5	CO4	A
9	Two random sample gave the following data:	7	CO4	A

	Size	Mean	SD
Sample 1	8	9.6	1.2
Sample 2	11	16.5	2.5

Can we conclude that the two samples have been drawn from the same normal population?

10	Theory predicts that the proportion of beans in the four groups A, B, C, D should be 9:3:3:1. In an experiment among 1600 beans, the numbers in the four groups were 882, 313, 287, and 118. Does the experimental results support the theory?	7	CO4	A

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