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RAS 301 Engineering Mathematics III: B. Tech. (Third Semester)–2018-19
Assignment 3 (Unit-2) Statistical Technique

[1]. If the first four moments of a distribution about the value 5 are equal to -4, 22, -117 and 560. Determine the corresponding moments. (i) About the mean (ii) Discuss the Kurtosis of the distribution.

[2]. Find the first four moments about the mean & kurtosis for the following frequency distribution:

Marks	0-10	10-20	20-30	30-40	40-50
No of students	5	10	40	20	25

[3]. The first four moments of a distribution about x=2 are 1, 2.5, 5.5 and 16. Calculate the first four moments about the mean and about origin. Comment upon the skewness and kurtosis of the distribution.

[4]. Complete the first four moment about the mean from the following date:-

Mid value go the variety	5	10	15	20	25	30	35
Frequency	8	15	20	32	23	17	5

[5]. Obtain the moment generating function of the random variable x having probability distribution.

$$f(x) = \begin{cases} x & for \quad o < x < 1 \\ 2 - x & for \quad k \ x < 2 \\ 0 & elsewhere \end{cases}$$

[6]. Let the random variable X assume the value 'n' with the probability law $p(X = n) = pq^{n-1}, n = 1,2,3\ldots$ Find the moment generating function and hence mean and variance.

[7]. By the method of least-squares, find the straight line that best fit the following data:-

X:	1	2	3	4	5
Y:	13	27	40	55	68

[8]. By the method of least-squares, find the curve $y = ax + bx^2$ that fit the following data:-

x	1	2	3	4	5
y	1.8	5.1	8.9	14.1	19.8

[9]. Find the regression line of y on x from the following data:

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

[10]. Fit the curve $pv^{\gamma} = k$ to the following data:

p (kg/cm^3)	0.5	1.0	1.5	2.0	2.5	3
v (Liters)	1620	1000	750	620	520	460

[11]. Find Karl Pearson's coefficient of correlation from the following figures of height of fathers and sons.

Height of fathers (inches)	65	66	67	67	68	79	71	73
Height of sons (inches)	67	68	64	68	72	70	69	70

[12]. In a partially destroyed laboratory record of an analysis of a correlation data, the following results are only eligible: variance of x = 9, regression equations: 8x-10y+66=0:40x-18y=214. What were(i) the mean values of x and y (ii) the standard deviation of y and the coefficient of correlation between x and y.

[13]. What do you mean by regression analysis, explain? If for two random variables, x and y with the same mean, the two regression equations are y=ax+b and $x = \alpha y + \beta$ show that $\frac{b}{\beta} = \frac{1-a}{1-\alpha}$.Also find the common mean.

[14]. Calculate mean, standard deviation, moment coefficient of skewness and kurtosis of a binomial distribution if number of trials are 18 and probability of success is $\frac{1}{3}$

[15]. The sum and product of the mean and variance of binomial distribution are 24 and 128 respectively. Find the distribution.

[16]. If 20 % of bolts produced by a machine are defective, determine the probability that out of 10 bolts, chosen at random (i) 1, (ii) none, (iii)almost 2 bolts will be defective.

[17]. A binomial variate X satisfies the relation p(x=4) = p(x=2) when n=6. Find the value of parameter p and p (x = 1).

[18]. The ratio of the probability of 3 sucesses in 5 independent trials to the probability of 2 sucesses in 5 independent trials is ¼. What is the probability of 4 sucesses in 6 independent trials?

[19]. In a certain factory turning out razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Calculate the approximate number of packets containing no defective, one defective and two defective blades in a consignment of 10,000 packets. (Given: $e^{-0.02} = 0.9802$)

[20]. A sample of 100 dry battery cells tested to find the length of life, produced the following results: Assuming the data to be normally distributed, what percentage of battery cells are expected to have a life :

(i). More than 15 hours, (ii). Less than 6 hours, (iii). Between 10 and 14 hours.

[21]. To test the effectiveness of inoculation against cholera, the following table was obtained:

	Attacked	Not attacked	Total
Inoculated	30	160	190
Not inoculated	140	460	600
Total	170	620	790

(The figure represents the number of persons.)

Use χ^2 -test to defend or refute the statement that the inoculation prevents attack from cholera. (Value of χ^2 at 5% significance level for 1 degree of freedom is 3.841)

[22]. A machine which produces mica insulating washers for use in electric device to turn out washers having a thickness of 10 mm. A sample of 10 washers has an average thickness 9.52 mm with a standard deviation of 0.6 mm. Find out t.

[23]. Compute the students t for the following values in a sample of eight: $-4, -2, -2, 0, 2, 2, 3, 3$ taking the mean of universe to be zero.