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| **Unit IV**  **Unit Name: Basic Statistics (session 21 to session 29)** |
| **Tutorial No. 1**   1. Find the mean and standard deviation of the following probability distribution.  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X=xi | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | pi | 0.008 | 0.032 | 0.142 | 0.216 | 0.240 | 0.206 | 0.143 | 0.013 |   [Ans. 4.903, 1.444]   1. Compute coefficient of skewness and coefficient of Kurtosis for the following distribution  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X=xi | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | | pi | 0.008 | 0.032 | 0.142 | 0.216 | 0.240 | 0.206 | 0.143 | 0.013 |   [Ans. 0.0193, 2.3888]   1. The first three moments of the distribution about the value 3 of the random variable are 2, 10, -30 respectively. Find mean variance and skewness.   [Ans. 5, 6, -74] |
| **Tutorial No. 2**   1. A coin is tossed three times. Find binomial probability distribution for getting number of heads. Also find probability distribution. 2. Find binomial distribution if the mean is 5 and variance is 10/3. Find. 3. The odds in favour of X winning a game against Y are 4:3. Find the probability of y winning 3 games out of 7 played. 4. The incidence of an occupational disease in an industry is such that the works have 20% chances of suffering from it. What is the probability that out of 6 workers 4 or more will catch the disease? 5. The probability of failure in physics practical examination is 20%. If 25 batches of 6 students each take examination, in how many batches 4 or more students would pass? 6. Find the mean, variance, skewness and kurtosis of the probability distribution 7. Fit a binomial distribution for the following data:  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x: | 0 | 1 | 2 | 3 | 4 | | f: | 5 | 29 | 36 | 25 | 5 |   Also find mean, variance, skewness and kurtosis. |
| **Tutorial No. 3**   1. In a city there are a large number of street lamps of which on an average 3 are non-working. Find the probability that on a particular night exactly two lamps are not working. 2. 10. In a certain manufacturing process 5% of the tools produced turn out to be defective. Find the probability that in a sample of 40 tools atmost 2 will be defective. 3. It is known that the probability of an item produced by a certain machine will be defective is 0.05. If the produced items are sent to the market in packets of 20, find the number of packets containing at least, exactly and atmost 2 defective items in a consignment of 1000 packets using (i) binomial distribution and (ii) Poisson approximation to binomial distribution. 4. A manufacturer finds that the average demand per day for the mechanic to repair his new production is 2.5. Over a period of one year the demand per day is distributed as Poisson distribution. He employs two mechanics. On how many days in one year a) both mechanics would be free, b) some demand is refused. 5. Fit a Poisson distribution for the following data:  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | x: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | | f: | 314 | 335 | 204 | 86 | 29 | 9 | 3 |   Also find mean, variance, skewness and kurtosis. |
| **Tutorial No. 4**   1. If X is a normal variate with mean 10 and standard deviation 4, find (i) , (ii) . Also find skewness and kurtosis. 2. The marks obtained by the students in Mathematics, Physics and Chemistry in an examination are normally distributed with the means 52, 50 and 48 and with standard deviations 10, 8 and 6 respectively. Find the probability that a student selected at random has secured a total of (i) 180 or above and (ii) 135 or less 3. The life of army shoes is normally distributed with mean 8 months and standard deviation 2 months. If 5000 pairs are issued how many pairs would be expected to need replacement after 12 months. 4. Calculate the correlation coefficient from the following data  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | X | 100 | 200 | 300 | 400 | 500 | | Y | 30 | 40 | 50 | 60 | 70 |   [**Ans:** r = 1]   1. The following table gives the number of blinds per lakh of population in different age groups. Find the correlation between age and blindness  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Age (in yrs.) | 0–10 | 10–20 | 20–30 | 30–40 | 40–50 | 50–60 | 60–70 | 70–80 | | No. of blinds | 55 | 67 | 100 | 111 | 150 | 200 | 300 | 500 |   [**Ans:** r = 0.8982]   1. Two judges gave the following rank to a series of eight one act plays in drama competition. Examine the relationship between their judgments.  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Judge A | 8 | 7 | 6 | 3 | 2 | 1 | 5 | 4 | | Judge B | 7 | 5 | 4 | 1 | 3 | 2 | 6 | 8 |   [**Ans:** r = 0.62]   1. Calculate the rank correlation coefficient from the following data.  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Height | 60 | 62 | 64 | 66 | 68 | 70 | 72 | 74 | | Weight | 92 | 83 | 101 | 110 | 128 | 119 | 137 | 146 |   [**Ans :** R= 0.93**]**   1. Obtain the rank correlation coefficient from the following data.  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X | 10 | 12 | 18 | 18 | 15 | 40 | | Y | 12 | 18 | 25 | 25 | 50 | 25 |   [**Ans :** R= 0.5429**]**   1. Find Karl Pearson’s coefficient of correlation and the two lines of regression for the following Also estimate Y if X = 80  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 62 | 64 | 65 | 69 | 70 | 71 | 72 | 74 | | Y | 126 | 125 | 139 | 145 | 165 | 152 | 180 | 208 |   [**Ans:** y = - 258.373 + 6.046 x and y = 225.307]   1. Find the most likely price in Mumbai corresponding to the price of Rs. 70.00 at Calcutta from the following:  |  |  |  |  | | --- | --- | --- | --- | | Calcutta(X) | | Mumbai(Y) | | | Mean |  | |  | | S.D. |  | |  |   Correlation coefficient between the prices of commodities in the two cities is 0.8.   1. If the lines of regression of sample are x + 6y = 6 and 3x + 2y = 10.   Find i) mean of x & y and  ii) correlation coefficient between x and y  iii) estimate y when x = 12   1. For an army personnel of strength 25, the regression of weight of kidneys (Y) on weight of heart (X), both measured in ounce, is Y- 0.399X - 6.934 = 0 and the regression of weight of heart on weight of kidney is X - 1.212Y+2.461 = 0. Find the correlation coefficient between X & Y and their mean values. Can you find out the S.D. of X and Y as well? |