**Engineering Mathematics –III ( IT )**

**Subject Code : 18MA3GCDIT**

**Module – 1 (Curve Fitting & Statistics Modelling)**

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| **S.No** | **Questions** |
| **1.** | 1. Find the linear law  |  |  |  |  |  | | --- | --- | --- | --- | --- | | W | 50 | 70 | 100 | 120 | | P | 12 | 15 | 21 | 25 |  1. Fit the best possible curve of the form using method of least square for the data  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 5 | 10 | 15 | 20 | 25 | | y | 16 | 19 | 23 | 26 | 30 | |
| **2.** | 1. Fit the best possible curve of the form , using method of least square for the data  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | x | 1 | 3 | 4 | 6 | 8 | 9 | 11 | 14 | | y | 1 | 2 | 4 | 4 | 5 | 7 | 8 | 9 |  1. A simply supported beam carries a concentrated load X at its mid-point. Corresponding to various values of X the maximum deflection Y is measured and is given in the following table. Find the law of the form and hence estimate Y when X = 150.  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | X | 100 | 120 | 140 | 160 | 180 | 200 | | Y | 0.15 | 0.55 | 0.6 | 0.7 | 0.8 | 0.85 | |
| **3.** | 1. Fit a straight line to the following data. And also find the expected production in the year 2006  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Year | 1961 | 1971 | 1981 | 1991 | 2001 | | Production in tones | 8 | 10 | 12 | 10 | 16 |  1. Fit the best possible curve of the form using method of least square for the data  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 1 | 2 | 3 | 4 | 5 | | y | 14 | 13 | 9 | 5 | 2 | |
| **4.** | 1. Fit a parabola to the data  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | 1 | 2 | 3 | 4 | 5 | | y | 10 | 12 | 13 | 16 | 19 |      1. Fit a parabola to the data  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | x | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 | | y | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 | |
| **5.** | 1. Fit a parabola to the data  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | x | 0 | 1 | 2 | 3 | 4 | 5 | | y | 1 | 3 | 7 | 13 | 21 | 31 |      1. Fit a parabola to the data  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | x | -2 | -1 | 0 | 1 | 2 | | y | -3.150 | -1.390 | 0.620 | 2.880 | 5.378 | |
| **6.** | 1. The revolution (r) and time (t) are related by quadratic polynomial. Estimate the number of revolution for time 3.5 units given  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | t | 1.2 | 1.6 | 1.9 | 2.1 | 2.4 | 2.6 | 3 | | r | 5 | 10 | 15 | 20 | 25 | 30 | 35 |  1. Fit a parabola to the data  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | x | -3 | -2 | -1 | 0 | 1 | 2 | 3 | | y | 38 | 16 | 4 | 2 | 10 | 28 | 56 | |
| **7.** | 1. Calculate the mean and standard deviation for the following:  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Size of item | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | Frequency | 3 | 6 | 9 | 13 | 8 | 5 | 4 |  1. Find the mean and standard deviation for the following  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Mid Value | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | | Frequency | 2 | 22 | 19 | 14 | 3 | 4 | 6 | 1 | |
| **8.** | 1. Compute the average for the following data  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Class interval | 0-99 | 100-199 | 200-299 | 300-399 | 400-499 | 500-599 | 600-699 | 700-799 | | Frequency | 10 | 54 | 184 | 264 | 246 | 40 | 1 | 1 |  1. Following table gives the cumulative frequency of the age of a group of 199 teachers. Find the mean of the group.  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Age in yrs | 20-25 | 25-30 | 35-40 | 40-45 | 45-50 | 50-55 | 55-60 | 60-65 | 60-65 | 65-70 | | Cum. Freq | 21 | 40 | 90 | 130 | 146 | 166 | 176 | 186 | 195 | 199 | |
| **9.** | 1. The crushing strength of 8 cement concrete experimental blocks, in metric tonnes per sq. cm, was 4.8, 4.2, 5.1, 3.8, 4.4, 4.7 and 4.5. Find the mean crushing strength and the standard deviation 2. The scores obtained by two batsmen A and B in 10 matches are given below. Calculating mean, SD, and coefficient of variation for each batsman, determine who is more efficient and who is more consistent.  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | A: | 30 | 44 | 66 | 62 | 60 | 34 | 80 | 46 | 20 | 38 | | B: | 34 | 46 | 70 | 38 | 55 | 48 | 60 | 34 | 45 | 30 | |
| **10.** | 1. The index number of prices of two articles A and B for six consecutive weeks are given below. Find which has a more variable price?  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | A: | 314 | 326 | 336 | 368 | 404 | 412 | | B: | 330 | 331 | 320 | 318 | 321 | 330 |  1. The two observers bring the following two sets of data which represent measurements of the same quantity.  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | I | 105.1 | 103.4 | 104.2 | 104.7 | 104.8 | 105.0 | 104.9 | | II | 105.3 | 105.1 | 104.8 | 105.2 | 106.7 | 102.9 | 103.1 |   Calculate the SD in each case. Which set of data is more reliable? |
| **11.** | 1. Define: (i) Correlation (ii) Regression (iii) Co-efficient of correlation (iv) Lines of Regression and (v) Regression co-efficient. 2. Find the correlation co-efficient between and from the given data:  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 78 | 89 | 97 | 69 | 59 | 79 | 68 | 57 | |  | 125 | 137 | 156 | 112 | 107 | 138 | 123 | 108 | |
| **12.** | 1. Ten people of various heights as given below were requested to read the letters on a car at 25 yards distance. The number of letters correctly read is given below:      |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Height (in feet) | 5.1 | 5.3 | 5.6 | 5.7 | 5.8 | 5.9 | 5.10 | 5.11 | 6.0 | 6.1 | | No. of letters | 11 | 17 | 19 | 14 | 8 | 15 | 20 | 6 | 8 | 12 |   Is there any correlation between heights and visual power?   1. Calculate the correlation co-efficient for the following heights in inches of fathers (X) and their sons (Y).  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 65 | 66 | 67 | 67 | 68 | 69 | 70 | 72 | |  | 67 | 68 | 65 | 68 | 72 | 72 | 69 | 71 | |
| **13.** | 1. Establish the formula . Hence calculate *r* from the following data:  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | X | 21 | 23 | 30 | 54 | 57 | 58 | 72 | 78 | 87 | 90 | | Y | 60 | 71 | 72 | 83 | 110 | 84 | 100 | 92 | 113 | 135 |  1. Find the co-efficient of correlation between industrial production and export using the following data and comment on the result.  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Production (in crore tons) | 55 | 56 | 58 | 59 | 60 | 60 | 62 | | Exports(in crore tons) | 35 | 38 | 38 | 39 | 44 | 43 | 45 | |
| **14.** | 1. Find the correlation coefficient and the regression lines of y and x and x on y for the following data:  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | X | 2 | 4 | 6 | 8 | 10 | | Y | 5 | 7 | 9 | 8 | 11 |      1. Find the correlation co-efficient and the equations of regression lines for the following values of and :  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | |  | 2 | 5 | 3 | 8 | 7 | |
| **15.** | 1. Find the correlation co-efficient between and for the given values. Find also the two regression lines.  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | |  | 10 | 12 | 16 | 28 | 25 | 36 | 41 | 49 | 40 | 50 |  1. The following results were obtained from records of age(x) and blood pressure (y) of a group of 10 men:  |  |  |  | | --- | --- | --- | | - |  |  | | Mean | 53 | 142 | | Variance | 130 | 165 |   and Find the appropriate regression equation and use it  to estimate the blood pressure of a man whose age is 45 |
| **16.** | 1. In the following table are recorded data showing the test scores made by salesman on an intelligence test and their weekly sales. Calculate the regression line of sales on test scores and estimate the most probable weekly sales volume if a salesman makes a score of 70  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Salesman | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | Test scores | 40 | 70 | 50 | 60 | 80 | 50 | 90 | 40 | 60 | 60 | | Sales(000) | 2.5 | 6.0 | 4.5 | 5.0 | 4.5 | 2.0 | 5.5 | 3.0 | 4.5 | 3.0 |      1. The two regression equations of the variables *x* and *y* are and . Find (i) mean of *x’*s, (ii) mean of *y’*s and (iii) the correlation coefficient between *x* and *y*. |
| **17.** | 1. Obtain the lines of regression and hence find the co-efficient of correlation for the data:  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 1 | 3 | 4 | 2 | 5 | 8 | 9 | 10 | 13 | 15 | |  | 8 | 6 | 10 | 8 | 12 | 16 | 16 | 10 | 32 | 32 |  1. The following data gives the age of husband () and the age of wife () in years. Form the two regression lines and calculate the age of husband corresponding to 16 years age of wife.  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | 36 | 23 | 27 | 28 | 28 | 29 | 30 | 31 | 33 | 35 | |  | 29 | 18 | 20 | 22 | 27 | 21 | 29 | 27 | 29 | 28 | |
| **18.** | 1. Find two lines of regression and coefficient of correlation for the given data below: 2. In a partially destroyed laboratory data, only the equations giving the two lines of regression of *y* on *x* and *x* on *y* are available and are respectively, , . Calculate the coefficient of correlation, and |
| **19.** | 1. Compute the correlation coefficient and the equation of the lines of regression for the following data:  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | *X* | 77 | 54 | 27 | 52 | 14 | 35 | 90 | 25 | 56 | 60 | | Y | 35 | 58 | 60 | 40 | 50 | 40 | 35 | 56 | 34 | 42 |  1. Calculate the co-efficient of correlation between age of cars and annual maintenance cost and comment:  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | Age of cars (years) | 17 | 18 | 19 | 19 | 20 | 20 | 21 | | annual maintenance cost (Rupees) | 12 | 16 | 14 | 11 | 15 | 19 | 22 | |
| **20.** | 1. Two random variables have the regression lines with equations and Find the mean values and the correlation coefficient between x and y. 2. Compute the correlation coefficient and the equation of the lines of regression for the following data:  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | *x* | 80 | 45 | 55 | 56 | 58 | 60 | 65 | 68 | 70 | 75 | | y | 82 | 56 | 50 | 48 | 60 | 62 | 64 | 65 | 70 | 74 | |