***Instructions:***

* *All Questions carry equal marks.*
* *All Questions are compulsory*
* *All answers to be explained in not more than 1000 words for question 1 and 2 and for question 3 in not more than 500 words for each subsection. Use relevant examples, illustrations as far as possible.*
* *All answers to be written individually. Discussion and group work is not advisable.*
* *Students are free to refer to any books/reference material/website/internet for attempting their assignments, but are not allowed to copy the matter as it is from the source of reference.*
* *Students should write the assignment in their own words. Copying of assignments from other students is not allowed*
* *Students should follow the following parameter for answering the assignment questions*

|  |  |
| --- | --- |
| **For Theoretical Answer** | |
| **Assessment Parameter** | **Weightage** |
| Introduction | 20% |
| Concepts and Application  related to the question | *60%* |
| Conclusion | *20%* |

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| --- | --- |
| **For Numerical Answer** | |
| **Assessment Parameter** | **Weightage** |
| Understanding and usage  of the formula | 20% |
| Procedure / Steps | *50%* |
| Correct Answer &  Interpretation | *30%* |

Data Set: Sample of 7 different species of fish has been taken and their weight in grams, lengths (vertical, diagonal, cross given as length 1, length 2 and length 3 respectively), height and width in cm is given below:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Species | Weight | Length1 | Length2 | Length3 | Height | Width |
| Bream | 725 | 31.8 | 35 | 40.9 | 16.36 | 6.0532 |
| Bream | 720 | 32 | 35 | 40.6 | 16.3618 | 6.09 |
| Bream | 714 | 32.7 | 36 | 41.5 | 16.517 | 5.8515 |

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| --- | --- | --- | --- | --- | --- | --- |
| Bream | 850 | 32.8 | 36 | 41.6 | 16.8896 | 6.1984 |
| Bream | 1000 | 33.5 | 37 | 42.6 | 18.957 | 6.603 |
| Bream | 920 | 35 | 38.5 | 44.1 | 18.0369 | 6.3063 |
| Bream | 955 | 35 | 38.5 | 44 | 18.084 | 6.292 |
| Bream | 925 | 36.2 | 39.5 | 45.3 | 18.7542 | 6.7497 |
| Bream | 975 | 37.4 | 41 | 45.9 | 18.6354 | 6.7473 |
| Bream | 950 | 38 | 41 | 46.5 | 17.6235 | 6.3705 |
| Roach | 0 | 19 | 20.5 | 22.8 | 6.4752 | 3.3516 |
| Roach | 110 | 19.1 | 20.8 | 23.1 | 6.1677 | 3.3957 |
| Roach | 120 | 19.4 | 21 | 23.7 | 6.1146 | 3.2943 |
| Roach | 150 | 20.4 | 22 | 24.7 | 5.8045 | 3.7544 |
| Roach | 145 | 20.5 | 22 | 24.3 | 6.6339 | 3.5478 |
| Roach | 160 | 20.5 | 22.5 | 25.3 | 7.0334 | 3.8203 |
| Roach | 140 | 21 | 22.5 | 25 | 6.55 | 3.325 |
| Roach | 160 | 21.1 | 22.5 | 25 | 6.4 | 3.8 |
| Roach | 169 | 22 | 24 | 27.2 | 7.5344 | 3.8352 |
| Roach | 161 | 22 | 23.4 | 26.7 | 6.9153 | 3.6312 |
| Roach | 200 | 22.1 | 23.5 | 26.8 | 7.3968 | 4.1272 |
| Roach | 180 | 23.6 | 25.2 | 27.9 | 7.0866 | 3.906 |
| Roach | 290 | 24 | 26 | 29.2 | 8.8768 | 4.4968 |
| Roach | 272 | 25 | 27 | 30.6 | 8.568 | 4.7736 |
| Roach | 390 | 29.5 | 31.7 | 35 | 9.485 | 5.355 |
| Whitefish | 270 | 23.6 | 26 | 28.7 | 8.3804 | 4.2476 |
| Whitefish | 270 | 24.1 | 26.5 | 29.3 | 8.1454 | 4.2485 |
| Whitefish | 306 | 25.6 | 28 | 30.8 | 8.778 | 4.6816 |
| Whitefish | 540 | 28.5 | 31 | 34 | 10.744 | 6.562 |
| Whitefish | 800 | 33.7 | 36.4 | 39.6 | 11.7612 | 6.5736 |
| Whitefish | 1000 | 37.3 | 40 | 43.5 | 12.354 | 6.525 |
| Parkki | 55 | 13.5 | 14.7 | 16.5 | 6.8475 | 2.3265 |
| Parkki | 60 | 14.3 | 15.5 | 17.4 | 6.5772 | 2.3142 |
| Parkki | 90 | 16.3 | 17.7 | 19.8 | 7.4052 | 2.673 |
| Parkki | 120 | 17.5 | 19 | 21.3 | 8.3922 | 2.9181 |
| Parkki | 150 | 18.4 | 20 | 22.4 | 8.8928 | 3.2928 |
| Parkki | 140 | 19 | 20.7 | 23.2 | 8.5376 | 3.2944 |
| Parkki | 170 | 19 | 20.7 | 23.2 | 9.396 | 3.4104 |
| Parkki | 145 | 19.8 | 21.5 | 24.1 | 9.7364 | 3.1571 |
| Parkki | 200 | 21.2 | 23 | 25.8 | 10.3458 | 3.6636 |
| Parkki | 273 | 23 | 25 | 28 | 11.088 | 4.144 |
| Parkki | 300 | 24 | 26 | 29 | 11.368 | 4.234 |

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| --- | --- | --- | --- | --- | --- | --- |
| Perch | 5.9 | 7.5 | 8.4 | 8.8 | 2.112 | 1.408 |
| Perch | 32 | 12.5 | 13.7 | 14.7 | 3.528 | 1.9992 |
| Perch | 40 | 13.8 | 15 | 16 | 3.824 | 2.432 |
| Perch | 51.5 | 15 | 16.2 | 17.2 | 4.5924 | 2.6316 |
| Perch | 70 | 15.7 | 17.4 | 18.5 | 4.588 | 2.9415 |
| Perch | 100 | 16.2 | 18 | 19.2 | 5.2224 | 3.3216 |
| Perch | 78 | 16.8 | 18.7 | 19.4 | 5.1992 | 3.1234 |
| Perch | 80 | 17.2 | 19 | 20.2 | 5.6358 | 3.0502 |
| Perch | 85 | 17.8 | 19.6 | 20.8 | 5.1376 | 3.0368 |
| Perch | 85 | 18.2 | 20 | 21 | 5.082 | 2.772 |
| Perch | 110 | 19 | 21 | 22.5 | 5.6925 | 3.555 |
| Pike | 430 | 35.5 | 38 | 40.5 | 7.29 | 4.5765 |
| Pike | 345 | 36 | 38.5 | 41 | 6.396 | 3.977 |
| Pike | 456 | 40 | 42.5 | 45.5 | 7.28 | 4.3225 |
| Pike | 510 | 40 | 42.5 | 45.5 | 6.825 | 4.459 |
| Pike | 540 | 40.1 | 43 | 45.8 | 7.786 | 5.1296 |
| Pike | 500 | 42 | 45 | 48 | 6.96 | 4.896 |
| Pike | 567 | 43.2 | 46 | 48.7 | 7.792 | 4.87 |
| Pike | 770 | 44.8 | 48 | 51.2 | 7.68 | 5.376 |
| Pike | 950 | 48.3 | 51.7 | 55.1 | 8.9262 | 6.1712 |
| Pike | 1250 | 52 | 56 | 59.7 | 10.6863 | 6.9849 |
| Smelt | 6.7 | 9.3 | 9.8 | 10.8 | 1.7388 | 1.0476 |
| Smelt | 7.5 | 10 | 10.5 | 11.6 | 1.972 | 1.16 |
| Smelt | 7 | 10.1 | 10.6 | 11.6 | 1.7284 | 1.1484 |
| Smelt | 9.7 | 10.4 | 11 | 12 | 2.196 | 1.38 |
| Smelt | 9.8 | 10.7 | 11.2 | 12.4 | 2.0832 | 1.2772 |
| Smelt | 8.7 | 10.8 | 11.3 | 12.6 | 1.9782 | 1.2852 |
| Smelt | 10 | 11.3 | 11.8 | 13.1 | 2.2139 | 1.2838 |
| Smelt | 9.9 | 11.3 | 11.8 | 13.1 | 2.2139 | 1.1659 |
| Smelt | 9.8 | 11.4 | 12 | 13.2 | 2.2044 | 1.1484 |
| Smelt | 12.2 | 11.5 | 12.2 | 13.4 | 2.0904 | 1.3936 |

Q-1:

1. Find the mean and standard deviation for each type of fish for every variable.
2. If you need to choose a fish on the basis of weight, which fish you choose?
3. Find mean, median, quartiles for the entire data set for each variable.

# (10 Marks)

Q-2: Regress the following:

1. Taking weight as dependent variable and height as independent variable. Is variable is found to be significant?
2. Taking weight as dependent variable and width as independent variable. Is variable is found to be significant?
3. Taking weight as dependent variable and length1, length 2 and length 3 as independent variable. Are variables is found to be significant? Which variable is not significant?
4. Taking weight as dependent variable and height, width, length 1, length 2 and length 3 as independent variable.
5. On basis of adjusted R square compare the model of part a, b, c and d. which model is best to predict weight?

# (10 Marks)

Q-3 The daily COVID 19 cases (in hundred) for Delhi for past 2 week is summarize in the following table:

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Cases | 28 | 29 | 33 | 31 | 37 | 34 | 36 | 43 | 41 | 32 | 34 | 37 | 39 | 32 |

1. Using exponential smoothing method forecast the cases for 15 days, taking alpha as 0.3 and Initial forecast is the average of all data.

# (5 Marks)

1. Using linear trend analysis, find the trend line for number of COVID 19 cases in Delhi and forecast for next 3 days. Also compute the Mean Square Error.

# (5 Marks)

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