

**M.Sc. ENVIRONMENTAL SCIENCE**  
**Third Semester**  
**STATISTICAL TECHNIQUES**  
**(MEV - 302)**

**Duration: 3Hrs.**

**Full Marks: 70**

Part-A (Objective) =20  
Part-B (Descriptive) =50

**(PART-B: Descriptive)**

**Duration: 2 hrs. 40 mins.**

**Marks: 50**

**Answer any four from Question no. 2 to 8**  
**Question no. 1 is compulsory.**

1. Define statistics. Mention its types and variables with proper examples. (2+8=10)
2. Mention about types of correlation. The annual training expenditure (lakhs of rupees) and the corresponding labour productivity index (0-100) for the past 8 years of a country are presented below-

Year(i)	Annual training expenditure( $X_i$ )	Productivity index( $Y_i$ )
1	5	80
2	7	90
3	9	75
4	10	85
5	12	95
6	15	70
7	18	95
8	20	60

Find the correlation coefficient between  $X_i$  and  $Y_i$  after Pearson's product moment formula. (5+5=10)

3. The heights of different dogs (at the shoulders) are: 600mm, 470mm, 170mm, 430mm and 300mm. Find out the Mean, the Variance, and the Standard Deviation. (3+4+3=10)
4. In an assessment, two samples of students from two regions of same distance learning institute from same variance gave the following results:

Sample	Size	Sample variance	Significance level( $\alpha$ )
1( $n_1$ )	10	64( $S_1^2$ )	0.05
2( $n_2$ )	15	40( $S_2^2$ )	

Find out calculated F ratio and check that calculated F ratio is more than table F value. (The tabulated value of F at 0.05 level for 9 and 14 degree of freedom is  $F_{0.05}=2.65$ ). (8+2=10)

5. Define probability. Explain three important terminologies of probability. Mention about various approaches to probability. (2+3+5=10)
6. Classify statistical measures and put forward proper definition for each. Give support of examples. (10)
7. Define factor analysis. Write steps of Principal Component Analysis (PCA). (2+8=10)
8. Department of Earth Science has deputed four different batches of its students to four different training programmes (A, B, C and D) to improve their communication skills. Each batch contained five students with similar qualification background. After the training programme the department conducted a common examination to test their improvement. The percentage scores are summarized in the following table:

A	B	C	D
80	70	65	90
90	60	50	89
96	55	58	85
85	85	55	95
70	90	40	80

Perform ANOVA to check whether there is a significant difference in terms of improving communication skills of students by assuming a significance level of 0.05. (10)

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**Duration: 20 minutes**

**Marks – 20**

**(PART A - Objective Type)**

**I. Choose the correct answer:**

**1×20=20**

1. Find the geometric mean of 2 and 18.  
i) 6                      ii) 8                      iii) 12                      iv) 16
2. When the measure of skewness is 0, it is called-  
i) Positive skewness                      ii) Negative skewness  
iii) Bell shaped                      iv) Symmetrical
3. If group has value 10,12,16,25,30, the range is-  
i) 10                      ii) 20                      iii) 25                      iv) 30
4. If A-addition, S-subtraction, M-multiplication and D-division then  $10D5S14D2A9M1=?$   
i) 2                      ii) 3                      iii) 4                      iv) 5
5. Relation between two variables is determined by-  
i) Dispersion                      ii) Mean  
iii) Correlation                      iv) Regression
6. A man proceeding to the north turns to the right, after sometime he takes a turn to the left and again to the left, then he goes to right and after some distance again turns towards his right. The direction in which he is moving now is-  
i) East                      ii) North                      iii) South                      iv) West
7. If average deviation is 105, and mean is 210, then Coefficient of AD is-  
i) 1.0                      ii) 0.5                      iii) .99                      iv) 0.7
8.  $Q_3 - Q_1 / Q_3 + Q_1$ , is-  
i) Coefficient of range                      ii) Coefficient of variation  
iii) Coefficient of quartile deviation                      iv) Coefficient of mean
9. Which is not a measure of central tendency?  
i) Weighted mean                      ii) Standard deviation  
iii) Geometric mean                      iv) Arithmetic mean
10. Median is a-  
i) Positional average                      ii) Mathematical average  
iii) Both i and ii                      iv) None of these

11. 25% of 25% of a quantity is x% of the quantity where x is-  
i) 6.25%                      ii) 12.5%                      iii) 25%                      iv) 50%
12. A coefficient of correlation is computed to be -0.95 means that-  
i) Relation is weak                      ii) Relation is strong and positive  
iii) Relation is strong but negative                      iv) No relation
13. Mean deviation, Variance and Standard Deviation of the values 4,4,4,4,4,4 is-  
i) 4                      ii) 8                      iii) 2                      iv) 0
14. In statistics, a sample means-  
i) A portion of the sample                      ii) A portion of the population  
iii) All items under investigation                      iv) None of the above
15. The weights of students in a college is a-  
i) Discrete variable                      ii) Continuous variable  
iii) Qualitative variable                      iv) None of these
16. Number of outcomes of a dice when rolled a few times is-  
i) Experiment                      ii) Event  
iii) Sample space                      iv) Trial
17. The middle value of an ordered array of numbers is the-  
i) Mode                      ii) Mean  
iii) Median                      iv) Mid-point
18. The mean of a distribution is 23, the median is 24 and mode is 25.5. The distribution is-  
i) Positively skewed                      ii) Symmetrical  
iii) Asymptotic                      iv) Negatively skewed
19. If mean is 25 and standard deviation is 5 then C.V. is-  
i) 25%                      ii) 100%                      iii) 75%                      iv) 20%
20. If in a certain language PUNCTUAL is coded as 16598623, how would ACTUPULN be coded?  
i) 834536                      ii) 29861635                      iii) 834530                      iv) 834539