INDIA METEOROLOGICAL DEPARTMENT

QUESTION BANK

OF

ADVANCED METEOROLOGICAL TRAINING COURSE (AMTC)

SEMESTER-II EXAMINATION

BASED ON 176-181 BATCHES

(2015-2021)

PAPER-VII: ADVANCED STATISTICS

PART A

India Meteorological Department
Meteorological Training Institute
Advanced Meteorological Training Course,
SEMESTER- II Final Examination
ADVANCED STATISTICS

PAPER VII : Advanced Statistics PART- A

Q.1 Fill in the blanks.

1. Classical Harmonic Analysis is based on the premise that time series are based on _____ number of oscillations each with _____ wavelength.
2. In EOF Analysis the eigenvalues of a symmetric matrix are a measure of _____ by each EOF .
3. Major components of a time series are _____ & _____.
4. Power Spectrum Analysis assumes that a time series consists virtually _____ number of small oscillations spanning _____ distribution.
5. Simple Correlation Analysis determines the relation between two _____ quantities, whereas canonical correlation analysis determines the relation between two _____ quantities.
6. The measure of similarity between maps by the k-means clustering method is _____ .
7. The measure of similarity between maps for the MM-method is _____ .
8. The measure of similarity between meteorological patterns by the k-means clustering method is _____ _____.
9. The significance difference between two means for small / large samples can be tested by _____ / _____ .
10. Wavelet analysis determines the dominant modes of _____ variability and how these modes vary in _____ .

Q.2. Answer in brief

1. Computational steps for Spectrum Analysis (no equations required)
2. Describe the mathematical procedure to classify maps by (i) the Map-to-Map Correlation Method **OR** (ii) the k-means clustering method .
3. Difference between Low Pass Filters and Band Pass Filters correlation analysis?
4. During a 120-day period it rained on 40 days. What is the probability of a non-rainy day?
5. Empirical Orthogonal Functions
6. Explain extraction of Extreme Value Data set by the method of Block Maximum Statistics
7. Explain False Alarm Rate and Hit Rate
8. Explain in brief a Stochastic Weather Generator.
9. Explain in brief the method to compute EOFs .
10. Explain Quartiles, Deciles and Percentiles
11. Explain the k-means Clustering method
12. Extracting Intrinsic Mode Functions by the method of Empirical Mode Decomposition
13. How are eigenvectors, eigenvalues related with Empirical Orthogonal Functions?
14. How is LDA closely related to Principal Component Analysis (PCA) and Factor Analysis (FA)?
15. How is Linear Discriminant Analysis related Principal Component Analysis?
16. In a partially destroyed data record of analysis of correlation between two variables x &y, the following results were only legible. [Variance of x=9; Reg line of y on x = 8x-10y+66=0 ; Reg line of x on y = 40x -18y =214] Determine : (i) mean value of x & y, (ii) Correlation coefficients between x & y, (iii) Standard deviation of y, (iv) Can we

assume the first equation to be the regression line of x on y, and the second equation as y on x ? Justify your answer .

17. Intrinsic Mode Functions / Empirical Mode Decomposition
18. k-means clustering method
19. k-means clustering method or a method for Self Organizing Maps (SOMs)
20. Method / approach for Spectrum Analysis (No equations needed).
21. Power Spectrum Analysis
22. Principle Component analysis
23. Relative Operating Characteristic (ROC) is a plot between which two quantities?
24. Self Organizing Maps / k-means clustering method
25. Stepwise Multiple Regression Analysis
26. Stepwise Multivariate Regression analysis
27. What are Intrinsic Mode Functions?
28. What are Moving Averages?
29. What are scatter plots?
30. What are similarities and differences between chi-square test and log-linear analysis?
31. What are the advantages of Empirical Mode Decomposition to Fourier Analysis?
32. What are the measures of Good-ness of fit in case of Regression Analysis?
33. What are the measures of similarity between spatial patterns for the Map-to-Map Correlation Method and the k-means clustering method?
34. What are the similarities and differences between chi-square test and log-linear analysis?
35. What are Weather Generators?

36. What do you understand about Weather Generators?
37. What do you understand by Empirical Orthogonal Functions and the related eigenvalues and the eigenvectors in meteorology?
38. What do you understand by Linear Discriminant Analysis (LDA) ?
39. What do you understand by Weather Generators?
40. What is Artificial Neural Network?
41. What is Brier Score?
42. What is Forecast Skill?
43. What is the advantage of Wavelet analysis over Spectrum analysis?
44. What is the difference between Canonical Correlation Analysis and Multivariate Regression Analysis?
45. What is the difference between eigenvalues and eigenvectors?
46. What is the difference between Empirical Orthogonal Function Analysis and Empirical Mode Decomposition?
47. What is the difference between Empirical Orthogonal Functions (EOFs) and Extended EOFs?
48. What is the difference between Empirical Orthogonal Functions and Intrinsic Mode Functions?
49. What is the difference between Harmonic Analysis and Wavelet Analysis?
50. What is the difference between Linear Discriminant Analysis and Principal Components Analysis?
51. What is the difference between Log-linear Analysis and Chi-square test?
52. What is the difference between Low pass filters and Band pass filters?

53. What is the difference between simple and multiple regression analysis?
54. What is the difference between simple correlation analysis and canonical correlation analysis?
55. What is the difference between simple correlation analysis and canonical What is the difference between ch-square test and log-linear analysis?
56. What is the difference between simple correlation analysis and multiple correlation analysis?
57. What is the difference between simple linear correlation analysis and canonical correlation analysis?
58. What is the difference between simple linear regression equation and a multiple linear regression equation?
59. What is the difference between Spectrum Analysis and Empirical Mode Decomposition?
60. What is the difference between Spectrum Analysis and Harmonic Analysis ?
61. What is the difference between Wavelet Analysis and Spectrum Analysis?
62. What is the measure of similarity between meteorological patterns by the k-means clustering method?
63. What is the measure of similarity between patterns for the k-means clustering method?
64. What is the relation between the two regression coefficients bxy and byx?
65. What is the similarity and difference between chi-square test and log-linear analysis?
66. Write a short note on Artificial Neural Network.