M.Phil 1st Semester Examination, 2019

EARTH SYSTEM SCIENCE

(*Advance Statistics for Geospatial Analysis*)

PAPER —ESS-112

Full Marks : 50

Time : 2 hours

Answer any **four** questions

The figures in the right-hand margin indicate marks

Candidates are required to give their answers in their own words as far as practicable

Illustrate the answers wherever necessary

1.   (*i*)   Define with example Discrete and Continuous variables.

     (*ii*) What are sample and sampling ?

(iii) How many samples do we need (a) Based on binomial probability theory and (b) Based on multinomial probability theory? $2 + 3 + 5$

2. (i) Compute the RMSE for the following data

Observed : 1·6, 1·9, 2·1, 3·6, 4·26, 4·49
Predicted : 1·6, 1·85, 2·2, 3·6, 4·28, 4·49

(ii) Should dependent variable of binary logistic regression be the matric data with two class or continuous data?

(iii) Write a descriptive note on krigging and co-krigging. $4 + 1 + 5$

3. (i) Explain concept of Principal Component Analysis and its uses.

(ii) In a bivariant observations of X_1 and X_2, Variance $X_1 = 20·3$ and Variance $X_2 = 24·1$; and Covariance is 15.6. Prove that first and second eigenvalues are 37·9 and 6·5 respectively; and first and second eigenvectors are :

$$I = \begin{vmatrix} 0·66 \\ 0·75 \end{vmatrix} \quad II = \begin{vmatrix} 0·75 \\ -0·66 \end{vmatrix} \qquad 2 + 8$$

　　　　　　　　　(*Continued*)

4. (i) What are different possible criteria for minimization of deviations from a fitted line ? Explain with proper sketch.

(ii) Define and derive Goodness of Fit for a line $\hat{Y}_i = b_0 + b_1 X_i$, where, $\hat{Y}_i$ id the estimated value of Y_i at specific values of X_i. 5 + 5

5. (i) How the spatial interpolation methods were applied to create Bioclim data ?

(ii) Compute the value of P using 4, 8, 12 nearest neighbours using IDW : 5 + 5
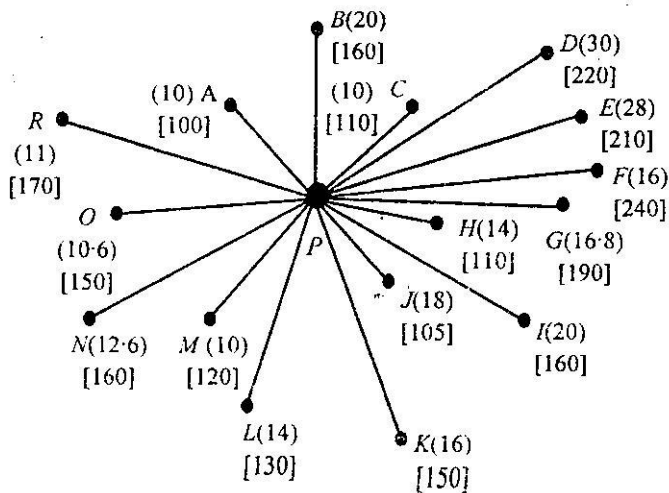
6. (*i*) Explain with example the concept of Null Hypothesis and Alternate Hypothesis.

(*ii*) Define Path Analysis. What are prerequisites for conducting path analysis. Explain limitations of path analysis.   2 + 8

7. Discuss very briefly about the application of Remote Sensing and GIS in Geoscience research. 10

8. Discuss very briefly about spatial data generation using various types of aerospace data.   10

9. Assignment Writing (to be submitted by the candidates before examination) :   10

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