# M.Sc. 2nd Semester Examination, 2010

## REMOTE SENSING & GIS

PAPER—VIII

*Full Marks* : 40

*Time* : 2 hours

*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*

**Write the answers of questions for each Module in separate books**

RG—1207

(*Fundamental of Statistical Concepts and Geo-statistics*)

[ *Marks* : 20 ]

Answer any **two** questions : $10 \times 2$

1. (*a*) The data given below are the average temperature recorded fortnightly in a place throughout the year. Prepare a frequency distribution table from it where the lower limit of the first class and width of the classes would be 10 and 5 respectively :

| | | | | | |
|---|---|---|---|---|---|
| 36 | 24 | 19 | 30 | 45 | 42 |
| 15 | 10 | 12 | 10 | 40 | 25 |
| 20 | 35 | 30 | 39 | 45 | 10 |
| 15 | 20 | 28 | 38 | 41 | 23 |

(*b*) Average temparature recorded for the month of April and May, 2010 in a district were $38^{\circ}$ C and $42^{\circ}$C respectively. Calculate combined average temparature of the district for the month of April and May, 2010 put together.

(*c*) Average rainfall in the year 2009 recorded in City A was 160 mm and in City B it was 140 mm and their variance are 81 and 100 respectively. State in which city variability of rainfall is greater and why ? $4 + 3 + 3$

2. Average depth of tube-well (in feet) collected by two researchers in five study areas are given below :

| | Study Area | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | Total |
| Researcher *A* | 70 | 120 | 140 | 85 | 105 | 520 |
| Researcher *B* | 85 | 110 | 120 | 75 | 110 | 500 |
| Total | 155 | 230 | 260 | 160 | 215 | 1020 |

On the basis of the data can it be concluded that the sampling techniques adopted by two researchers are significantly different? (Given 5% value of $\chi^2$ for 4 d.f. and 5 d.f. are 9·49 and 11·07 respectively). 10

3. Define "Errors in statistics". Discuss with examples the 'sampling' and 'non-sampling' errors related to RS & GIS. 3 + 7

4. Calculate coefficient of correlation from the following figures relating to the density of population and death rate in six cities : 10

| Density of population (per sq. miles) | Death rate ('000) |
|---|---|
| 200 | 10 |
| 500 | 16 |
| 400 | 14 |
| 700 | 20 |
| 600 | 17 |
| 300 | 13 |

## RG–1208

*(Spatial Geostatistics and Statistical Applications in GIS)*

[ *Marks* : 20 ]

Answer any **two** questions : $10 \times 2$

1. Explain the utility of Nearest Neighbour Analysis. Calculate the average nearest neighbour distance ($\overline{de}$) and nearest neighbour statistic (Rn) from the

table below to explain the nature of clustering/ dispersion. Also calculate the standard error of mean distance ($SE_{\bar{d}}$). 3 + 3 + 2 + 2

| Sl. no. of settlement | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| Nearest Neighbour | 2 | 1 | 4 | 3 | 9 | 8 | 6 | 6 | 5 |
| Nearest Neighbour distance (km) | 1 | 1 | 1·2 | 1·2 | 1·5 | 1·1 | 1·2 | 1·1 | 1·5 |

2. The data given below show the rainfall and yield of crop/acre.

| Rainfall (cm) | 150 | 200 | 250 | 300 | 350 | 400 | 450 |
|---|---|---|---|---|---|---|---|
| Yield (quintal) | 8 | 10 | 15 | 18 | 22 | 20 | 7 |

Fit a straight line to the above data and estimate the amount of yield when rainfall is 325 cm. 8 + 2

3. How the concept of population potential is related to the migration principle of Ravenstein. Calculate

the population potential of the following P.S from their total population and distance between them. 2 + 8

| P. S. → | | 1. | 2. | 3. | 4. | 5. | 6. |
|---|---|---|---|---|---|---|---|
| ↓ | Population | 5642 | 21812 | 22030 | 17870 | 113768 | 21824 |
| 1. | | 9·06 | 55 | 54·3 | 18·1 | 25 | 6·25 |
| 2. | | 55 | 2·8 | 5·6 | 72·5 | 37·5 | 65·6 |
| 3. | Distance (km) | 54·3 | 5·6 | 2·8 | 71·8 | 35·6 | 61·8 |
| 4. | | 18·1 | 72·5 | 71·8 | 9·06 | 40 | 38·1 |
| 5. | | 25 | 37·5 | 35·6 | 40 | 12·5 | 28·7 |
| 6. | | 36·2 | 65·6 | 61·8 | 38·1 | 28·7 | 14·3 |

4. Explain with an example how 'Z'-score analysis helps to compare more than one set of statistical data. Why *Z*-score is unit free? How we can locate the mean centre of population of a region? What is the significance of temporal shift of mean centre of population? 4 + 1 + 4 + 1