5. (a) What types of censoring are encountered in environmental data for pollutant concentrations and ecological measurements?

   (b) Describe the five steps involved in Monte Carlo methods for Risk Assessment. Give any four principles for Monte Carlo Risk assessment as outlined by USEPA. (9+9=18)

6. Write short notes on the following :

   (a) Environmental Monitoring using ANOVA

   (b) Extra Sum of Squares in Regression Analysis

   (c) Point transect sampling (3×6=18)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 1259 **I**

Unique Paper Code : 2373010007

Name of the Paper : DSE : Environmental Statistics

Name of the Course : **B.Sc. (Hons) Statistics (NEP-UGCF)**

Semester : V

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Question No. **1** is compulsory.
4. Simple non programmable calculators are allowed.

1. (a) What do you mean by Baseline studies in Environmental Science. Give an example.

   (b) Name any three methods used for sampling in the wild.

   (c) Explain what do you mean by margin of error in sample size determination?

   (d) What do you mean by recapture sampling? Explain with an example.

   (e) Explain the rotating panel design with augmentation for long-term environmental monitoring with an example.

   (f) What is adaptive sampling with regards to environmental studies? Give an example.

   (3×6=18)

2. (a) Despite large amounts of money spent on them, the Exon Valdez oil spill on the coastal habitat of Alaska failed to produce the desired result. Discuss in detail the issues related to sampling design in these studies.

   (b) Explain Ranked Set Sampling with an example.

   (9+9=18)

3. (a) Define Quadrat Sampling. What are the steps to determine the distribution patterns in Quadrat Sampling using Variance to Mean Ratio Method?

   (b) Derive the Petersen estimator for estimating population size in recapture sampling, stating assumption(s) clearly. Why is the estimator biased? Give the bias corrected version of this estimator. What is it called? (9+9=18)

4. (a) Describe the Mantel Randomization Test for measuring and analyzing spatial correlation in environmental data.

   (b) Given a dataset containing daily average PM2.5 levels (in$\mu g/m^3$) over a 15 day period, calculate the autocorrelation for lags 1 and 2. What do these autocorrelation values indicate about the relationship between PM2.5 levels on consecutive days? Additionally, interpret the significance of the results in the context of air quality monitoring.

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
PM 2.5 level (in$\mu g/m^3$)	35	40	38	45	50	60	55	70	68	65	55	52	50	48	45