Exam. Code : 210002
Subject Code : 8441

M.Sc. (Botany) Semester—II

LOTC–526 : ECOLOGICAL MODELLING AND REMOTE SENSING

Time Allowed—3 Hours] [Maximum Marks—50

Note :— All sections are mandatory. Use of calculators is permitted

SECTION—A

Note :— Each part of the question carries 1 mark. Answer to any part should not exceed 4 lines. (8 marks)

Assume a forest ecosystem that has various populations of producers and consumers, where dispersal of individuals of *Rhesus macaque* was observed. Answer the following :

(i) Define dispersal.

(ii) What is the difference between dispersion and dispersal ?

(iii) Explain different patterns of dispersion that can be expected in a population.

(iv) Distinguish between immigration and emigration.

(v) How intra-specific interactions vary from inter-specific interactions ?

(vi) How can you quantify the species diversity in the ecosystem ?

(vii) Plants in any terrestrial ecosystem absorb, transform, and store energy. What is the difference between Gross Primary Production and Net Primary Production of the system.

(viii) The forest was declared as Biosphere Reserve as an initiative to protect the biodiversity in the region. How do you think this will affect the human activity in the area ?

SECTION—B

Note :— Attempt any SEVEN questions. Each question carries **3** marks. Answer to any of the questions should not exceed **2** pages. (21 marks)

1. Ten plants of species A were planted five years ago in a plot X where the potential damage by herbivores was negligible. These plants were sampled for their leaf length that was estimated to be 3.5 cm, 5 cm, 4.5 cm, 5.6 cm, 4.9 cm, 7 cm, 5.5 cm, 3.5 cm, 4.5 cm, 6.5 cm. Find out the mean length of leaves in species A at the age of 5 years.

2. Find out the Moristas's index of aggregation for a population of a species with the following observations :

Sample	1	2	3	4	5	6	7	8	9
No. of Individuals	2	4	3	0	1	2	3	5	0

3. Estimate the frequencies expected under Poisson distribution from the following data :

# of ind/Quad	0	1	2	3	4
Observed Freq	56	11	6	6	4

4. From the small dataset given below, estimate the mean height (fts) of species X at the age of Y years. Also calculate the variance, standard deviation and confidence intervals. Interpret your results :

Indi	1	2	3	4	5	6	7	8
Ht	10	15	14	20	13	18	13	14

5. Explain why nutrient cycling is important in any ecosystem.

6. Find out the Brillouin's measure of diversity for a community with number of individuals of different species as follows :

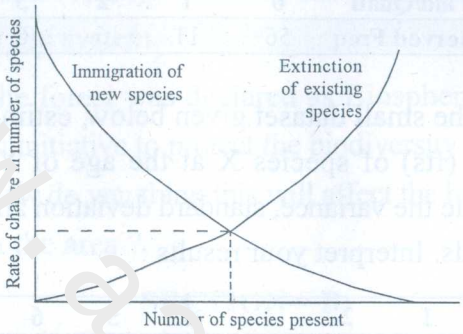
Sp No.	1	2	3	4	5	6
# of ind	2	8	4	1	1	2

7. Draw a population-growth curve.

8. Define biological diversity. Give a brief account of various levels of biodiversity.

9. List the various categories as established by IUCN that have proved to be useful at the national and international levels in marking the status of a species for conservation purposes.

10. Provide your comments on the relationship between colonization and extinction on islands from the following :



SECTION—C

Note :— Attempt any **THREE** questions. Each question carries **7** marks. Answer to any question should not exceed **4** pages. (**21** marks)

1. From the data given below, compute and compare the Simpson's Index with Shannon's index.

Species	Community 1	Community 2	Community 3
Sp A	40	1	0
Sp B	40	1	0
Sp C	40	196	200
Sp D	40	1	0
Sp E	40	1	0

2. Perform the Chi-square test for association between Species A and Species B from the following data :

	Species A present	Species A Absent
Species B present	5	30
Species B absent	25	30

3. Write short notes on the following :

   (a) Water (prevention and control of pollution) Act, 1974

   (b) Air (prevention and control of pollution) Act, 1981

   (c) Environment Protection Act, 1986.

4. Predict the number of species on the islands of size 10, 100, 1000 and 10,000 sq. miles when Z equals 2.5 and C equals one.

5. Discuss the salient features of Digital Image Processing.