

Seat No. : _____

NF-147
December-2015
B.Sc., Sem.-V
CC-305 : Statistics
(EA) – Statistical Ecology

Time : 3 Hours]

[Max. Marks : 100

- Instructions :** (1) **All** questions are compulsory.
(2) **Each** question carries equal marks.
(3) Statistical tables and graph papers will be provided on request.
(4) Use of Scientific calculator is allowed.

1. (a) Explain “Statistical Ecology”. Describe linear growth model, in context to ecology.

OR

Explain in brief. Leslie matrix.

- (b) What is density dependence ? Explain, in details, logistic growth model.

OR

Define Stable and stationary population, force of mortality, cohort, with respect to life tables and state different terms used in life tables.

2. (a) Discuss Capture – Recapture method.

OR

Define Life table. State its uses.

OR

- (b) State interrelationship between different terms of life tables.

OR

Describe exponential growth model.

3. (a) State uses of log normal distribution in ecology, stating one example.

OR

Give brief idea about Poisson forest, quadrature sampling.

- (b) Write a short note on iterative procedure to find maximum likelihood estimator of population size.

OR

Write a note on Simpson's index.

4. (a) What is biodiversity ? What are the measures of protecting biodiversity ?

OR

Write a note on utility of geometric distribution in ecology giving one illustration.

- (b) Explain the procedure of calculating Shannon's index.

OR

What is richness index ?

5. Answer the following :

- (a) State Gompertz's model. State its use.
 - (b) State two applications of life tables.
 - (c) How will you interpret the exponential growth model ?
 - (d) Define nearest neighbour distance and i th order nearest neighbour distance.
 - (e) State Zippin's estimator of closed population.
 - (f) State the role of removal method.
 - (g) Give use of log normal distribution.
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NF-147
December-2015
B.Sc., Sem.-V
CC-305 : Statistics
(EB) – Statistics Using R

Time : 3 Hours]

[Max. Marks : 70

1. (a) Explain R in detail. Also write short note on R preliminaries.

OR

Explain R as a statistical software and calculator.

- (b) The following frequency distribution relates to lives of 400 light bulbs. Write a program for “less than” and “more than” ogive curves on the same graph.

OR

Prepared a frequency distribution for following data using R functions :

62 65 45 58 25 23 65 88 45 47 19 28 29 96 85 96 64 92 34 38 76 98 56 85
 65 91 82 72 76 64 42 38 96 85 41 25 23 68 61 54 72 32 75 26 18 29 18 43
 18 65 68 96 75 82 43 53 83 92 65 37 39 64

2. (a) Following data represent the number of germinating seeds among 10 seeds on damp filter paper for 80 sets of seeds. Fit binomial distribution.

Compute expected frequencies. Plot expected frequencies using R functions.

X	0	1	2	3	4	5	6	7	8	9	10
frequency	6	20	28	12	8	6	0	0	0	0	0

ORFollowing table shows the pmf of number of floods recorded per year at a gauging station in some country. Write a program for rod or spike plot, $F(x)$ and plot $F(x)$ versus x .

X = x	0	1	2	3	4	5	6	7	8
P(x)	0	2/34	6/34	7/34	9/34	4/34	1/34	4/34	1/34

- (b) Write a program to draw a random samples of sizes 20 from
- $N(5, 2)$
- distribution, also find mean and s.d. of the sample.

ORWrite a program in R : Let $n = 20$, $p = 0.1$ compute $p(X = x)$ for $x=0, 1, 2, \dots, n$, using both binomial and Poisson model. Also Prepare table for both $p(x)$ using appropriate function.

3. (a) Draw scatter plots of
- $(X1, Y1)$
- and
- $(X2, Y2)$
- for the following data :

Y1	X1	Y2	X2
8.04	10	9.14	10
6.95	8	8.14	8
7.58	13	8.74	13
8.81	9	8.77	9
8.33	11	9.26	11
9.96	14	8.10	14
7.24	6	6.13	6

OR

The following data pertaining to the growth of a colony of bacteria in a culture medium.

Day since incubation (x)	3	6	9	12	15	18
Bacteria count (y in '000)	115	147	239	356	579	864

Write a program to fit the line of regression of v on x where $v = \log_{10}(y)$, also plot a scatter diagram of (x, v) .

- (b) Compute Pearson's and Spearman's correlation coefficient for the following data :

X	5.12	6.18	6.77	6.65	6.36	5.90	5.48	6.02	10.34	8.51
Y	2.30	2.54	2.95	3.77	4.18	5.31	5.53	8.83	9.48	14.20

OR

The following data pertain to the resistance in (ohms) and the failure times (minutes) of 12 overloaded resistors.

Resistance (x)	43	29	44	33	33	47	34	31	48	34	46	37
Failure time (y)	32	20	45	35	22	46	28	26	37	33	47	30

Obtain a line of regression of y on x and draw the diagnostic plots using R Function.

4. (a) Suppose that during 400 five minutes intervals, the air traffic control of the airport received 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 radio messages with respective frequencies 3, 15, 47, 76, 68, 74, 46, 39, 15, 9, 5, 2, 0, 1. Check whether the Poisson model with $\lambda = 4.6$ fits the data.

OR

Fit Binomial distribution and test goodness of fit for the following data :

X	0	1	2	3	4
F	5	20	45	20	10

- (b) suppose three drying formulas for curing a glue are studied and the following drying times are observed.

Sr. No.	Formula	Observations
1	A	13, 10, 8, 11, 8
2	B	13, 11, 14, 14
3	C	4, 1, 3, 4, 2, 4

Carry out parametric analysis of variance, assuming equality of variances.

OR

- (b) Simulate one random sample each from normal (1, 1) and $\exp(1)$ distribution. Draw box plots and qq normal plots to judge whether the parent population are normal.

5. Answer the following :

- (1) Explain matrix function with example.
- (2) If $X \sim p(\lambda = 3.5)$, find $p(X > 8)$ using R function.
- (3) How to use data frame function in R ?
- (4) Give any two uses of R-software.
- (5) Explain seq function with example.
- (6) If $X \sim B(5, 0.25)$, find $p(X = 8)$ and $P(X > 3)$ using R function.
- (7) 3, 4, 5, 7, 8, 2, 2, 3, 4, 4, 4. Find mode using R function.