

Total No. of Questions : 4]

SEAT No. :

P908

[Total No. of Pages : 6

[5315]-605

T.Y. B.Sc.

STATISTICS (Principal) (Paper - VI)

ST - 346 (A) : Medical Statistics

(2008 Pattern)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:-

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Use of scientific calculator and statistical tables is allowed.*
- 4) *Symbols and abbreviations have their usual meaning.*

Q1) Attempt *each* of the following:

- a) In each of the following cases, choose the correct alternative: **[1 each]**
 - i) The logistic growth equation is called sigmoidal because it is shaped like letter:
A) V
B) Z
C) S
D) σ
 - ii) The relative risk of an event is always
A) Positive
B) Zero
C) Negative
D) A number between zero and one
 - iii) Pharmacodynamics is
A) Absorption of drug in the body
B) Distribution of drug in the body
C) What drug does to the body?
D) What body does with drug?

P.T.O.

- iv) In epidemiology, logit function of probability π is given by
- A) $\ln[(1 - \pi) / \pi]$ B) $\ln[\pi / (1 - \pi)]$
 C) $\ln[\pi(1 - \pi)]$ D) $\ln[\pi / (1 + \pi)]$
- b) In each of the following cases, state whether the given statement is true or false : **[1 each]**
- i) Correlation does not imply causation.
 ii) Humans are used in preclinical trials.
- c) Define the following terms: **[1 each]**
- i) $\pm 20\%$ role for assessment of bioequivalence
 ii) blinding
- d) i) State the role of FDA. **[1]**
 ii) Explain the term efficacy of drug. **[1]**

Q2) Attempt any *two* of the following: **[5 each]**

- a) Explain Mc Nemar's test for testing the hypothesis for symmetry of 2×2 contingency table with help of an illustration.
- b) Explain in brief the discoveries in epidemiology made by the following:
 i) William Harvey
 ii) Florence Nightingale
- c) Derive the equation for sigmoidal growth

Q3) Attempt any *two* of the following: **[5 each]**

- a) Suppose μ_c and μ_T denote the mean responses of two formulations control (C) and test (T) with unknown variance. Explain how you test $H_0: \mu_T = \mu_c$ against $H_1: \mu_T > \mu_c$. Assuming equal sample sizes for both the test groups, find the expression of sample size of each group to get power $1 - \beta$.
- b) Write a short note on 'Parallel design' used in clinical trials.
- c) A survival model is defined by the following values of P_x for a radix of 1,00,000:

Time Units (x)	0	1	2	3	4	5	6
Survival Probability (P_x)	0.95	0.90	0.80	0.50	0.30	0.10	0

Prepare life-table containing columns d_x, q_x, L_x, T_x, e_x .

Q4) Attempt any *one* of the following:

- a) i) Explain in brief Phase IV study in clinical trails. [5]
 ii) Consider the following data on time and concentration for a hypothetical drug. Estimate C_{max} , T_{max} . Also calculate $AUC_{(0,12)}$ [5]

Time	0.25	0.50	0.75	1	2	3	4	6	9	12
Concentration (microgram/ml)	15	12.5	10.5	9	5.9	4.5	3.6	2.4	1.3	0.7

- b) i) Consider the following data on vision grades of two eyes of 7477 women factory workers. Grade 1 represent normal vision and Grade 4 is the weakest vision. Using Bowker test, test whether there is any relation between the grade of left eye and right eye. Use 5% level of significance.

Vision grades of eyes of women workers

Right eye	1	2	3	4
Left eye				
1	1520	266	124	66
2	234	1512	432	78
3	117	362	1772	205
4	36	82	179	492

- ii) Define survival function and write down interpretation of $S(x)$. Also, state the properties of $S(x)$. [5]



Total No. of Questions : 4]

P908

[5315]-605

T.Y. B.Sc.

STATISTICS (Principal) (Paper - VI)

ST - 346 (B) : Statistical Ecology

(2008 Pattern) (Elective - II)

Time : 2 Hours]

[Max. Marks : 40

Instructions to the candidates:-

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of calculator and statistical table is allowed.
- 4) Symbols and abbreviations have their usual meaning.

Q1) Attempt *each* of the following:

- a) Choose the correct alternative in each of the following: [1 each]
- i) An exponential growth is characterized by a steadily _____ growth rate.
A) increasing B) decreasing
C) non - increasing D) non - decreasing
 - ii) The growth of widely diverse organisms can be described by a _____ curve.
A) Sigmoid B) Logistic
C) Gompertz D) Normal
 - iii) In the study of rabbits which of the following model is used?
A) Exponential B) Linear
C) Logistic D) Leslie Matrix
 - iv) The population growth is zero if the intrinsic growth rate λ is
A) 0 B) 1
C) greater than 1 D) less than 1

b) In each of the following, state whether the given statement is true or false: **[1 each]**

- i) Number of species in a community is called species richness.
- ii) In case of a single recapture, Peterson's estimator is also m.l.e. of the population size (N).

c) Define each of the following: **[1 each]**

- i) Gompertz curve
- ii) Stable population

- d) i) Explain the role of a Placebo in clinical trials.
- ii) What is the role of FDA?

[1 each]

Q2) Attempt any two of the following: **[5 each]**

- a) Explain Mc Nemar's test for testing the hypothesis for symmetry of 2×2 contingency table with the help of an illustration.
- b) Write a note on parallel designs used in clinical trials.
- c) For a Gompertz model determine the maximum growth rate.

Q3) Attempt any two of the following: **[5 each]**

- a) In Leslie matrix model state assumptions made, two kinds of parameters, model and its matrix representation.
- b) Explain the concept of point to individual nearest neighbour distance in Poisson forest.
- c) Explain the method of quadrant sampling to estimate the population density in a forest. Also discuss the scope and limitations of this method.

Q4) Attempt any one of the following:

- a) i) For a Gompertz model determine the maximum growth rate.
- ii) Discuss the states of equilibria in Gompertz growth model.

[5+5]

OR

- b) i) Describe the line transect method for estimating animal population in forest. What is rational behind using exponential detection function?
- ii) Describe capture - recapture method. Derive Peterson's estimator of population size (N) for single recapture in case of closed population.

[5+5]

