

No. of Printed Pages : 5

MSTE–003

**POST GRADUATE DIPLOMA IN
APPLIED STATISTICS (PGDAST)**

Term-End Examination

December, 2024

MSTE–003 : BIOSTATISTICS–I

Time : 3 Hours

Maximum Marks : 50

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **four** questions from the remaining question nos. 2 to 7.*

(iii) *Use of scientific calculator (non-programmable) is allowed.*

(iv) *Use of Formulae and Statistical Tables Booklet for PGDAST is allowed.*

(v) *Symbols have their usual meanings.*

1. State whether the following statements are true or false. Give reasons in support of your answer :

5×2=10

- (a) Fertility is a multiplicative component of the growth of the population.
 - (b) The dose is considered as random for each subject in the indirect bioassay.
 - (c) The beginning of the pre-clinical phase of a disease is marked by the point in time when signs and symptoms of the disease develop.
 - (d) We confirm the efficacy and compare the new regimen with the existing drug in Phase-IV of a clinical trial.
 - (e) An assay is called a symmetric assay if the number of subjects is same for each dose.
2. (a) Differentiate between demographic analysis and population studies.

- (b) The agewise data on the number of live births are given in the following table : 6

Age Group	No. of Women (in '000)	No. of Live Births (in '000)
15–19	55	20
20–24	70	180
25–29	65	200
30–34	64	170
35–39	60	120
40–44	58	60
45–49	50	10

Calculate :

- (i) General fertility rate,
 - (ii) Age-specific fertility rate, and
 - (iii) Total fertility rate.
3. In a parallel-line assay, 3 doses of test and standard preparations were applied on each of the 3 subjects. The following values were computed for the responses recorded for this assay :

10

$$\overline{y_s} = 15, \overline{y_t} = 20, S_{x_s x_s} = 0.3,$$

$$S_{y_s x_s} = 11, S_{x_t x_t} = 0.4, S_{y_t x_t} = 10.5$$

$$\text{TSS} = 800 \text{ and } \text{SSD} = 790$$

- (i) Test the linearity of the dose-response curves for both preparations.
 - (ii) Test whether the dose-response curves for both preparations are parallel or not.
4. (a) Differentiate between direct and indirect bioassays with examples. 5
- (b) Describe different types of errors in demography. 5
5. Write short notes on the following :
 - (a) Tertiary prevention 3
 - (b) Analytic epidemiology 3
 - (c) Cohort studies 4
6. Write a note on statistical ethics in clinical trials. 10

7. (a) A standard diagnostic test for a particular disease provides correct diagnosis in 62% subjects. Another new diagnostic test was tried on 30 subjects for non-inferiority which provided correct diagnosis in 19 subjects.

Can we conclude that the new diagnostic test is not inferior to the standard one at 10% level of significance, if the non-inferiority margin is only 1% ? 5

- (b) Consider the following hypothetical data to obtain the risk difference, risk ratio and odds ratio for lung cancer, comparing smokers to non-smokers : 5

	Lung Cancer ⁺	Lung Cancer ⁻	Total
Smokers	1200	1600	2800
Non-Smokers	800	2200	3000
Total	2000	3800	5800

× × × × × × ×