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MSTE-003

POST GRADUATE DIPLOMA IN APPLIED STATISTICS (PGDAST)

Term-End Examination

December, 2022

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 (non-programmable) calculator is allowed.*

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

(*v*) *Symbols have their usual meanings.*

P. T. O.

1. State whether the following statements are True *or* False. Give reasons in support of your answers : 5×2=10

   (a) The main contribution of James Lind in the history of epidemiology was : "He wrote a book on the Bill of Mortality."

   (b) Prevalence measures the occurrence of new cases of a specific disease only.

   (c) Clinical trials are conducted on animals only.

   (d) A life table based on one year age interval is called abridged life table.

   (e) Bioassay can be used for standardizing the drugs not for estimating the potency of test drug.

2. (a) Explain the various levels of disease prevention. 6

   (b) What types of diseases are suitable for screening ? 4

3. Explain different phases of a clinical trial in detail. 10

4. Explain the following :

   (a) Design to cross-sectional study 2

   (b) Analysis of data of cross-sectional study 4

   (c) Advantages and disadvantages of cross-sectional study 2

   (d) Types of clinical trials. 2

5. (a) According to censuses of 1971 and 1981 the population of a particular city are 7,45,876 and 12,50,532 respectively. Estimate the population for the year 1975 using linear interpolation formula. 2

   (b) The population of a town in two census years are as follows which are assumed to be in a geometrical progression : 3

Year	Population
1941	54,892
1971	1,08,431

On the basis of the given information, compute the following :

(i) The rate of increase in population per thousand per annum.

(ii) The estimate of the population in 1965 using appropriate formula.

(c) The following figures for the year 2002 are obtained from the sample registration system under operation in a city : Mid-year population = 3,52,72000; Total births = 1,84,236; Total deaths = 72,299. Calculate the annual crude rate of natural increase. 2

(d) State the inherent assumptions of life tables. 3

6. Suppose two preparations, say A and B of a lethal drug are infused at a fixed rate into the blood stream of guinea pigs until their hearts stop beating (causing death).

Suppose that preparations A and B are considered as standard and test preparations, respectively.

The following table shows the amount needed per kilogram of body weight of guinea pigs to stop their hearts for both preparations :

Doses	
Preparation A (in mg/kg)	Preparation B (in mg/kg)
2.18	1.40
1.67	1.42
1.8	1.54
2.04	1.3
1.53	1.12
1.32	1.79
1.98	2.11
1.76	2.16
1.94	1.71

(i) Estimate the relative potency of the test preparation. 2

(ii) Obtain the variance of the relative potency calculated in (i). 4

(iii) Construct the 95% fiducial limits for the relative potency based on t-variate. 4

7. (a) Find probit for the following values of the proportions with and without adding 5 : 4

(i) 0.10 and 0.90

(ii) 0.25 and 0.75

(b) Calculate GFR, ASFR and TFR from the data given as follows : 6

Age group	No. of Women (in '000)	Total Births
15—19	15	250
20—24	16.2	2243
25—29	15.8	1897
30—34	15.2	1320
35—39	14.8	915
40—44	15	280
45—49	14	145

Assume that the proportion of female birth is 45.2 percent.