

SARDAR PATEL UNIVERSITY

M.Sc(Statistics) Fourth Semester

Wednesday, December 5, 2012.

Time 2:30 p.m. to 5:30 p.m.

Subject:PS04ESTA03: Bioassays

Total Marks 70

Note: (i) Figures to the right of questions indicate maximum marks.

1. Choose the correct answer(s) and write in your answer book. 8
- (i) The difference between direct assay and indirect assay is
- (a) required response is observed in both cases (b) One can used to estimate the potency where as the other can't be used for the same.
- (c) In direct assay response is observed whereas in indirect assay we predict the response. (d) None of (a) to (c)
- (ii) If the test preparation behaves like dilution of standard preparation then then the assay is called
- (a) Standard Assay (b) Direct Assay
- (c) Concentration Assay (d) None of (a) through (c)
- (iii) Potency is a measure of :
- (a) Strength of the drug. (b) Weakness of the drug
- (c) Correlation between dose and response. (d) None of (a) to (c)
- (iv) If the dose response relation $y=F(z)$ satisfies the condition $z_1 > z_2$ implies $F(z_1) > F(z_2)$ then relation is:
- | | |
|---------------|-------------------|
| (a) Linear | (b) Quadratic |
| (c) Monotonic | (d) None of these |
- (v) In parallel line assays
- (a) Slopes of lines are same and intercepts may be different (b) Intercepts are same and slopes are also same
- (c) Slopes and Intercepts are different. (d) None of (a) to (c)
- (vi) Let $u=f(\alpha+\beta x)$ where the x is the dose metameter. Then the response metameter is
- (a) $y=f^{-1}(u)$ (b) $y=g(u)$
- (c) $y=\log u$ (d) none of (a) to (c)

(vii) The variance of the estimate of slope in a simple regression is

- (a) $\frac{\sigma^2}{S_{xx}}$ (b) $\sigma^2 S_{xx}$
 (c) $\frac{\sigma^2}{S_{yy}}$ (d) None of (a) to (c)

(viii) The linearizing transformation of the dose is used for

- (a) increasing the variance (b) decreasing the variance
 (c) stabilizing the variance (d) none of (a) to (c)

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Answer any **seven** of the following.

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- (i) Define potency of test preparation to standard. Suppose potency of a product is 1.6 units. Interpret the value.
 (ii) Describe Box and Cox response metameter.
 (iii) Describe how one would check the validity assumption of linearity of dose response relation.
 (iv) Give the advantages of parallel line assay.
 (v) Write down the table of coefficients of orthogonal contrast in (2,2) point design corresponding to parallel line assay.
 (vi) Explain briefly slope ratio assay.
 (vii) Explain quantal response.
 (viii) Explain logit quantal response model.
 (ix) Describe normal sigmoid model.

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- (a) The following table gives the doses (cc per 100g of body weight) obtained from two groups of mice for two preparations of insulin, labeled as A and B. Estimate the relative potency (treating A as standard) and interpret the result.

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	Standard(A)	Test(B)
	2.4	5.2
	1.9	8
	2	4.8
	2.3	6.5
	1.7	7
		8.1
		6
Total	10.3	45.6
Mean	2.06	6.514286
Sum of Squares	21.55	306.94

- (b) State and prove Fieller's theorem.

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OR

- (b) Using Fieller's theorem obtain fiducial limits for the potency obtained in (a) above

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- 4 (a) Consider the following summary data. 6

\bar{t}_i	Sum	Sum of Squares
20	-4.28045	86.20153
20	9.530439	134.835
20	-3.57066	93.03282
20	1.528226	128.4005

Carryout test of homogeneity using Bartlett's test.

- (b) Write a note the role probit analysis in the study of quantal responses. 6
- OR**
- (b) Discuss in detail (3,3) point design corresponding to a parallel line assay 6
- 5 (a) Write a detailed note on parallel line assays. 6
- (b) Describe completely (2, 2) design in RBD for a parallel assay. 6
- OR**
- (b) Write a note on the application of logit models in quantal response studies. 6
- 6 (a) Discuss slope ratio assay with suitable example. 6
- (b) Write a detailed note on planning biological assays. 6
- OR**
- (b) Describe in detail test of parallelism. 6

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