

**Shree Manibhai Virani and Smt. Navalben Virani Science College (Autonomous)**

Affiliated to Saurashtra University, Rajkot

**SEMESTER END EXAMINATION NOVEMBER – 2016**

**M.Sc. Microbiology / M.Sc. Biotechnology**

**16PMBDC01 / 16PBTDC01 - RESEARCH METHODOLOGY & EXPERIMENTAL DESIGN**

*Duration of Exam – 3 hrs*

*Semester – I*

*Max. Marks – 70*

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**Part A (5x2= 10 marks)**

Answer **ALL** questions

1. Enlist different types of Research. Define Applied Research.
2. What is Citation Index? Mention its significance.
3. What are non-parametric tests? Mention the advantages of non-parametric tests.
4. Define dependent and independent variable.
5. What are the main objectives of Design of Experiments? Give examples of Experimental Designs.

**Part B (5X5 = 25 marks)**

Answer **ALL** questions

6a. Describe the Process of Defining a Research Problem

**OR**

6b. Write a note on Primary and Secondary sources

7a. Explain the different steps involved in preparation of a Research Paper.

**OR**

7b. Mention various components of a research article with suitable example.

8a. Write a note on Measures of Dispersion

**OR**

8b. A hypothetical set of weight of an insect in grams is given where,  $X_1=1.2$ ,  $X_2=1.4$ ,  $X_3=1.6$ ,  $X_4=1.8$ ,  $X_5=2.0$ ,  $X_6=2.2$ ,  $X_7=2.4$ . Calculate range, quartile deviation, mean deviation and sample variance.

9a. Write a note on ANOVA.

**OR**

9b. Write a note on Research Hypothesis

10a. Write a note on Latin Square Design.

**OR**

10b. In a factorial experiment what is the total number of experimental units when there are 3 replications, 4 levels for factor A and 3 levels for factor B?

**Part C (5X7 = 35 marks)**

Answer **ALL** questions

11a. Give an account of sources of Literature survey and Highlight the significance of Literature survey

**OR**

11b. Highlight the salient features of different Search Engines used for the search of Scientific Literature.

12a. Give a detailed account of the process involved in dealing with publishers for scientific articles.

**OR**

12b. Write a detail note on various components of 'Thesis' in order of appearance.

13a. What is skewness? Comment on the features of skewness. Describe methods for studying skewness.

**OR**

13b. Calculate coefficient of skewness and kurtosis for the following data on rainfall (cm) in the month of September in Jamnagar.

2, 0, 6, 8, 13, 7, 2, 2, 4, 10, 11, 2, 0, 5, 11, 0, 0, 8, 7, 8, 9, 6

14a. Describe the different methods for measuring correlation.

**OR**

14b. Two types of diet were administered to two groups of preschool going children for increase in weight and the following increase in weight (100 g) were recorded after a month. Test whether there is any significant difference the two diets with respect to increase in weight. (t value for 15 DF at 5% level of significance is 2.13).

Diet A	4	3	2	2	1	0	5	6	3
Diet B	5	4	4	2	3	2	6	1	0

15a. Write a detailed note on Completely Randomized Design

**OR**

15b. Write a detailed note on Randomized Complete Block Design