Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014

Subject code: 1721408 Date: 08-12-2014

Subject Name: Research Methodology

Time: 02:30 pm - 05:00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Define Research. Distinguish between basic research and applied research. **07**

(b) What are different criteria for good research? **07**

Q.2 **(a)** Clearly explain the research process with flow chart. **07**

(b) What do you mean by Primary data and Secondary data? Differentiate between Qualitative research and Quantitative research. **07**

OR

(b) Enumerate some of the problems encountered by researchers in India. **07**

Q.3 **(a)** Define ordinal scale, nominal scale, interval scale and ratio scale with suitable example. **07**

(b) An administrator wanted to study the utilization of long-distance telephone service by a department. One variable of interest is the length, in minutes, of long-distance calls made during one month. There were 38 calls that resulted in a connection. The lengths of calls, already ordered from smallest to largest, are presented in Table below. Locate the quartiles and also determine the 90th percentile. **07**

1.6	1.7	1.8	1.8	1.9	2.1	2.5	3.0	3.0	4.4
4.5	4.5	5.9	7.1	7.4	7.5	7.7	8.6	9.3	9.5
12.7	15.3	15.5	15.9	15.9	16.1	16.5	17.3	17.5	19.0
19.4	22.5	23.5	24.0	31.7	32.8	43.5	53.3		

OR

Q.3 **(a)** What are the guiding considerations in the construction of questionnaire? Explain. **07**

(b) The city of Madison regularly checks the quality of water at swimming beaches located on area lakes. Fifteen times the concentration of fecal coliforms, in number of colony forming units (CFU) per 100 ml of water, was measured during the summer at one beach. **07**

180	1600	90	140	50	260	400	90
380	110	10	60	20	340	80	

(a) Calculate the sample variance and sample standard deviation.
(b) One day, the water quality was badð the reading was 1600 CFUð and the beach was closed. Drop this value and calculate the sample standard deviation for the days where the water quality was suitable for swimming.

Q.4 **(a)** What is ñCentral Limit Theoremò? What is its significance? **07**

(b) Distinguish between the following: **07**
(i) Null hypothesis and alternative hypothesis;
(ii) One-tailed test and two-tailed test;

(iii) Acceptance region and rejection region;

OR

Q.4 **(a)** Explain the terms Type I error and Type II error in the context of hypothesis testing. What do you mean by ñpower of testò? **07**

(b) For two samples, taken from two normally distributed populations, we have $n_1=30$, $n_2=35$, $\bar{x}_1 = 25$, $\bar{x}_2 = 27$, $^2_1 = 26$, $^2_2 = 28$. Test the hypothesis that the two population means are not equal. Use = 0.05. **07**

Q.5 **(a)** Point out the important limitations of tests of hypotheses. What precaution the researcher must take while drawing inferences as per the results of the said tests? **07**

(b) Water collected in a single bottle from a river is divided into eleven specimens. Four specimens are randomly selected and sent to Lab A, three to Lab B and four to Lab C. The amount of heavy metals (ppm) is measured for each specimen. Calling each lab a treatment, suppose the data are **07**

Treatment	Observations
A	7 5 4 4
B	6 1 2
C	2 1 0 1

Prepare ANOVA table and carry out the F test for equality of means taking = 0.05.

OR

Q.5 **(a)** Mention the different types of report, particularly pointing out the difference between a technical report and a popular report. **07**

(b) What do you mean by multivariate techniques? Explain their significance in context of research studies. **07**