Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 1721408 **Date: 25-06-2014**

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)** Enumerate the main objectives of research and explain them in detail. **07**

(b) What is research problem? Define the main issues which should receive the attention of the researcher in formulating the research problem. **07**

Q.2 **(a)** Explain the meaning of the following in context of Research design. **07**

(a) Dependent and Independent variable
(b) Extraneous variable
(c) Experiments

(b) Differentiate between Exploratory and Descriptive research design. **07**

OR

(b) Briefly describe the steps in Sampling Design. **07**

Q.3 **(a)** What is Likert type scale? Explain the procedure for developing it. **07**

(b) Classify the following data as either qualitative data or quantitative data. In addition, classify the quantitative data as discrete or continuous. **07**

(a) The number of times that a movement authority is sent to a train from a relay station is recorded for several trains over a two-week period. The movement authority, which is an electronic transmission, is sent repeatedly until a return signal is received from the train.

(b) A physician records the follow-up condition of patients with optic neuritis as improved, unchanged, or worse.

(c) A quality technician records the length of material in a roll product for several products selected from a production line.

(d) The Bureau of Justice Statistics Sourcebook of Criminal Justice Statistics in reporting on the daily use within the last 30 days of drugs among young adults lists the type of drug as marijuana, cocaine, or stimulants (adjusted).

OR

Q.3 **(a)** Enlist the various methods of data collection. Differentiate between Questionnaires and Schedules. **07**

(b) Table below gives the number of days that 25 individuals spent in house arrest in a criminal justice study. **07**

(a) Construct a box plot for these data.

OR

(a) Find the percentile for the days 25, 55 and 60. Also find 25th, 55th percentile and 8th decile of the data.

35	25	90	60	45
40	58	90	90	55
60	55	80	90	60
55	60	85	75	60
56	55	75	80	90

Q.4 **(a)** What is a Hypothesis? Define following terms with respect to hypothesis testing. **07**

(a) Null Hypothesis
(b) Alternative hypothesis
(c) P-value
(d) Level of significance

(b) The diameters of steel shafts produced by a certain manufacturing process should have a mean diameter of 0.255 inches. The diameter is known to have a standard deviation of 0.0001 inch. A random sample of 10 shafts has an average diameter of 0.2545 inch. **07**

(a) Set up appropriate hypotheses on the mean.
(b) Test these hypotheses using Ŭ= 0.05. What are your conclusions?
(c) Find the P-value for this test.

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) The following are the burning times of chemical flares of two different formulations. The design engineers are interested in both the mean and variance of the burning times. **07**

Type 1		Type 2	
65	82	64	56
81	67	71	69
57	59	83	74
66	75	59	82
82	70	65	79

Test the hypothesis that the two variances are equal. Use Ŭ= 0.05.

Q.5 **(a)** What is ANOVA? Explain Coding Method in context with ANOVA. **07**

(b) The tensile strength of portland cement is being studied. Four different mixing techniques can be used economically. The following data have been collected: **07**

Mixing Technique	Tensile Strength (lb/in^2)			
1	3129	3000	2865	2890
2	3200	3300	2975	3150
3	2800	2900	2985	3050
4	2600	2700	2600	2765

Test the hypothesis that mixing techniques affect the strength of the cement. Use Ŭ = 0.05.

OR

Q.5 **(a)** Briefly explain the layout of the Research report. **07**

(b) Write short notes. (Any two) **07**

1. Latin-square design
2. Central-limit theorem
3. Scales of measurement

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