

GUJARAT TECHNOLOGICAL UNIVERSITY
Ph.D. COURSE WORK EXAMINATION – 2024 (REGULAR)

Subject Code: PHD2301**Date: 01/09/2024****Subject Name: Research Methodology_Engineering & Computer Science****Time: 01:30 PM – 04:30 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) Discuss the role of researcher bias in qualitative and quantitative research. How do researchers mitigate bias in each type of research? Justify your answer giving suitable example. **10**
- (b) How did you identify the research gap (s) for your PhD problem? Discuss the process followed by you for identification of research gap(s). State the identified research gap(s). **10**
- Q.2** (a) How can you incorporate qualitative research design in your PhD work? List out the stage(s) where you would like to use qualitative research design in your PhD work. **10**
- (b) (i) What is the need for Research Design? What are the features of good design? **10**
(ii) Diameter and length of a cylinder is measured as 30 mm and 50 mm respectively. Calculate the absolute uncertainty and uncertainty using Kline and McClintock Method in the estimation of volume of the cylinder if uncertainty in measurement of each dimension is ± 1 mm.
- OR**
- (a) Discuss the following research design techniques: **10**
1. Experimental
2. Correlational
- (b) What are the key points one has to consider in experimental planning? Also with suitable example justify that internal validity is higher in case of laboratory experiments compared to field experiments. **10**
- Q.3** (a) Explain Gaussian distribution. What kind of experiments have such distributions? Observations of certain quantity follow Gaussian distribution. If the standard deviation of these observation is 2, calculate the value of maximum probability of these observations. **05**
- (b) What is the objective of Student's t test? How Student's t test is used for one sample and two samples? **05**
- Q.4** (a) Compare Kruskal-Wallis test and chi-square test. **05**
- (b) Create a comprehensive checklist covering all COREQ items and provide specific examples to illustrate how you would ensure thorough and transparent reporting throughout your study. **05**
- Q.5** (a) What are the key components to write an effective abstract on your identified research topic? Write your abstract as an example. **05**
- (b) Analyze the role of a detailed work plan in overcoming constraints when writing a technical research proposal. What are the key components of a robust work plan, and how do they contribute to the proposal's success? **05**