**Assignment: Statistical Inference**

**Total Marks: 30**  
**Instructions:**

* Attempt **all three questions**.
* Show detailed working wherever applicable.
* Use relevant formulas and justify your answers conceptually.

Q1: Types of Sampling Techniques *(10 marks)*

a) Define and differentiate the following sampling methods with one example each:

* Simple Random Sampling
* Stratified Sampling
* Cluster Sampling
* Systematic Sampling

b) In what situation would stratified sampling be more appropriate than simple random sampling? Explain with a real-world application.

Q2: Characteristics of a Good Sample *(10 marks)*

a) List and explain five key characteristics of a good sample in the context of statistical inference. *(5 marks)*  
b) Why is representativeness considered the most critical characteristic of a good sample? Illustrate with an example from a real-world survey or research study. *(5 marks)*

Q3: Estimation of Population Mean and Proportion *(10 marks)*

a) A researcher wants to estimate the average monthly expenditure of university students. A random sample of 40 students shows a sample mean of Rs. 12,000 with a standard deviation of Rs. 2,000.  
Construct a 95% confidence interval for the population mean. *(5 marks)*

b) In a political survey, 1200 people were randomly selected, and 720 said they support a new education policy.  
i. Estimate the population proportion of supporters.  
ii. Construct a 95% confidence interval for this population proportion. *(5 marks)*