BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: **SEMESTER : IV**
BRANCH: **SESSION : SP/2025**

SUBJECT: ED223 SAMPLING TECHNIQUES AND DESIGN OF EXPERIMENTS
TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**
5. Tabulated value of $\left|Z_{\frac{\alpha}{2}}\right| are: |Z_{0.05}| = 1.645,\ |Z_{0.025}| = 1.96, |Z_{0.005}| = 2.58$

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Q.1	Discuss any two probability sampling methods with its advantages and disadvantages.	[5]	1	4
Q.2	Discuss any two non-random sampling methods with suitable examples.	[5]	1	3
Q.3	From a list of 82932 farms in a state, a sample of 2312 farms was selected by srswor. Let yi denote the number of cattle on the ith farm in the sample. Then we are given: $\sum y_i = 37211, \sum y_i^2 = 923489$ Estimate from the sample, (i) the total number of cattle in the state, its standard error, 95% confidence limits of the estimate (ii) the average number of cattle per farm, its standard error, 95% confidence limits of the estimate	[5]	2	4
Q.4	Considering all possible simple random samples drawn without replacement of size 2 from a population having 4 units with values {3, 5, 9, 1}, (i) show that the sample mean is an unbiased estimator of population mean. (ii) show that s^2 is an unbiased estimator of population mean square S^2.	[5]	2	4
Q.5(a)	For Q4, for all samples of size n=2 using srswor, Calculate the sampling variance of $\bar{y}$ *and show that it agrees with the formula* $\left(\frac{N-n}{Nn}\right)S^2$.	[3]	2	3
Q.5(b)	Show that for sampling from a finite population, the sample mean $\bar{y}$ in srswor(N,n) is a better estimator of $\bar{Y}$ as $Var(\bar{y}\|srswor) < Var(\bar{y}\|srswr)$	[2]	2	3

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