BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: IMSc **SEMESTER : VII**
BRANCH: MATH **SESSION : MO/2025**

SUBJECT: MA407 SURVEY SAMPLING

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Why is sampling necessary? What are the essential steps in a sample survey?	[5]	1	1
Q.1(b)	Distinguish between sampling errors and non-sampling errors.	[5]	1	2
Q.2(a)	Show that in simple random sampling without replacement, the probability of a unit to be selected at any draw equals its probability of being selected in the first draw.	[5]	2	2
Q.2(b)	In a certain town, 2000 cultivators' holdings were stratified according to their sizes. The following data were recorded:	[5]	2	3

Stratum number:	1	2	3	4	5	6	7
No. of holdings:	394	461	381	334	169	113	148
Mean area under wheat per holding:	5.4	16.3	24.3	34.5	42.1	50.1	63.8
S.D. of area under wheat per holding:	8.3	13.3	15.1	19.8	24.5	26.0	35.2

For a sample of 200 farms, compute the sample size in each stratum under proportional and optimum allocations.

Q.3(a)	Explain ratio method of estimation. When is regression method of estimation preferable to ratio method?	[5]	3	2
Q.3(b)	In a company of 80 employees, 6 employees were interviewed and their monthly expenditure were noted. The data along with their monthly salary as per company records are given below:	[5]	3	3

Employee no:	1	2	3	4	5	6
Monthly Expenditure(Rs.):	42000	35000	51000	38000	47000	32000
Monthly salary (Rs.):	78000	70000	80000	72000	75000	65000

Given that the average monthly salary of all employees is Rs. 75000, estimate the average monthly expenditure of all employees.

Q.4(a)	When is double sampling useful? How is it different from two-stage sampling?	[5]	4	1
Q.4(b)	Explain double sampling for ratio and regression estimators for estimating the population mean.	[5]	4	2
Q.5(a)	Explain probability proportional to size (pps) sampling. Give an example.	[5]	5	2
Q.5(b)	Explain Cumulative Total Method for drawing a probability proportional to size sample of size n without replacement out of a population of N units.	[5]	5	3

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