

**UNIVERSITY EXAMINATIONS****FIRST SEMESTER 2025/2026 ACADEMIC YEAR****THIRD YEAR EXAMINATION FOR THE DEGREE OF
BACHELOR OF SCIENCE (ECONOMICS & STATISTICS)****STAT 321: SAMPLE SURVEY*****STREAM: R******TIME: 2 HRS******DAY: THURSDAY [8.30 – 10.30 A.M]******DATE: 05/02/2026*****THIS QUESTION PAPER CONSISTS OF FIVE (5) PAGES****PLEASE DO NOT OPEN UNTIL THE INVIGILATOR SAYS SO.**

INSTRUCTIONS: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE [30 MARKS]

- a) Briefly discuss the non-sampling errors in sample survey **[4 Marks]**
- b) From a list of 1000 names and addresses, a simple random sample of 100 is selected without replacement and 25 had wrong names and addresses. Estimate the total number of addresses needing correction in the list and determine the error of estimation. **[5 Marks]**
- c) Explain the reasons behind the use of stratified random sampling. **[3 Marks]**
- d) A population of size 1000 is divided into 3 strata. Their sizes and standards are shown in the table below

Stratum	Size	Standard deviation
1	200	6
2	400	8
3	400	12

A stratified random sample of size 120 is to be drawn from the population. Determine the sizes of samples from the strata for

- i) Neyman allocation
- ii) Proportional Allocation **[9 Marks]**
- e) In a private Library, the books are kept on 150 shelves of similar sizes. The number of books on 20 shelves picked at random were found to be

28 23 25 33 31 18 22 29 30 22
 26 20 21 28 25 15 32 29 34 40

- i) Calculate the sample mean and variance
- ii) Estimate the total number of books in the library and its approximate 98% Confidence Interval **[9 Marks]**

QUESTION TWO [20 MARKS]

To estimate the average amount due on 500 open hospitals accounts, a simple random sample of 12 records is drawn. The sample values for these 12 records is shown below:

Record Number	Amount of Money owed (\$)
1	42.00
2	45.00
3	35.00
4	33.00
5	32.00
6	52.00
7	43.00
8	40.00
9	41.00
10	46.00
11	42.00
12	39.00

- a) Calculate \bar{y} and $V(\bar{y})$ **[10 Marks]**
- b) Calculate the 95% Confidence Interval for the population mean **[5 Marks]**
- c) Estimate the population total and it's standard deviation **[5 Marks]**

QUESTION THREE [20 MARKS]

A market research firm conducted a survey in a city for the purpose of estimating the total monthly household expenditure on Compact Discs (CDs) and the total number of households owning a Compact Disc Player (CDP). The city was divided into four areas and a random sample of households was selected from each area. The results of the survey are shown below.

Area	N_i	n_i	Sample Average Monthly expenditure	Sample proportion owning CDP
1	20,000	100	10.40	0.150
2	10,000	100	6.10	0.083
3	35,000	100	4.05	0.042
4	15,000	100	8.24	0.075

- a) Estimate the average monthly household expenditure on CDs in the city and the proportion of households in the city that owns CDP. **[10 Marks]**
- b) Calculate the total monthly expenditure on CDs and the total number of households owning a CDP in the city. **[6 Marks]**
- c) Calculate the 95% Confidence Interval for the total number of households owning a CDP in the city. **[4 Marks]**

QUESTION FOUR [20 MARKS]

A school desires to estimate the average score that may be obtained in a reading comprehension exam for students in the sixth grade. The school’s students are grouped into three tracks, with the slow learners in track I, average in track II and those considered first learners in track III. The results are given below.

Track 1			Track 2			Track 3		
$N_1 = 52$			$N_2 = 72$			$N_3 = 36$		
$n_1 = 16$			$n_2 = 20$			$n_3 = 14$		
42	32	36	85	82	48	80	92	68
31	65	29	75	53	73	85	72	87
43	19	53	65	78	49	85	91	90
14	61	31	69	72	81	81	62	79
42	30	39	53	59	68	61	83	
32			52	71	61			
			59	42				

- a) Calculate \bar{y}_{st} and $V(\bar{y}_{st})$ **[14 Marks]**
- b) Estimate the total score and the estimated variance **[6 Marks]**

QUESTION FIVE [20 MARKS]

A researcher is allocated kf 2,000 to conduct a survey by means of a stratified random sampling. The population consists of Stratum A of size 40,000, stratum B of size 20,000 and stratum C of size 10,000. The set up cost of administering the survey is kf 200 and the cost of sampling one unit are kf 2.25, kf 4.00 and kf 1.00 for strata A, B and C respectively. The standard deviation of observations in stratum A is twice that for observations from stratum B or from stratum C. Assuming that all the available money is spent, estimate the

- a) Sample size n **[8 Marks]**
- b) Optimum allocation **[7 Marks]**
- c) Proportional allocation **[5 Marks]**