RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

Bachelor of Science in Applied Sciences
Third Year - Semester I Examination – July/Aug 2023

MAT 3214 – APPLIED STATISTICS

Time: Two (02) hours

Answer **all** questions.
Calculators and Statistical tables will be provided.

1. a) i. Write the differences between Census and Sample survey and discuss the advantages of Sample survey over to Census survey.

(20 marks)

ii. Explain briefly Systematic and Quota sampling methods.

(20 marks)

b) The number of misprints on a page of a newspaper has a Poisson distribution with mean 1.2. Find the probability that the number of errors

i. on a page four is 2,

ii. on a page three is less than 3,

iii. on first ten pages is 5, and

iv. on all forty pages adds up to at least 3.

(60 marks)

2. a) Fit a normal curve to the following data and calculate the theoretical frequencies by the area method.

Given that $\bar{X} = 43.7$ and $\sigma = 14.8$.

Marks	11 - 20	21 - 31	31 - 40	41 - 50	51 - 60	61 - 70	71 - 80
No. of Students	5	18	42	27	32	20	8

(60 marks)

b) From past experience a professor knows that the test score of a student taking her final examination is a random variable with a mean of 75 and a standard deviation of 8. How many students would have to take the examination to ensure, with probability at least 0.95 that the class average would be at least 73?

(40 marks)

3. a) A commonly prescribed drug for relieving nervous tension is believed to be only 60% effective. Experimental results with a new drug administered to a random sample of 100 adults who were suffering from nervous tension show that 70 received relief. Is this sufficient evidence to conclude that the new drug is superior to the one commonly prescribed? Use the level of significance $\alpha = 0.05$.

(50 marks)

b) Bon-Air elementary school has 1000 students. The principle of the school thinks that the average IQ of students at school is at least 110 to prove her point. She administers an IQ test to 20 randomly selected students. The average IQ is 108 with Standard deviation 10. By assuming the significant level $\alpha = 0.01$ what can you conclude about the average IQ of a randomly selected student in a Bon-Air school?

(50 marks)

4. a) It is claimed that the number of errors made by a type setter per thousand words is a poison distribution. 100 random samples of sets of 1000 words from this type setter are examined and the number of errors is counted. Using Chi-Square goodness of fit test, test whether these data consistent with the above claim at the 5% level of significance.

No. of errors	0	1	2	3	4	5
Frequency	10	16	20	28	12	14

(60 marks)

b) Weights of a random sample of 14 bricks in Kilograms are shown in the following table.

3.27	4.55	3.24	3.98	2.74	3.64	2.80
3.76	4.50	3.56	3.09	4.46	2.28	3.76

Is the mean weight of bricks produced by this process different from 3.5kg? Test this result at 5% level of significance.

(40 marks)

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