RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree

Third Year - Semester I Examination – March/April 2014

MAT 3214 – APPLIED STATISTICS

Answer all questions. Time allowed: TWO hours

Statistical tables and calculators will be provided.

1. (a) (i) Discuss main differences between the census and sampling survey methods.

(ii) Write short notes on two random sampling methods.

(iii) What are the methods of data collection?

(iv) Discuss the advantages and disadvantages of any three methods of data collection.

(b) The average number of trucks arriving on any one day at a truck depot in a certain city is known to be 15. What is the probability that on a given day fewer than 12 trucks will arrive at this depot?

2. (a) Weights of a random sample of 16 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 the bricks produced by this process different from $3.5kg$? Test this result at 5% level of significance.
State any assumptions you make.

(b) An office manager wishes to see whether the typing speed of 10 secretaries can be increased by changing over to computers. The number of words typed per minute is given below.

Secretary	1	2	3	4	5	6	7	8	9	10
Type writer	63	72	85	97	82	101	73	62	58	75
Computer	68	80	95	93	80	106	82	78	65	83

(i) Test whether the variances of the two populations are equal or not.

(ii) Test the claim that by using computers the secretaries can type more words per minute.
(A 5% level of significance would be appropriate for the required tests.)

3. (a) In order to test the effectiveness of a new drug for common cold, a random sample of persons suffering from common cold was taken. A randomly selected group of the patients were given the new drug and the other group were given similar tablets but containing only sugar. The results of the experiment are noted below. Test at 5% level of significance whether the new drug has proved effective in curing patients.

Treatment \ Result	Cured	Not cured	Total
Specific drug	56	64	120
Sugar	52	78	130
Total	108	142	250

(b) Following data was obtained to test whether the number of gamma rays emitted per second by a certain radioactive substance is a random variable having the Poisson distribution.

Number of gamma rays	Frequency
0	19
1	48
2	66
3	74
4	44
5	35
6	10
7	4

Use index of dispersion to test this hypothesis at 5% level of significance

4. The following is the distribution of the readings obtained with a Geiger counter of the number of particles emitted by a radioactive substance in 100 successive 40-second intervals:

Number of particles	Frequency
$-\infty < x \leq 10$	1
$10 < x \leq 15$	10
$15 < x \leq 20$	37
$20 < x \leq 25$	36
$25 < x \leq 30$	13
$30 < x \leq 35$	2
$35 < x < +\infty$	1

Test at 5% level of significance whether the observed distribution follows a normal distribution with $\mu = 20$and $\sigma = 5$.