RAJARATA UNIVERSITY OF SRI LANKA

FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences
First Year – Semester II Examination – November / December 2016

ICT 1404- MATHEMATICS & STATISTICS FOR COMPUTING

Time: Three (03) hours.

Answer ALL questions.

---

01. (a) Define the following terms:

(i) Sample Space (05 marks)

(ii) An Event (05 marks)

(iii)Mutually exclusive events (05 marks)

(b) Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5? (15 marks)

(c) In my town, it's rainy one third of the days. Given that it is rainy, there will be heavy traffic with probability 0.5, and given that it is not rainy, there will be heavy traffic with probability 0.25. If it's rainy and there is heavy traffic, I arrive late for work with probability 0.5. On the other hand, the probability of being late is reduced to 0.125 if it is not rainy and there is no heavy traffic. In other situations (rainy and no heavy traffic, not rainy and heavy traffic) the probability of being late is 0.25. I go for work on a random day.

(i) What is the probability that it's not raining, there is heavy traffic and I am not late? (25 marks)

(ii) What is the probability that I am late? (25 marks)

(iii) Given that I arrived late for work, what is the probability that it rained that day? (20 marks)

02. (a) Define the following terms:

(i) Random Variable (05 marks)

(ii) Discrete Probability Distribution (05 marks)

(iii)Continuous Probability Distribution (05 marks)

(b) State whether each of the following random variables is discrete or continuous:

(i) The number of runs scored in a cricket test match in Sri Lanka in 2002. (05 marks)

(ii)The price, per litre of petrol, in randomly selected filling stations in Anuradhapura. (05 marks)

(iii) The time it takes for a student selected at random to register for the next semester. (05 marks)

(iv)Your weight before breakfast each morning. (05 marks)

(c) State whether the following distribution is a valid probability distribution or not. Justify your answer: (15 marks)

X	0	1	2
$P(X)$	0.25	0.6	0.15

(d) Five coins are tossed simultaneously and the number of heads obtained is recorded.

(i) Tabulate the probability distribution for the number of heads. (30 marks)

(ii) Draw a probability distribution graph of the outcomes. (20 marks)

03. (a) State the conditions satisfied by the p.d.f. of the random variable X, in a binomial distribution. (20 marks)

(b) The certain Company purchases large shipments of bulbs and uses the following acceptance sampling plan:

Randomly select and test 24 bulbs, then accept the whole shipment if there is only one or none that does not work. A large shipment actually has a 4 % defective bulbs.

(i) What does the random variable X represent, in this case? (10 marks)

(ii) Does X have a binomial distribution? Check the conditions. (25 marks)

(iii) What is the probability that the whole shipment will be accepted? (25 marks)
(i.e. What is the probability that only one or none of the bulbs is defective?)

(iv)What is the probability that the whole shipment will be rejected? (20 marks)
(i.e. What is theprobability that two or more bulbs will not work?)

04. (a) State the formula for Poisson distribution. (15 marks)

(b) Suppose that you are surrounded by 100 elephants, but you have a machine gun. Suppose you fire the gun randomly and 200 bullets hit the elephants. However, every elephant you don't hit tramples you.

(i)What is the average number of hits per elephant? (10 marks)

(ii)What is the probability that an elephant avoids getting hit? (15 marks)

(c) Use the normal approximation to the binomial distribution to approximate stated probability for stated probability in each of the following cases:

(i) A random sample of 1000 eligible voters is drawn and X = number who actually voted in the last section. It is known that 60% of all eligible voters did vote. Find, $P(X \leq 620)$. (30 marks)

(ii) To be eligible for a certain job, women must be at least 62 inches tall, and 87% of women meet this criterion. In a random sample of 2000 women, X = number who qualify for the job (based on the height). Find, $P(X \leq 1700)$. (30 marks)

05. (a) Define the following terms:

(i) Dependent variable (05 marks)

(ii) Correlation coefficient (05 marks)

(b) In the following table, let X = Average Mark on five quizzes prior to the mid-term exam and Y = score in the mid-term exam for $n = 11$ students, randomly selected from a statistics class of 950 students:

X	80	68	94	72	74	83	56	68	65	75	88
Y	72	71	96	77	82	72	58	83	78	80	92

(i) Plot the data, and describe the important features of this plot. (20 marks)

(ii) Does this have a strong relationship? (20 marks)

(iii)Calculate the linear regression line for this sample. (40 marks)

(iv)What is the predicted mid-term exam score for a student with a quiz average equal to 75? (10 marks)

.....END.....