RAJARATA UNIVERSITY OF SRI LANKA

FACULTY OF APPLIED SCIENCES, MIHINTALE

B.Sc. (General) Degree in Information and Communication Technology
First Year – Semester II Examination – April / May 2015

ICT 1404 Mathematics & Statistics for Computing

Answer ALL Questions **Time : Three (03) hours .**

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01. (a) Convert each of the following decimal numbers to binary, octal, and hexadecimal formats.

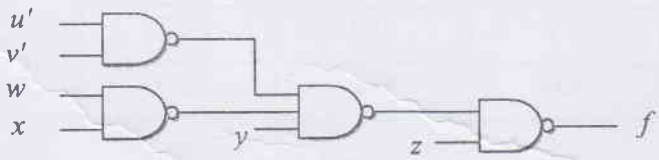
(i) $(3479)_{10}$ **[10 Marks]**

(ii) $(642)_{10}$ **[10 Marks]**

(b) Twenty-four dogs are in a kennel. Twelve of the dogs are black, six of the dogs have short tails, and fifteen of the dogs have long hair. There is only one dog that is black with a short tail and long hair. Two of the dogs are black with short tails and do not have long hair. Two of the dogs have short tails and long hair but are not black. If all of the dogs in the kennel have at least one of the mentioned characteristics, how many dogs are black with long hair but do not have short tails? **[30 Marks]**

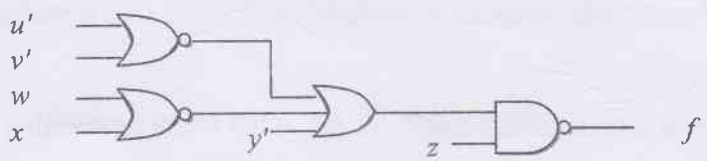
(c) Write a Boolean expression for each of the logic diagrams below. You need not find the simplified expression:

(i)



[25 Marks]

(ii)



[25 Marks]

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02. (a) Define the following terms:

(i) An experiment **[05 Marks]**

(ii) A sample space **[05 Marks]**

(iii) An event **[05 Marks]**

(b) A company that manufactures cardboard boxes is trying to understand some of its quality problems. Managers have collected data on defect types and production shifts. The data are summarized in the following table:

Defect	Shift 1	2	3
Colour	8	4	3
Printing	6	5	2
Skewness	0	2	0

Suppose that a box from the sample is selected at random and examined more closely.

(i) What is the probability that the box has a colour defect? **[10 Marks]**

(ii) What is the probability that the box was produces during the second shift? **[10 Marks]**

(iii) Is it possible for the selected box to have a colour defect and to have been produced on the second shift? If so, what is the probability? **[15 Marks]**

(iv) What is the probability that the selected box has a colour defect or was produced on the second shift? **[15 Marks]**

(c) During the survey conducted by the ABC team concerning professional baseball fans, data were recorded on gender. The expanded data are given below:

Response	Gender: Male	Female	Total
Yes	128	53	181
No	672	353	1025
Total	800	406	1206

(i) What is the probability that a person responded was male? Female? **[10 Marks]**

(ii) If a person voted was female, what is the probability that she was a professional baseball fan? **[10 Marks]**

(iii) If a person voted was a professional baseball fan, what is the probability that the person was male? **[10 Marks]**

(iv) What can you conclude about professional baseball fans from these data? **[05 Marks]**

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03. Name two types of distribution functions. **[10 Marks]**

(a) The Department of Transformation for a city has found that 25% of all parking tickets issued are not paid within 1 month of issue. The department takes a random sample of 20 parking tickets that were issued 1 month ago and counts the number that have not been paid.

(i) Identify the random variable. **[05 Marks]**

(ii) What are the parameters of the binomial distribution? **[10 Marks]**

(iii) Find the probability that, in the sample of 20 tickets, at most 6 have not been paid. **[15 Marks]**

(iv) What is the probability that between 4 and 8 inclusive have not been paid? **[15 Marks]**

(b) The amount of money spent by students for textbooks in a semester is a normally distributed random variable with a mean of $235 and a standard deviation of $15.

(i) Sketch the normal distribution that describes the amount of money spent on textbook in a semester. **[15 Marks]**

(ii) What is the probability that a student spends between $220 and $250 in any semester? **[15 Marks]**

(iii) What percentage of students spend less than $225 in a semester? **[15 Marks]**

04. State the formulas to calculate the slope and intercept in linear regression. **[20 Marks]**

For many countries tourism accounts for a large part of revenues. To predict tourism revenues, one of the variables that is considered important is the number of foreign visitors to the country. Data for six different countries were collected:

Country	Visitors (millions)	Tourism Receipts (billions)
France	60	27.3
Spain	48	25.1
United States	45	58.4
Italy	30	27.1
Britain	23	17.5
Germany	15	11.9

(i) Find the equation of the regression line. **[40 Marks]**

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(ii) Use the regression line to predict the tourism revenues for Italy and the United states.

[10 Marks]

(iii) Calculate the residuals for each observed value. **[20 Marks]**

(iv) For which country does the regression line do a better job of predicting tourism receipts?

[10 Marks]

05. (a) The number of faxes sent during the past week by the employees at a mail order company were as follows:

32	19	20	23
12	21	22	27
28	23	22	22
22	27	19	24
20	21	19	26
25	21	26	23
22	22		

(i) What is the mean number of faxes sent per employee? **[10 Marks]**

(ii) What is the median number of faxes sent per employee? **[10 Marks]**

(iii)What is the mode number of faxes sent per employee? **[10 Marks]**

(b) Calculate the median for the following frequency distribution:

Marks	No. students (f)	Cumulative frequency (cf)
5-10	7	7
10-15	15	.....
15-20	24	.....
20-25	31	.....
25-30	42	.....
30-35	30	.....
35-40	26	.....
40-45	15	.....
45-50	10	.....

[40 Marks]

(c) The number of road construction projects that take place at any one time in a certain city follows a Poisson distribution with a mean of 3. Find the probability that more than four road construction projects are currently taking place in the city. **[30 Marks]**