THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF MANAGEMENT STUDIES PROGRAMME
LEVEL 03 – 2005/2006
FINAL EXAMINATION 2006
QUANTITATIVE TECHNIQUES FOR MANAGEMENT II – MCU 3209

DATE : 04.03.2006	TIME : 1.30 p.m – 4.30 p.m

INSTRUCTIONS
Duration: Three Hours
ANSWER ANY FIVE (05) QUESTIONS.
All questions carry equal marks.

This question paper has seven questions.
Non-programmable calculators are allowed.
Normal and Chi-square tables are annexed herewith.

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(1)   (i)   What are the properties of a normal distribution? Explain them briefly.

        (ii)   A bolt manufacturing machine produces bolts of 10 mm diameter.
When the bolts were measured it was found their diameters are
normally distributed with mean 10.1 mm and standard deviation 0.2
mm.

The bolts have to be rejected if the diameter of the bolts are not within
the range of 9.60 mm and 10.40 mm.

        (a)   What is the probability of producing defective bolts?

Set of components for the machine can be fitted to the machine to
reduce the manufacturing variations.

        (b)   A buyer wishes to buy the products only if the defects are less
than 2%. To accept this business, what should be the standard
deviation of the bolts produced by the machine?

        (c)   State the assumptions made when arriving at the answer for (b)
above.

(2)   (i)   A garment factory had observed that the average number of machine
breakdowns per day is 2.

        (a)   What is the probability that there will be no machine
breakdowns in a given day?

        (b)   What is the probability that there will be more than five
breakdowns during the next two days?

(ii) Following table gives the number of lost customers of a restaurant in a 50 day period.

No. of lost customers	0	1	2	3	4
No. of days	21	18	7	3	1

(a) Fit Poisson distribution to the above data.
(b) What is the probability that more than 3 customers leave without being served in a given day?

(3) (i) Briefly explain the 'Binomial distribution'.

(ii) Pens are packed in packets of 5. If the probability that a pen is defective is 0.5 then,
   a) What is the probability that at least one pen in a packet is defective?
   b) What is the probability that all of the pens in a packet are non – defective?

(iii) Three hundred students are registered for the BMS degree program. The probability that a BMS student needs a copy of a particular text book from the main library in a weekend is 0.04.

   a) What is the probability that there is no demand for the book in a given weekend?

   b) The library wishes to provide books to 90% of the BMS students who needed them during a given weekend. What is the minimum number of books should be available in the library to fulfill the above requirement?

(4) (i) Explain why 'time series' is considered to be an effective tool of forecasting.

(ii) Using suitable examples explain (a) seasonal variation and (b) cyclical fluctuations of time service data.

(iii) The percentage of quarterly centered moving averages of the quarterly sales of the past five years of company X are given below.

Year	Quarter			
	I	II	III	IV
2001	-	-	128	135
2002	130	118	123	133

2003	120	120	119	130
2004	128	122	124	132
2005	126	120	-	-

(a) Calculate the quarterly seasonal indexes.
(b) If the sales forecast for year 2006 is 5000 units, estimate the sales for IIIrd and IVth quarters.

(5) (i) Briefly explain the "Sample Error".

(ii) You have received two packets of a certain electronic devices from two manufacturers. The following test results pertaining to them are available to you.

	Sample A	Sample B
Sample size	100	100
Mean Life (Hrs.)	1300	1250
Standard deviation (Hrs.)	80	95

Are the qualities (life) of the components of the two categories different at 5% significance level? Explain.

(iii) A student has made an opinion that 60% of the students registered at the Open University leaves without completing their program. A random sample of 50 registered students showed that 36 of them left without completing their program. Are these sample results confirm the student's opinion? (Use level of significance at 0.05%)
State the assumptions made for your answer.

(6) (i) Explain the uses of "Chi-square" test.

(ii) A making company is interested in finding out whether there is a relationship between three brands of soap and the gender of the user. The company has collected data from a sample of 150 persons.

Soap	Gender		Total
	Male	Female	
Brand A	25	30	55
Brand B	40	15	55
Brand C	30	10	40

Is the brand of soap and gender of the users are independent?

(7) Write short notes on the following.

    (i)   Sampling frame and sampling unit.

    (ii)   Random sampling techniques and non-random sampling techniques.

    (iii)   Test statistics and critical region.

    (iv)   Coefficient of correlation.

    (v)   Covariance.