THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)
(A Centre of Excellence)
Faculty of Business & Social Studies

DEPARTMENT OF BUSINESS STUDIES

UNIVERSITY EXAMINATION FOR BACHELOR OF BUSINESS ADMINISTRATION
(BBA M11/M12)

HBC 2240: ADVANCED STATISTICS

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2012
TIME ALLOWED: 2 HOURS

<u>**INSTRUCTIONS TO CANDIDATES:**</u>
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
This paper consists of **THREE** printed pages

Question One (Compulsory)

a) (i) Explain the meaning of the following terms as applied in statistics:
   - (i)   Sampling frame
   - (ii) Maximax rule
   - (iii) C-Chart   **(3 marks)**

   (ii) Describe **TWO** disadvantages of multiple correlation analysis.   **(4 marks)**

   (iii) For a given operation, a 10% marginal learning curve operates. Assuming that the first unit takes 30 minutes, how long should the 20th unit take?   **(4 marks)**

b) (i) In a trivariate distribution:
      $R_{12} = 0.863$, $r_{13} = 0.648$, and $r_{23} = 0.709$

Calculate the multiple correlation coefficient treating first variable as dependent and second, third variables as independent. **(4 marks)**

(ii) Distinguish between process control and product control. **(4 marks)**

c) (i) State **SIX** advantages of statistical quality control. **(6 marks)**

(ii) Outline **FIVE** advantages of control charts. **(5 marks)**

Question Two

a) Describe each of the following sampling techniques:
   (i) Stratified Sampling
   (ii) Quota Sampling
   (iii) Multi-Stage Sampling
   (iv) Judgmental Sampling
   (v) Cluster Sampling **(10 Marks)**

b) The data below is for a machine which is set to deliver packets of a given weight. Tensamples of sizes 5 each were recorded:

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean (x)	15	17	15	18	17	14	18	15	17	16
Range (R)	7	7	4	9	8	7	12	4	11	5

Determine the values for the central line and control limits for mean chart and comment on the states of control (conversion factor for n = 5, $A_2 = 0.58$, $D_2 = 0$, $D_4 = 2.11$) **(10 marks)**

Question Three

The multiple regression equation for two independent variable is given as:
$$y = a + b_1 \ x_1 + b_2 \ x_2$$

Given the following values:
$$y = an = 12, \ sy = 800 \ \sum x = 135, \ \sum x_2 = 1300, \ \sum x_1^2 = 1450$$
$$\sum x_1 y = 8300, \ \sum x_2^2 = 115,000, \ \sum x_2 y = 7300$$
$$\sum x_1 x_2 = 11,600$$

Determine the values of a, b₁ and b₂ **(20 marks)**

Question Four

a) A Manufacturing Company is planning to introduce to the market three models of home security systems namely: Standard, Regular and Premium. These models vary in sophistication and complexity and currently the company has sufficient capacity to manufacture only one model. A pay-off table for analysis of the probable acceptance and the resulting profits is shown below:

Model Acceptance	Acceptance Probability	Profits "Sh. 000"		
		Model Type		
		Standard	Regular	Premium
Excellent	0.2	60	100	20
Average	0.5	40	60	80
Poor	0.3	20	0	-40

Decide which model should be introduced to the market using:
(i)   Minimax regret criterion   **(5 marks)**
(ii)   Hurwizz Criterion, degree of optimism being 0.7   **(5 marks)**

b) For a given operation a 30% cumulative average learning curve operates. Assuming that the first unit takes 30 minutes, how long should the 20th unit take to produce?   **(10 marks)**

Question Five

A general road contractor receives a bonus for each day of early completion of the project before the final contract deadline. He has a choice of using three different subcontractors. The ability of each of the subcontractors to finish the job is influenced by the type of weather conditions. The general contractor estimates the number of days that each subcontractor will be able to finish early for each type of weather conditions. This summary is given below along with the general contractor's estimates of the probabilities for each weather condition.

	Type of Weather Condition			
	Number of Days Ahead of Schedule			
	Clear (0.4)	Light Rain (0.3)	Heavy Rain (6.1)	Rain with Heavy Wind
Subcontractor 1	14	10	9	6
Subcontractor 2	12	9	7	8
Subcontractor 3	16	11	6	5

Draw a decision tree representing the possible decisions and states of nature. Advise the contractor on which subcontractor to use for the project.   **(20 marks)**