



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF BUSINESS ENTREPRENEURSHIP AND MANAGEMENT
SCIENCES

SECOND SEMESTER EXAMINATION FOR BACHELOR OF

BMS 200: MATHEMATICS AND STATISTICS

Date:

Time:

INSTRUCTIONS:

1. (a) What are the characteristics of a poisson probability distribution? (3 marks)
(b) What are the characteristics of a good estimator? (3 marks)
(c) The information given below relates to sales of cakes made in the year 2007 and 2008 and the unit price of each cake

TYPE OF CAKE	2007 UNIT PRICE (SHS)	QUANTITY	2008 UNIT PRICE I(SHS)	QUANTITY
O	100	100	120	240
P	140	120	160	260
Q	180	80	140	220
R	160	140	180	250

Required: Using 2007 as the base year, calculate

- (i) Laspyres quantity index (2 marks)
- (ii) Paasches quantity index (2 marks)

(iii) Fishers ideal price index (2 marks)

(d) The data below shows the distribution of ages of volunteers in a self help project

Age (years)	Number of volunteers
20 - 29	7
30 - 39	21
40 - 49	19
50 - 59	5
60 - 69	6
70 - 79	2
80 - 89	1

Compute the mean and the median age of the volunteers (7 marks)

(e) What are the advantages of using the mean as a good measure of central tendency? (4 marks)

(f) The sample statistics $\bar{X}$ is the point estimator for. (1 mark)

(g) From a population of 500 elements, a sample of 225 elements is selected. The variance of the population is 900. What is the standard error of the mean? (2 marks)

(h) State two components of a time series. (1 mark)

(i) Customers arrive randomly at a department store at an average rate of 3.4 per minute. Assuming that the customer arrivals from a poisson distribution, calculate the probability that:-

(a) No customers arrive in any particular minute (2 marks)

(b) Two or more customers arrive in any particular minute (2 marks)

2. (a) Differentiate between the following types of sampling techniques

(i) Cluster sampling and simple random sampling (2 marks)

(ii) Stratified random sampling and systematic random sampling. (2 marks)

(b) List two advantages of multi-stage sampling technique (2 marks)

(c) A population consists of provinces which are divided into districts. The districts are

further divided into divisions and the divisions are divided into wards. Describe how you would select a simple random sample from the above population using the multi stage sampling technique. (8 marks)

(d) Identify and explain the characteristics of a good measure of dispersion. (5 marks)

3 (a) Distinguish between histogram and frequency polygon. (2 marks)

(b) The data below shows the profit realized by 40 medium size companies for the year 2006.

24.4	28.7	22.9	24.4	28.4	24.1	22.7	26.0
25.0	28.0	23.5	25.9	22.6	24.7	22.9	28.1
23.5	29.5	27.7	22.3	22.0	24.4	23.5	29.6
22.9	25.4	29.0	23.8	21.4	23.0	21.4	28.6
22.3	22.6	25.1	21.4	20.8	27.5	21.7	29.5

Required

(i) Using the inclusive form of grouping, prepare a frequency distribution table, with equal classes for the data above, beginning with the class 20.0-20.9 (4 marks)

(ii) Construct a histogram and frequency polygon to represent the data above (6 marks)

(iii) Using the histogram constructed above, estimate the modal profit realized by the firms. (2 marks)

(c) Using appropriate diagrams, briefly explain the following types of distributions:

(i) Positively skewed distribution (3 marks)

(ii) Negatively skewed distribution (3 marks)

4. A cost accountant has derived the following on the weekly output of standard size boxes from a factory

Week	Output in thousand	Total cost in thousands
1	20	60
2	2	25
3	4	26

4	23	66
5	18	49
6	14	48
7	10	35
8	8	18
9	13	40
10	8	33

- Plot a scatter diagram of the data (5 marks)
- State the coordinates of a point that must lie on a regression line fitted on the data above. (3 marks)
- By inspection, plot the line of “bestfit” on the diagram. (3 marks)
- Find the equation of the regression line (5 marks)
- What is the fixed cost of the factory (2 marks)
- State three uses of regression analysis (3 marks)

- State three uses of a time series analysis (3 marks)
 - State four factors that affect a time series (4 marks)
 - Soma bookshop Ltd opened a branch in Eldoret town. The branch manager thinks that sales have not been good as initially anticipated. He has collected the following data on sales for the branch for the last 12 months.

YEAR	MONTH	SALES SH ‘000’
2003	NOV	230
	DEC	200
2004	JAN	190
	FEB	170
	MARCH	190
	APRIL	200
	MAY	190
	JUNE	180

	JULY	170
	AUG	160
	SEPT	140
	OCT	150

Required:

- (i) A time series graph to represent the above information (4 marks)
- (ii) A three month moving average (6 marks)
- (iii) A trend line on the same axis in (i) above (3 marks)