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

FIRST SEMESTER EXAMINATION FOR DEGREE IN BACHELOR OF COMMERCE

BMS 200: BUSINESS MATHEMATICS AND STATISTICS

Date: 10/8/2016 **Time: 8:30 – 10:30 AM**

INSTRUCTIONS

Answer Question One And Any Other Two Questions

1. (a) Explain the circumstances under which the following averages would be the most appropriate in describing a distribution. (3 marks)

   (i) Arithmetic mean
   (ii) Geometric mean
   (iii) Harmonic mean

   (b) A population consist of provinces which are divided into districts. The districts are further divided into divisions and the divisions are divided into wards. Describe the most suitable sampling technique and how you would select a simple random sample using that sampling technique. (5 marks)

   (c) State four characteristics of a Poisson probability distribution. (2 marks)

   (d) Citrus fruits are packed in containers of 20 for export. It is known that 2% of such fruits are spoilt by the time they reach their destination. If such a container is picked at random, determine the following probabilities;-

   (i) Obtaining more than 2 spoilt fruits. (2 marks)
   (ii) Probability that at most one fruit is spoilt. (2 marks)

(e) Reliable furniture's is a family business that has been selling to retail customers in Nairobi for many years. They advertise extensively on radio and TV emphasising their low prices and easy credit terms. The owner wound like to review the relationship between sales and the amount spent on advertising . Below is information on sales and advertising expenses for the last four months.

Month	Advertising expenses (shs 'million"	Sales revenue (Sh million)
July	2	7
August	1	3
September	3	8
October	4	10

From the above information, determine the persons product moment correction co-efficient and interpret your results. (5 marks)

f) State and explain four components of a time series. (6 marks)

g) David bakes and supplies various types of cakes to Faida supermarket on a weekly basis. The table below shows the sales made in the year 2003 and 2004 and the price per cake in shillings.

	2003		**2004**	
Type of cake	Quantity	Price	Quantity	Price
Marble cake	99	95	120	110
Chocolate	80	85	105	85
Fruit cake	105	125	98	138

From the above data and using 2003 as the base period, compute

i) Paashes,price index for the year 2004 (2 marks)

ii) Fishers price index for the year 2004 (3 marks)

2. a) Distinguish between the following terminologies

i) Regression analysis and correction analysis. (2 marks)

ii) Co-efficient of correlation and co-efficient of determination. (2 marks)

b) The C.EO of family planning of Kenya would like to establish whether there is a relationship between the amount spent per month on food and the size of the family that is do large families spend more on food? A sample of 10 families in Kericho county revealed the following figures for family size and the amount spent on food per month.

Family Size	Amount Ksh'000'	Family Size	Amount Ksh '000'
3	99	3	111
6	104	4	74
5	151	4	91
6	129	5	119
6	142	3	91

Required:

i) Co-efficient of correction. (6 marks)
ii) Co-efficient of determination. (2 marks)
iii) Interpret your anwers in (i) and (ii) above. (2 marks)
iv) Use LSM (Least Square Method) to determine a linear equation to express the relationship between the two variables. (5 marks)
v) What is the expected expenditure for a family of 8. (1 mark)

3. a) State three characteristics of a normal probability distribution. (2 marks)

b) Suppose a normally random variable X has a mean of $\mu=30$ and standard deviation of $\delta = 7$. Find the following probabilities;

i) $x> 23$ (2 marks)
ii) $x>20$ (2 marks)
iii) x is between 32 and 40 (2 marks)

c) 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

Required:

a) Compute the median age for the volunteers (3 marks)
b) Compute the modal age for the volunteers. (3 marks)
c) Compute the coefficient of skewness and comment on the distribution of data (3 marks)
d) What is the kurtosis and what does it measure. (2 marks)

4. (a) Explain the meaning of the following words as used in connection with index numbers

i) Index relative (2 marks)

ii) Chain base relative (2 marks)

iii) Consumer price index (2 marks)

b) The following data gives the recording costs and the number of times each item was used over the last three years.

ITEM	COST PER USAGE SHS '000'	USAGE 1999	USAGE 1998	FREQUENCY 1999
A	290	330	90	74
B	1060	1240	86	92
C	500	400	126	144

Using 1998 as the base calculate

i) Laspyress quantity index (2 marks)
ii) Paasclaes quantity index (2 marks)

c) Electrical products LTD manufacturers among other products lighting bulbs. Recently, the company launched a new energy saving lighting bulb. The life of the bulb is as summarised below.

Length of life (hours)	Number of bulbs
1000-1200	1
1200-1400	4
1400-1600	8
1600-1800	10
1800-2000	11

2000-2200	7
2200-2400	5
2400-2600	3
2600-2800	1

Required:

i) Compute the standard deviation of life (6 marks)
ii) Compute the variance (1 mark)
iii) Compute the coefficient of variation (2 marks)
iv) Compute the range (2 marks)

5. a) Write short notes on

i) Moving averages (2 marks)

ii) Line of best fit as applied in the time series. (2 marks)

b) The table below shows the profits of a firm in the millions of shillings over a period of 4 years

Year	Quarters			
	1	2	3	4
1999	12	9	11	14
2000	13	10	17	20
2001	15	13	20	22
2002	16	12	21	24

Required

i) Plot a trend line on the graph paper provided and comment on the results (5 marks)
ii) Using the least square method, determine the trend values for the data on the amount of profits. (5 marks)
iii) Using the multiplicative model, compute seasonal indices. (6 marks)