KASNEB

ATD LEVEL II

DCM LEVEL II

BUSINESS MATHEMATICS AND STATISTICS

TUESDAY: 22 November 2016. **Time Allowed: 3 hours.**

Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.

QUESTION ONE

(a) Highlight four applications of linear functions. (4 marks)

(b) Distinguish between "marginal cost function" and "marginal revenue function". (4 marks)

(c) Dorcas and Gladys visited a supermarket to purchase some items. Dorcas bought 9 jackets and 12 sweaters for Sh.21,000. Gladys bought 14 jackets and 6 sweaters for Sh.900 more than Dorcas.

Required:
Using matrix algebra, determine the cost of a jacket and a sweater. (6 marks)

(d) An engineering firm intends to invest in a project whose profit function is given by $y = 28x - x^2 - 11$ where:

y is profit in Sh. "000".
x is the running time of the project in weeks.

The project can run for at most 24 weeks.

Required:

(i) The initial cost of the project. (1 mark)

(ii) The break-even time of the project in weeks. (3 marks)

(iii) The best time to end the project. (2 marks)

(Total: 20 marks)

QUESTION TWO

(a) The total revenue function of a certain product Q is quadratic in nature. The following data show the number of units of the product sold and their corresponding sales revenue:

Number of units of Q sold:	15	20	30
Sales revenue, R Sh. ("000"):	2,325	2,900	3,750

Required:

(i) The total revenue function. (4 marks)

(ii) The maximum revenue. (3 marks)

(iii) The revenue, when the number of units of Q sold is 50 units. (2 marks)

(b) The table below shows the grouped frequency distribution of marks obtained by 50 candidates in a zonal mathematics contest:

Marks	24-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequency	2	5	X	9	Y	8	5	3

Required:

(i) The values of X and Y, given that the mean of the distribution is 61.20 marks. (8 marks)

(ii) The variance of the marks. (3 marks)

(Total: 20 marks)

QUESTION THREE

(a) Explain the following terms:

(i) Relative dispersion. (2 marks)

(ii) Coefficient of relative dispersion. (2 marks)

(b) The following information shows the number of insurance claims made by a company on behalf of its employees by age over the last 5 years:

Age in years	10-20	20-30	30-40	40-50	50-60	60-70
Claims in Sh. "million"	10	64	46	44	18	10

Required:

(i) Represent the information in a histogram. (5 marks)

(ii) Use the histogram obtained in (b)(i) above to determine the approximate modal age of claimants. (2 marks)

(iii) The mean age of claimants of the company. (4 marks)

(iv) Using your results in (b)(ii) and (b)(iii) above, approximate the median age of claimants. (3 marks)

(v) Given that the standard deviation of the claims is 13.12, determine the skewness of the data. (2 marks)

(Total: 20 marks)

QUESTION FOUR

(a) Citing a suitable example in each case, explain the following terms:

(i) Mutually exclusive events. (2 marks)

(ii) Complementary events. (2 marks)

(b) The table below shows the daily wage of 66 labourers in a certain flower farm:

Wages in Shillings	**Number of labourers**
350-450	4
450-550	7
550-650	10
650-750	14
750-850	20
850-950	8
950-1,050	3

Required:

(i) The average wage. (2 marks)

(ii) The modal wage. (2 marks)

(iii) The median wage. (2 marks)

(iv) The standard deviation of the wage distribution. (3 marks)

(v) The coefficient of variation of the wage distribution. (1 mark)

(c) A tourist left United States of America with US dollars ($) 6,770 where he paid $400 for his flight to Kenya. Upon arrival in Kenya, he converted $4,000 to Kenyan Shillings at a rate of $1 = Ksh.90 and paid a commission of 2% to the Kenyan agent.

The tourist booked into a hotel for 15 days at Ksh.8,000 per night.
He booked a cab at Ksh.4,500 per day for 15 days.
He paid for a trip to the Masai Mara game reserve at a cost of $100 per day for 5 days.
He purchased 6 carvings at a cost of Ksh.7,000 each and jewellery at a cost of $1,200.
He was to travel to Uganda for a conference. He paid for his flight to Uganda at Ksh.25,000.
Upon arrival in Uganda, he converted all his monies to Ugandan shilling.
$1 = Ush.2,500
Ksh.1 = Ush.25.

Required:
The amount of money in Ugandan shillings the tourist had in Uganda upon arrival. (6 marks)

(Total: 20 marks)

QUESTION FIVE

(a) The consumer price index (CPI) for the years 2010-2015 are given as follows:

Year	2010	2011	2012	2013	2014	2015
CPI	138.6	142.8	148.3	152.4	156.6	160.3

Required:
The purchasing power of the shilling for each of the six years. (3 marks)

(b) The probability that a school bus picks school children on time along route X is $^5/_6$. Another school bus picks children along route Y with a probability of $^2/_3$ of being on time. The two events are independent events.

Required:
(i) Represent the above information using a tree diagram. (3 marks)

(ii) The probability that the two buses are both on time. (1 mark)

(iii) The probability that only one of the two buses arrives on time. (2 marks)

(iv) The probability that neither of the two buses arrives on time. (2 marks)

(c) A salesman earns a basic monthly salary plus 5% commission on the first Sh.200,000 sales made and X% rate of commission on any other extra sales made.

In September 2016, he earned a total of Sh.30,000 when the total sales were Sh.350,000.

In October 2016, he earned a total of Sh.37,500 when sales made were Sh.600,000.

Required:
(i) The basic monthly salary. (4 marks)

(ii) The value of X% being the rate of earning commission. (2 marks)

(iii) The total earnings in the month of November 2016 given that the total sales are Sh.850,000. (3 marks)

(Total: 20 marks)

.....