

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 $\frac{5}{6}$. Another school bus picks children along route Y with a probability of $\frac{2}{3}$ 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)

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