

# KASNEB

ATD LEVEL II

DCM LEVEL II

## BUSINESS MATHEMATICS AND STATISTICS

TUESDAY: 24 May 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) State four advantages and four disadvantages of closed-ended questions in a questionnaire. (8 marks)
- (b) Bundacho Bakery, produces two types of cakes, namely; queen cake and blackforest. The cost of producing 10 queen cakes and 8 blackforest is Sh.4,060. The cost of producing 4 queen cakes and 7 blackforest is Sh.2,840. The bakery makes a mark-up of 20% and 30% on queen cakes and blackforest respectively.

**Required:**

- (i) Using matrix algebra, determine the cost of producing a queen cake and a blackforest. (4 marks)
- (ii) The selling price of a queen cake and a blackforest. (2 marks)
- (c) James Wanigonda bought a television set on hire purchase terms. The deposit was indicated as Sh.35,000 and the balance payable in 12 equal instalments of Sh.4,500. As a policy of the company, a customer who defaults on an instalment is charged a penalty of 5% on the outstanding balance payable in the next month. James Wanigonda defaulted in the fifth month instalment and the ninth month instalment.

**Required:**

The total cost of the television set bought by James Wanigonda.

(6 marks)

**(Total: 20 marks)**

### QUESTION TWO

- (a) Highlight three applications of break-even analysis in a business environment. (3 marks)
- (b) In a certain manufacturing company, the total cost of production is given by the following function:

$$TC = -3q^2 + 12q - 2 \text{ where:}$$

TC = Total Cost  
q = Quantity produced in units.

The selling price per unit is Sh.5

**Required:**

- (i) The revenue function. (1 mark)
- (ii) The profit function. (2 marks)
- (iii) The break-even point in units. (3 marks)
- (iv) The level of production that would earn a profit of Sh.22,000. (3 marks)
- (c) An international economic forum was attended by 190 invited guests from three continents namely; Africa, Asia and America.

The following information relates to the guests who attended the forum:

100 guests represented Africa.  
80 guests represented Asia.

90 guests represented America.  
 35 guests represented both Africa and Asia.  
 33 guests represented both Asia and America.  
 48 guests represented both Africa and America.  
 15 guests represented all the three continents.

**Required:**

- (i) A venn diagram to represent the above information. (2 marks)
- (ii) The number of guests that were not representing any of the three continents. (2 marks)
- (iii) The number of guests that represented only one continent. (1 mark)
- (iv) The number of guests that represented two continents only. (1 mark)
- (v) The number of guests that represented at least two continents. (2 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Katama Insurance Company categorises its insurance claims by regions and the nature of claim as follows:

Nature of claim	Regions			
	Eastern	Southern	Northern	Western
Minor injuries treatment	75	128	29	52
In-patient treatment	233	514	104	251
Outpatient treatment	100	326	65	99

**Required:**

Determine the probability that:

- (i) A claim chosen at random is from Northern region. (1 mark)
  - (ii) A claim chosen at random is from Eastern region. (1 mark)
  - (iii) A claim chosen at random is either from Northern region or Southern region. (2 marks)
  - (iv) A claim chosen at random is for minor injuries treatment. (2 marks)
  - (v) A claim chosen at random is from Southern region, given that it is for minor injuries treatment. (3 marks)
  - (vi) A claim chosen at random is for outpatient treatment, given that it is from Western region. (3 marks)
- (b) The following data show the sales levels achieved by a salesman over a six month period together with the expenditure on fuel consumed over the same period:

Month	Sales level (Sh. "000")	Expenditure on fuel (Sh. "000")
January	250	30.00
February	180	20.00
March	315	30.25
April	225	27.50
May	345	28.75
June	500	42.60

**Required:**

The coefficient of variation for:

- (i) Monthly sales level. (4 marks)
- (ii) Monthly expenditure on fuel. (4 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Distinguish between the following terms:

- (i) Measures of central tendency and measures of dispersion. (4 marks)
- (ii) Nominal rate of interest and effective rate of interest. (4 marks)

(b) Agness Mwanyalo bought goods for sale worth Sh.90,000. She projected to make a profit of 25% on the selling price.

**Required:**

The price to be charged for the goods. (4 marks)

(c) The following data relate to the weekly output of production and the number of employees in a company:

Weekly Output in units ("000")	Number of employees
100 - 160	1
160 - 180	5
180 - 200	10
200 - 220	35
220 - 240	55
240 - 260	74
260 - 300	20

**Required:**

- (i) The arithmetic mean of the weekly output. (4 marks)
- (ii) The median weekly output. (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) The following are the indices of a country for the years 2011 - 2015:

Year	2011	2012	2013	2014	2015
Index	108	114	106	118	122

**Required:**

The constant base indices using 2010 as the base year (2010 = 100). (5 marks)

(b) The table below shows the number of services offered and prices charged per service for a small rural dental clinic during the last three quarters of year 2015:

Type of Service	Price (Sh.)			Quantity (Services)		
	April-June	July-September	October-December	April-June	July-September	October-December
Tooth extraction	800	900	1,200	300	275	400
Tooth filling	600	750	900	400	320	280
Tooth cleaning	450	600	800	700	660	800

**Additional information:**

Base period = April - June

**Required:**

- (i) The Laspeyre's price indices for the quarters July - September and October - December. (8 marks)
- (ii) The Paasche's price indices for the quarters July - September and October - December. (7 marks)

**(Total: 20 marks)**