

# 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)**