

# KASNEB

ATD LEVEL II

DCM LEVEL II

## BUSINESS MATHEMATICS AND STATISTICS

WEDNESDAY: 18 November 2015.

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) Explain three challenges that might be faced during statistical sampling. (6 marks)
- (b) The cash price of a television set is Sh.18,000. If the television is bought on hire purchase terms, a deposit of 25% of the cash price is required. A flat interest rate of 15% per annum is charged on the remaining balance for two years.

**Required:**

- The amount of monthly instalment on hire purchase terms. (4 marks)
- (c) The following information relates to the expenditure of a certain family during the years 2013 and 2014:

Item	Year 2013		Year 2014	
	Quantity in "000" units	Price per unit (Sh.)	Quantity in "000" units	Price per unit (Sh.)
A	120	6	160	8
B	60	12	80	10
C	80	10	40	16
D	200	4	300	4
E	40	14	20	20

**Required:**

- (i) Laspeyre's price index. Interpret your answer. (5 marks)
- (ii) Paasche's price index. Interpret your answer. (5 marks)

(Total: 20 marks)

### QUESTION TWO

- (a) A manufacturer finds that the variable cost ( $V$ ) in thousands of shillings of a product B is given by the equation  $V = 2B^2 - 30B$ , where  $B$  is the number of units of product B produced per month. The overhead cost in thousands of shilling is Sh.1,000 per month. Customers are charged a price of  $P = 60$  (thousand shillings) per unit of product B.

**Required:**

- (i) The total revenue function. (2 marks)
- (ii) The total cost function. (2 marks)
- (iii) The break-even sales level of product B. (4 marks)
- (iv) The level of profits/losses when 10 units of product B are produced and sold. (2 marks)
- (b) Uyombo Ltd. uses three machines in its production department. Machine X produces 3% defective items, machine Y produces 5% defective items and machine Z produces 10% defective items. Of the total output from the three machines, 60% of the items are produced by machine X, 30% by machine Y and 10% by machine Z.

One item is selected at random from a day's production.

**Required:**

- (i) A tree diagram showing the joint probabilities from the machines. (5 marks)
- (ii) The probability that the item is defective. (2 marks)
- (iii) The probability that the item was produced by machine X or by machine Z; given that the item is defective. (3 marks)

(Total: 20 marks)

### QUESTION THREE

(a) Explain the following terms as used in set theory:

- (i) Complement of a set. (2 marks)
- (ii) Union of sets. (2 marks)
- (iii) Intersection of sets. (2 marks)

(b) An American tourist visited Kenya with US dollars \$38,700. He exchanged all his dollars to Kenyan shillings Ksh., paying a bank charge of 2%. During his stay in Kenya, he spent Ksh.2,000,000 and paid Ksh.200,000 as air ticket. When leaving the country, he converted the remaining balance into US dollars without paying any bank charges.

Use exchange rate of 1 \$ = Ksh.103.72

**Required:**

The amount of money the tourist received at the end of his visit in US dollars. (4 marks)

(c) Tsuma Electronics Ltd. deals exclusively with three types of calculators namely A, B and C series. During the month of January, the company's purchases of calculators in units amounted to 50 A series, 75 B series and 36 C series.

The company has two sources of buying the calculators, X and Y whose unit cost prices are Sh.2,800, Sh.4,650, Sh.6,275 and Sh.2,640, Sh.4,250, Sh.6,450 respectively for A series, B series and C series calculators.

All calculators purchased from source X are sold at a profit of 20% while those from source Y are sold at a profit of 25%.

**Required:**

- (i) Represent the quantity of calculators in a row matrix. (1 mark)
- (ii) Represent the price of calculators in a column matrix. (1 mark)
- (iii) The total cost of calculators from each source using matrix algebra. (2 marks)
- (iv) The expected profit for purchasing calculators from each source using matrix algebra. (6 marks)

**(Total: 20 marks)**

### QUESTION FOUR

(a) Explain the following terms:

- (i) Depreciation. (2 marks)
- (ii) Annuity. (2 marks)
- (iii) Simple interest. (2 marks)

(b) KK Ltd. bought a piece of land for Sh.2,500,000 in January 2012. The value of the land appreciated by 18% per annum in 2012 and 2013. The land further appreciated by 15% in 2014. Due to harsh economic factors, the piece of land dropped in value by 12% during the year ending 2015.

**Required:**

- (i) The expected value of the land by the end of year 2015. (3 marks)
- (ii) The rate of interest per annum that would have resulted in the land appreciating to the same value after four years. (3 marks)

(c) The following information shows the production of product X and Y in a certain enterprise:

Year	1	2	3	4	5	6	7	8
Product X	238.2	281.2	319.4	352.2	391.0	448.9	479.6	536.0
Product Y	89.4	95.6	108.1	147.2	272.0	427.8	482.7	601.1

**Required:**

Construct on the same scale, a semi-logarithmic graph of each of the products X and Y.

(8 marks)

**(Total: 20 marks)**

AD23 & CD23 Page 2

Out of 3

**QUESTION FIVE**

(a) Highlight three advantages and three disadvantages of venn diagrams.

(6 marks)

(b) The following data relate to the distribution of lifetimes of 500 light bulbs tested by a compliance standards agency from two manufacturers A and B:

Life time (days)	Number of bulbs tested	
	A	B
500-550	27	22
550-600	50	46
600-650	85	78
650-700	99	88
700-750	94	92
750-800	74	86
800-850	47	52
850-900	24	36

**Required:**

(i) Mean lifetime of the bulbs from each manufacturer.

(6 marks)

(ii) Median lifetime of the bulbs from each manufacturer.

(4 marks)

(iii) Modal lifetime of the bulbs from each manufacturer.

(4 marks)

**(Total: 20 marks)**

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