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ATD LEVEL II

DCM LEVEL II

**BUSINESS MATHEMATICS AND STATISTICS**

**TUESDAY: 22 May 2018.**

**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 five applications of mathematical functions in business. (5 marks)
- (b) State four advantages of a hire purchase system in business. (4 marks)
- (c) (i) Willy Bushuti bought a house at the beginning of year 2002 at Sh.40,000,000. The value of the house has been increasing at the rate of 4% per annum.

**Required:**

The value of the house at the end of year 2017. (3 marks)

- (ii) Lucy Mwangudza bought a personal car for Sh.2,800,000 at the beginning of January 2017. The value of the car depreciates by 1% per month.

**Required:**

The expected value of the car at the end of December 2018. (3 marks)

- (d) The following data show the performance of 50 students in a Business Statistics examination.

| Number of students | Marks scored (%) |
|--------------------|------------------|
| 8                  | 37               |
| 14                 | 52               |
| 21                 | 67               |
| 6                  | 82               |
| 1                  | 96               |

**Required:**

Geometric mean for the above data.

(5 marks)

**(Total: 20 marks)**

**QUESTION TWO**

- (a) Name four types of measurement scales used in data collection. (4 marks)
- (b) Muungano Partnership shared profits among its five partners namely; Jane, Peter, Zainabu, Kioko and Linturi. Zainabu got  $\frac{11}{60}$  of the total amount while the rest of the amount was shared among Jane, Peter, Kioko and Linturi in the ratio 12:12:15:10 respectively. Zainabu received Sh.132,000.

**Required:**

The amount of money that was received by each of the remaining four partners.

(4 marks)

(c) XYZ Ltd. has availed the following data:

|                     |               |
|---------------------|---------------|
| Units produced      | 360 ± 20%     |
| Selling price (Sh.) | 1,400 ± 5%    |
| Material cost (Sh.) | 280,000 ± 10% |
| Labour cost (Sh.)   | 120,000 ± 4%  |

**Required:**

Maximum profit made by the company.

(4 marks)

(d) The table below shows prices and quantities of three commodities for the years 2014 and 2015:

| Item  | Year 2014   |                 | Year 2015   |                 |
|-------|-------------|-----------------|-------------|-----------------|
|       | Price (Sh.) | Quantity (Bags) | Price (Sh.) | Quantity (Bags) |
| Maize | 70          | 30              | 120         | 25              |
| Wheat | 110         | 10              | 140         | 12              |
| Beans | 180         | 8               | 360         | 5               |

**Required:**

Price index using the Marshall - Edgeworth method.

(8 marks)

(Total: 20 marks)

**QUESTION THREE**

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

- (i) Compound events. (2 marks)
- (ii) Mutually exclusive events. (2 marks)
- (iii) Complementary events. (2 marks)

(b) A trader purchased 125 books at a total cost of Sh.11,400. The trader wishes to make a profit of 40% on the selling price.

**Required:**

The selling price per book.

(3 marks)

(c) Adrian Advertising Agency has 2,000 clients who use different advertising methods.

- 830 clients use television advertising
- 700 clients use radio advertising
- 560 clients use newspaper advertising
- 350 clients use both television and radio advertising
- 360 clients use both radio and newspaper advertising
- 330 clients use both television and newspaper advertising
- 750 clients use none of the three advertising methods

**Required:**

- (i) Present the above information in a Venn diagram. (4 marks)
- (ii) The number of clients that use at least two of the three advertising methods. (3 marks)
- (iii) The number of clients that use television advertising only. (2 marks)
- (iv) The number of clients that use television or radio but not newspaper method of advertising. (2 marks)

(Total: 20 marks)

**QUESTION FOUR**

- (a) State four principles used in construction of tables in statistics. (4 marks)
- (b) The data below show the number of students enrolled for a computer packages course at Digital College for the years 2016 and 2017:

| Month     | Year |      |
|-----------|------|------|
|           | 2016 | 2017 |
| January   | 40   | 42   |
| February  | 48   | 45   |
| March     | 42   | 60   |
| April     | 58   | 64   |
| May       | 60   | 58   |
| June      | 80   | 70   |
| July      | 75   | 80   |
| August    | 60   | 75   |
| September | 55   | 60   |
| October   | 50   | 48   |
| November  | 60   | 55   |
| December  | 90   | 95   |

**Required:**

Construct a Z - chart to represent the above data. (10 marks)

- (c) Dena Ltd. offers credit to individuals who wish to buy cars. Anderson Charo wishes to acquire a car and has approached Dena Ltd. The terms of sale for the car are Sh.4,425,000 cash or Sh.1,800,000 deposit and Sh.195,000 per month for 24 months. Dena Ltd. can repossess the car in case Anderson Charo is unable to pay all the monthly instalments.

**Required:**

(i) The hire purchase price of the car. (2 marks)

(ii) The compound interest rate at which Sh.4,425,000 can be invested for 20 months to yield the hire purchase price of the car. (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

- (a) Summarise three advantages and three disadvantages of the arithmetic mean as a measure of central tendency. (6 marks)

- (b) Solve the following equations by matrix algebra:

$$\begin{aligned} 5x + 9y &= -30 \\ 6x - 2y &= 28 \end{aligned}$$

(5 marks)

- (c) Solve the following equation by a quadratic formula:

$$4x^2 - x - 3 = 0$$

(4 marks)

- (d) Solve the following simultaneous equations by substitution method:

$$\begin{aligned} 4x + 3y &= 7 \\ 3x - 2y &= 9 \end{aligned}$$

(5 marks)

**(Total: 20 marks)**

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