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ATD LEVEL II

PILOT PAPER

BUSINESS MATHEMATICS AND STATISTICS

December 2021.   **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)   A company sells packs of printer ink cartridges for Sh.2,400. If a customer orders more than 100 packs, the company is prepared to reduce the unit price by Sh.4 for each pack bought above 100 packs up to a maximum of 300 packs in a single order.

     Required:
     (i)   How much does it cost to buy 130 packs?   (6 marks)

     (ii)   If the cost is Sh.532,400, how many packs were ordered?   (6 marks)

(b)   Solve the following quadratic equation:
         $2q^2 – 19q – 10 = 0$ Where q = quantity produced.   (8 marks)
                                                              (Total: 20 marks)

QUESTION TWO
Kilunda saves Sh.10,000 in a bank at the beginning of each month. The bank offers a return of 12% compounded monthly.

Required:
(a)   Determine the total amount saved after 12 months.   (10 marks)

(b)   After how many months does the amount saved first exceed Sh.200,000?   (10 marks)
                                                            (Total: 20 marks)

QUESTION THREE
(a)   A potter makes and sells ceramic bowls. It is observed that when the price is Sh.3,200, only 9 bowls are sold in a week. But when the price decreases to Sh.1,300, weekly sales rise to 20. Assuming that demand follows a linear function, obtain a formula in terms of Q for P.   (5 marks)

(b)   The demand and supply functions of a good are given by; $P = –2Q_D + 50$
                                                       $P = ½ Q_s + 25$

     Where P, Q_D and Q_s are price, quantity demanded and quantity supplied respectively.

     Required:
     (i)   Determine the equilibrium price and quantity.   (10 marks)

     (ii)   Determine the effect on the market equilibrium if the government decides to impose a fixed tax of Sh..5 on each good.   (10 marks)
                                                            (Total: 20 marks)

QUESTION FOUR

Towards reduction of carbon emissions into the atmosphere, KL Ltd. has fully rolled out production of ethanol generators. However, part of the current stock includes ethanol convertible generators from diesel run, requiring 5% of the cost for conversion into ethanol generators. Currently in stock are 12 generators 4 of which are convertible while the rest already run on ethanol. The generators are exactly the same in size and design and cost Sh.124,000 each.

Required:

(a)   A tree diagram showing twice sampling of a generator from the current stock, without replacement by a customer who needs two generators.   (3 marks)

(b)   Determine the probability of selecting:

      (i)   At least one convertible generator.   (7 marks)

      (ii)   An option that makes the customer spend at most Sh.6,200 on conversion.   (6 marks)

(c)   Evaluate the probability of spending exactly Sh.6,200 on conversion.   (4 marks)
                                                                              (Total: 20 marks)

QUESTION FIVE

The data below relates to Maneno Suburb, an estate in Kitale town, on power consumption of 60 households. Consumption is on weekly basis:

Power bill (Sh.)	No. of households
351 – 400	3
401 – 450	6
451 – 500	8
501 – 550	9
551 – 600	10
601 – 650	12
651 – 700	8
701 – 750	4

Required:

(a)   Evaluate the mean of the distribution.   (7 marks)

(b)   Determine the standard deviation.   (7 marks)

(c)   Use the formula below to determine median:
$$\text{Med} = L + \frac{(n - c)}{f} i$$
                                                                                     (6 marks)
                                                                              (Total: 20 marks)