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ATD LEVEL II

DCM LEVEL II

BUSINESS MATHEMATICS AND STATISTICS

TUESDAY: 18 May 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)   Outline six steps that should be followed in obtaining relevant and sufficient primary data.   (6 marks)

(b)   The following data relates to the value of invoices (in thousands of shillings) selected for verification in an audit assignment:

Value of invoice Sh."000"	Frequency
60 – 62	5
63 – 65	18
66 – 68	42
69 – 71	27
72 – 74	8

Required:

(i)   The mean value of invoices selected.   (3 marks)

(ii)   The standard deviation of the value of invoices.   (3 marks)

(iii)   The value of the 75th percentile invoice.   (2 marks)

(iv)   The modal value of invoices.   (2 marks)

(c)   (i)   Calculate the 9th term of the following arithmetic sequence:

3,   8,   13,   18,   23,   28,   33,   38.   (2 marks)

(ii)   Determine the sum of the first 10 terms of the following arithmetic sequence:

1,   4,   7,   10,   13,   . . .   (2 marks)

(Total: 20 marks)

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

(i)   Null set.   (1 mark)

(ii)   Union of a set.   (2 marks)

(iii)   Complement of a set.   (2 marks)

(b)   Prime Furnitures Limited intends to launch a new luxury sofa set range. The selling price of a sofa set will be Sh.90,000. To make the range, the company has invested Sh.319,000,000 in new equipment. Variable production cost will be Sh.35,000 per set.

   Required:
   (i)   Number of sofa sets required to breakeven.   (3 marks)

   (ii)   The profit to be made assuming 6,000 units of sofa sets are sold.   (2 marks)

(c)   Coffee Makers Ltd. blends two types of coffee beans; American and Brazilian to make two blends of coffee, Morning and Noon. The Morning blend uses 75% of the available American beans and 10% of the available Brazilian beans. The Noon blend uses 20% of the available American beans and 60% of the available Brazilian beans.

   Required:
   (i)   Assuming that Coffee Makers Ltd. buys 200kgs of American beans and 300kgs of Brazilian beans, use matrix algebra to determine how much of each blend of coffee can be made.   (4 marks)

   (ii)   Determine the amount of beans to be bought assuming that Coffee Makers Ltd. intends to make 400kgs of Morning blend and 600kgs of Noon blend.   (6 marks)
   (Total: 20 marks)

QUESTION THREE
(a)   Highlight four applications of mathematical functions in business.   (4 marks)

(b)   The outstanding balances on the monthly bills of nine credit card accounts and the household income of the account holders are as follows:

Balance (Sh.)	250	1,630	970	2,190	410	830	0	550	0
Income (Sh."000")	15	23	26	28	31	35	37	38	42

   Required:
   (i)   A scatter diagram with outstanding balance as the dependent variable (Y).   (3 marks)

   (ii)   Pearson's correlation coefficient.   (7 marks)

   (iii) Comment on your results in (b) (ii) above.   (1 mark)

(c)   Find the derivatives of:

   (i) $y = 6x^3 + 10x^2 + 3x + 3$.   (3 marks)

   (ii) $y = 8x^2 - 4x^3$.   (2 marks)
   (Total: 20 marks)

QUESTION FOUR
(a)   Explain four types of discounts that are available in business transactions.   (4 marks)

(b)   Susan Mueni bought goods worth Sh.300,000 on hire purchase terms. She paid an initial deposit of 30%. A flat rate interest of 15% per annum is charged on the outstanding balance of the period of payment.

   The balance plus the interest is to be paid in 12 equal installments. Maria Nyasweti bought the same goods in cash and got a discount of 10%.

   Required:
   (i)   Determine Susan Mueni's initial deposit.   (1 mark)

   (ii)   The amount of monthly installment paid by Susan Mueni.   (3 marks)

   (iii) The difference between the amount paid by Susan Mueni and Maria Nyasweti.   (3 marks)

(c)   Zek Limited borrowed Sh.500,000 from ABK Bank at an interest rate of 15% compounded semi-annually.

Required:

(i)   The amount owed to the bank after 5 years assuming no payments are made in between.   (2 marks)

(ii)   The interest charged by the bank.   (1 mark)

(d)   In a class of 200 students, 72 are male and are studying accounting, 18 are male but not studying accounting, 84 are female and are studying accounting, 26 are female and are not studying accounting.

A student is chosen at random.

Required:

(i)   A contingency table showing the above information.   (3 marks)

(ii)   Determine the probability that a student studies accounting given that the student is a male.   (1 mark)

(iii)   Determine the probability that a student studies accounting given that the student is a female.   (1 mark)

(iv)   Determine the probability that a student studies accounting.   (1 mark)

(Total: 20 marks)

QUESTION FIVE

(a)   (i)   Explain the meaning of the term "index number".   (2 marks)

(ii)   Highlight four areas in which index numbers could be applied.   (4 marks)

(b)   The tables below show information obtained from a grocer on quantities and prices of basic vegetables consumed over the years 2017 - 2020:

Price (Sh./Bag)

Vegetable	2017	2018	2019	2020
Carrots	650	680	720	800
Spinach	720	960	1,020	1,100
Cabbages	1,100	1,140	1,180	1,200
Onions	1,600	1,680	1,750	1,800

Quantity (Bags)

Vegetable	2017	2018	2019	2020
Carrots	120	130	135	140
Spinach	82	85	90	95
Cabbages	160	172	162	164
Onions	240	245	250	242

Required:

(i)   Paasche's price index for the years 2019 and 2020 using 2017 as the base year.   (6 marks)

(ii)   Laspeyre's price index for the years 2019 and 2020 using 2018 as the base year.   (6 marks)

(c)   State two advantages of Fisher's ideal price index over other index numbers.   (2 marks)

(Total: 20 marks)

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