The Co-operative University of Kenya

SPECIALS AND SUPPLEMENTARY EXAMINATION AUGUST-2019

DIPLOMA EXAMINATION

UNIT CODE: DUCU 1105

UNIT TITLE: FOUNDATIONS OF MATHEMATICS

DATE: 30TH AUGUST, 2019 TIME: 2:30 PM – 4:30 PM

INSTRUCTIONS:
- Answer question **ONE (compulsory)** and any other **TWO** questions

QUESTION ONE

(A) The percentage of students over 40 years who have a Master's degree in Kenya has been increasing clearly and is summerized in the following table.

Year	1990	1995	2000	2005	2010
% of degrees	30	34	38	42	46

Required;
(a) Determine the linear function that relates to the percentage of people with a master degree. (6 Marks)
(b) Estimate the number of people who will have masters degree by 2020. (4 Marks)
(c) Determine the year in which people who will have a masters degree will be 58%. (4 Marks)
(B) Determine the 5th term and the sum of the first 20 terms of the series; 3,6,9,12... (6 Marks)
(C) Use completing square method to find the value of x.
$X^2 – 8X + 5 = 0$ (5 Marks)
(D) Rewrite the following exponential equation in the logarithm form. (5 Marks)
  (i) $3^4 = 81$
  (ii) $64^{1/2} = 8$

QUESTION TWO

(a) An amount of kshs 6,500 is placed in 3 investments at the rates of 6%, 8% and 9% per annum respectively. The total amount of income is 480 kshs. If the income from the second investment is kshs 60 less than the income in the third investment. Find the amount of each investment. (10 Marks)
(b) Find the value of the polynomial when X = 2. (5 Marks)
$3X^2 – 2X^2 – 4x + 1$
Solve the following equation using factorization method
$2X^2 – 6x – 36 = 0$ (5 Marks)

QUESTION THREE

(a) A certain production facility cost function is $C(X) = 2X + 5$ the revenue function is $R(X) = 8X – X^2$ where X is the number of units produced in thousands and R and C are measured in million of shillings.
  (i)   Find the profit function (3 Marks)
  (ii) Find the level of production that maximize the profit. (3 Marks)
  (iii) Determine the maximum profit in shillings. (3 Marks)
  (iv) What level of production that maximize revenue (3 Marks)
  (v)   What is the maximum revenue in million shillings. (3 Marks)

(b) Simplify the following surds (5 Marks)
    (A) $\sqrt{8}$
    (B) $(6 - \sqrt{7})(6 + \sqrt{7})$
    (C) $\frac{\sqrt{9}}{5}$

QUESTION FOUR

(a) A box has 6 blue beads and 4 red beads. Three beads are drawn at random without replacement using a tree diagram find the probability that
    (i)   They are all blue (4 Marks)
    (ii)   There are exactly two blue beads. (4 Marks)
    (iii)   There is atleast one blue bead. (4 Marks)
(b) Five choirboys are to be selected to occupy the first row in how many ways can they be selected. (4 Marks)
(c) Highlight FOUR applications of probability in an institution. (4 Marks)

QUESTION FIVE

(a) The following are number of products packed in packing company in a single day. Assuming that the products are registered in intervals as follows.

Products	Frequency
121 – 125	2
126 – 130	5
131 – 135	17
130 – 140	48
141 – 145	21
146 – 150	6
151 – 155	1

Required;

(a) Calculate the ;
    (i)   Modal product (1 Mark)
    (ii)   Mean (3 Marks)
    (iii)   Variance (5 Marks)
    (iv)   Standard deviation (2 Marks)
(b) Differentiate the following function as applied in integral Calculus
    (i) $\int 6x^2 \, dx$ (2 Marks)
    (ii) $\int \frac{3x^4}{4} \, dx$ (2 Marks)
    (iii) $\int_1^3 2x^3 \, dx$ (2 Marks)