NATIONAL OPEN UNIVERSITY OF NIGERIA
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS
SEPTEMBER 2020_1 EXAMINATION

COURSE TITLE: ADVANCED MATHEMATICAL ECONOMICS
COURSE CODE: ECO 459
UNITS: 2
TIME ALLOWED: 2HOURS

INSTRUCTION: ANSWER ANY THREE QUESTIONS. 23 MARKS FOR EACH QUESTION AND ONE MARK FOR CLARITY

QUESTION ONE

  (a) With concrete example, explain the term Linear equation.   **(5Marks)**

  (b) Solve the following for the unknowns

  (i) $3x + y = 10$, find x in terms of y   **(4Marks)**

  (ii) $5^{x+1} \times 25^{5x-4} = 5^{-x+5} \times 125^{2x}$, find x.   **(14Marks)**

                                                             Total = (23 Marks)

QUESTION TWO

  (a) Mention the types of simultaneous linear equation methods and explain any two you know.   **(9Marks)**
  (b) Given the following simultaneous linear equations:

   $2x + y = 7$…………………(i) $3x - y = 8$……………(ii)

Find x and y using: (a) Elimination method (b) Substitution method   **(14Marks)**

QUESTION THREE

  (a) (i) Differentiate between a sequence and a series.   **(4Marks)**

       (ii) The 4th and the 9th term of A.P are -9 and -24 respectively. Find the A.P and its 14th
term.   **(13Marks)**

  (b) Different the following with respect to x:

$(i)\, y\ =\ 9x^4 - 5x^3 + 2x^2 - 10x + 20$

$(ii)\, y = 10a^3 + 4a^2 - 6a + 5$

(6Marks)

Total = (23 Marks)

QUESTION FOUR

(a) Explain differentiation as the rate of change   **(3Marks)**

(b) (i) Use the first principle to differentiate $(i)\, y = x^3$ **(8Marks)**

Differentiate the following with respect to x:

(ii) $y = \dfrac{x+3}{2x-1}$ **(7Marks)**

(iii) $y = \dfrac{2x^2 + 3}{x}$ **(5Marks)**

Total (23Marks)

QUESTION FIVE

(a) (i) "Integration is also known as anti-differentiation"; discuss this statement with an illustration.   **(3Marks)**

(ii) Integrate the following with respect to x: (a) $\int \dfrac{3}{\sqrt[2]{x}}\, dx$ (b) $\int \dfrac{x^4}{\sqrt{x}}\, dx$ **(6Marks)**

(b) A firm has the following revenue (R) and cost (C) functions (per thousand naira):

$R\ =\ 180q\ -\ 2q^2,\ C = 2q^2 + 20q + 60$

(i) What quantity should be sold and at what price   **(10Marks)**

(ii) What will be the maximum profit   **(4Marks)**

Total (23Marks)