



**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:

$$2x + y = 7 \dots\dots\dots(i) \quad 3x - y = 8 \dots\dots\dots(ii)$$

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 :

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

(6Marks)

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

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:

$$(ii) y = \frac{x+3}{2x-1}$$

(7Marks)

$$(iii) y = \frac{2x^2+3}{x}$$

(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) $\int \frac{3}{\sqrt[2]{x}} dx$ (b) $\int \frac{x^4}{\sqrt{x}} dx$ (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)