



NATIONAL OPEN UNIVERSITY OF NIGERIA
PLOT 91, CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY, JABI - ABUJA
FACULTY OF SOCIAL SCIENCES
2020_2 EXAMINATION ...

COURSE CODE: ECO459
COURSE TITLE: ADVANCED MATHEMATICAL ECONOMICS
CREDIT UNITS: 2 UNITS
TIME ALLOWED: 2 HOURS (2HRS)
INSTRUCTION: 1. INDICATE YOUR MATRICULATION NUMBER CLEARLY
2. ANSWER THREE QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS

Question 1

- a. Solve for x and y in the following equations
- i. $3x + 2y = 10$ **5.3marks**
 - ii. Given $4^{8x} \times 8^{4x-2} = 32^{2x} \times 64^{2x-4}$
Find x **4marks**
- b. Solve for x and y in the following equations
- $3x + 2y = 10$
 - $4x + 6y = 12$ **6marks**
- c. The 3rd term of an AP is 15 and the 6th term is 27. Find the first term, the common differences and hence the sum of the first 10 terms. **8marks**

Question 2

- a. Differentiate using the first principle with respect to x
- $Y = 2x^2 - x + 3$ **7.3marks**
- bi. Differentiate with respect to x
- i. $Y = (2x - 1)(x^3 + 3)$ **4marks**
 - ii. $y = (3x^2 + 2)^4$ **4marks**
 - iii. If $y = \log_a 2x$, find $\frac{dy}{dx}$ **4marks**
 - iv. Given that the demand function of a consumer is $Q = 10 - 4P$, find the elasticity at $P = 2$ and $P = 3$. **4marks**

Question 3

- a. Maximize the following Total Revenue Function
- $TR = 240Q - 8Q^2$ **5.3marks**
- b. Minimize the following Total Cost Function
- $TC = 6Q^3 - 36Q^2 + 384Q + 200$ **8marks**

- c. Given the following Total Revenue and Total Cost Function of a firm. Maximize the profit of the firm.

$$TR = 700Q - 3Q^2$$

$$TC = 750 + 40Q$$

10marks

Question 4

- a. Find the integration of the following:

i. $\int 4x^2 dx$

2.5marks

ii. $\int 4x^{-1} dx$

2.5marks

- b. Using Integration by Part, integrate the following

$$\int 3x(2x^2 + 3)^2 dx$$

10.3marks

- c. The marginal cost (MC) of an oil producing firm is found to $6q^2 + 24q + 500$. Find the variable cost (VC) of producing 200 barrels of oil (Q) per day.

8marks

Question 5

- a. Define briefly

i. Differential equation

4marks

ii. Difference equation

4marks

- b. Give that:

$$D_t = -P_t + 240$$

$$S_t = -0.2P_{t-1} + 120$$

And initial price (P_0) = 200

i. Establish the market price P_t (time path)

10.3marks

ii. Equilibrium price P_e

2.5marks

iii. Comment on the stability condition of the model.

2.5marks