NATIONAL OPEN UNIVERSITY OF NIGERIA
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF ECONOMICS
2017_2 Examination, January/February 2018

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

INSTRUCTION: ANSWER ANY THREE (3) QUESTIONS. ALL QUESTIONS CARRY EQUAL MARKS

QUESTION 1

(a) Given the following linear equation find the value of x:

1. $x + 2 = 10,$ 2 mark
2. $2x + y = 15,$ find x in terms of y. 3 mark
3. $6^{x+1} \times 36^{5x+2} = 6^{-x+1} \times 216^{2x},$ 6 mark
4. $3^{10x} \times 9^{3x+1} = 27^{x+1} \times 81^{-x+8}$ 5 mark

(b) Find the demand function of $Q = f(P)$ If $\epsilon = -(5P + 2P^2)/Q$ and $Q = 500$ when $P = 10.$ 7 marks

QUESTION 2

a. Differentiate y = $(3x - 4)(x^2 + 8)$ with respect to x 7 marks

b. Given $y = 10x - 7 + x^2$ $find$ $\frac{dy}{dx}$ 3 marks

c. Given: $y = 500 + 4x + 2x^2 - 10x^3 - 12x^4$ find $\frac{dy}{dx}$ 3 marks

d. Differentiate $y = \log_e x^2$ 5 marks

e. Differentiate y = $\sin(7x^2 - 3x + 1)$ with respect to x. 5 marks

QUESTION 3

If the marginal revenue function for a commodity is $(6q^2 - 12q + 4)$ naira per units when the level of production is q units.

(i) Determine the total revenue function 11 marks
(ii) Find the total revenue when 40 units are sold. 12 marks

QUESTION 4

a. Integrate $\sqrt[9]{x}$ with respect to X 5 marks

b. Evaluate the given polynomial $\int (x^3 dx - 5^2 + 13x - 11)dx$ 6 marks

c. Evaluate $\int_1^2 x^2 dx = \left(\frac{x^8}{3} + c\right)_1^2$ 4 marks

d. Evaluate the given integration $\int (x^2 + 2x + 3)\left(\frac{1}{3}x^3 + x^2 + 3x - 7\right)^6 dx$

8 marks

QUESTION 5

The demand and supply function for a product are respectively given as P = 500 – 4q and P = 200 + 5q, where P is the price and q is the demand in unit.

(a)i. Determine the elasticity of the demand 5 marks

ii. The elasticity of supply 2 marks

iii. The equilibrium price and quantity 8 marks

(b)i. Using the information in (a) above to find the revenue function and hence determine the revenue for a sales of 20 units 2 marks

ii. If the cost function for the same product c = 20 + 10q, then determine the profit for a sales of 30 units. 6 marks

Best Wishes!