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NATIONAL OPEN UNIVERSITY OF NIGERIA

Plot 91, Cadastral Zone, Nnamdi Azikiwe Express Way, Jabi - Abuja

FACULTY OF MANAGEMENT SCIENCES

EXAMINATION 2018

COURSE CODE: **MBA 816**
COURSE TITLE: **Basic Mathematics and Statistics for Manager**
CREDIT UNIT: **3**
INSTRUCTION: **1. Indicate your Matriculation Number clearly**
2. Attempt question one (1) and any other three (3) questions; four questions in all
3. Question one (1) is compulsory and carries 25 marks, while the other questions carry 15 marks each.
4. Present all your points in a coherent and orderly Manner
TIME ALLOWED: **2½Hours**

1ai What are rational numbers and illustrate examples of rational numbers. **2 marks**

1aii Express the following rational numbers in
a) ascending order – ½, - 3, 4, 2, - ¾
b) descending order – 11, 9, - 4 – 17, 12, 3 **6 marks**

1b. Simplify i. $3\sqrt{60} - 5\sqrt{30} + 4\sqrt{12}$

ii $\sqrt{15} \times 3\sqrt{30} \times \sqrt{90}$

iii $\sqrt{45} \times \sqrt{40}$ **6 marks**

1c Simplify the following fractions

i) $\frac{6x - 3y}{3} = \frac{2}{5}$

ii) $\frac{12m - 6n}{12} = \frac{6}{8}$

Iii) $\frac{9y + y}{4} = \frac{12}{6}$ **6 marks**

1d A cyclist made a journey of 145km in a total time of $3\frac{1}{4}$ hours. He went part of the way at an average speed of 50km/h and for the rest of the journey the cyclist averaged 45km/h. How many kilometers did the cyclist cover at 40km/h and 48km/h. **2 marks**

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1e Solve the following fractions

i. $\frac{3}{8}(4x - 5) - \frac{5}{12}(3x - 5) = \frac{1}{6}$

ii. $\frac{4}{5}(2y + 5) = \frac{2}{3}(2y + 7) - \frac{2}{15}$

iii a) $y4 \times y^2$

b) $9^3 \times 12^2$ **3 marks**

2a Simplify the followings

i. Solve $3\sqrt{(-7y^{15}n^3)}$

ii. Simplify $6\sqrt{y^{18}}$

iii. Simplify $\frac{10x^2y + 9xy^2 - 10x^2y^2}{2xy} = 0$

iv. Find x if $6^x \times 4^{2x+6} \times 8^{x-1} = 16$.

3 marks

2b i. Explain the term ratio and illustrate it with examples

ii. Okewa bread wants to reduce the time taken for baking of 3 hours in the ratio of 7:8. What is the decreased time for baking?

iii) Find the ratio x:y if $6x^2 = 7xy + 20y^2$

iv) A man takes 18 minutes for a journey if he travels at 18km. per hour. How long will the journey take if he travels at 30km. per hour?

v) A car takes 60 minutes for a journey if it runs at 84km/h. At what rate must it run to do a journey of 50 minutes?

vi) The electrical resistance of a wire varies inversely as the square of its radius. Given that the resistance is 0.5 ohms when the radius is 0.3cm, find the resistance when radius is 0.45cm. **6 marks**

2c i) If y varies directly as the square of x and inversely as w and if y =36 when x = 6 and y = 8 find y when x = 10 and y = 4

ii) If w varies jointly as L and the square of r. find the percentage change in w if L increases by 20% and r increases by 50%. If w =15 when h = 3 and r = 2½, find w when h=1 and r = 10; find also w terms of h, r.

iii) Given that y is the sum of two quantities, one of which varies as x and the other which varies inversely as x. If y = 24 when x = 2 and y = 12 when x = 3, find the values of y when x = 6.

iv) If Z varies directly as the square of x and inversely as the square root of y, find the percentage change in Z if x increases by 20% and y decreases by 19%. If Z = 3 when x = 6 and y = 16, find Z when x = 12 and y = 25; find also Z in terms of x and y. **6 marks**

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3a. Ade drove for 3 hours at certain speed and then doubled that speed for the next 2 hours. If Ade drove the car covering 63kms altogether, find the speed for the first 3 hours.

3 marks

3b. Ayo cycled for 8 hours at a certain speed and then doubled that speed for the next 2 hours. If the total distance covered was 120kms altogether

(a) find the speed for the first two hours

(b) find the distance covered for the period he doubled his speed.

4 marks

3c. (a) Paul and Peter received an award of N25,000 as a reward for their excellent performances with a condition that Peter will receive N5,000.00 more than Paul. Determine the amount Peter and Paul will receive.

(b) A certain number is multiplied by 5 and then 35 is added, if the result is 100. Find the original number.

4 marks

3d Solve the simultaneous equations

a) $9w + 2x = 24$ - - - (1)

$6w + 5x = 3$ - - - (2)

b) Solve the following simultaneous equations

$10x - 5y = -3$

$3x + 4y = 2$

4 marks

4a. Given the following quadratic equation; $y = 2x^2 – 3x – 7 = 0$, using the range of x = -1 to +4, plot the graph and read the roots.

(a) Solve the quadratic equation $3y^2 – 4y + 5 = 0$

(b) Solve the equation $y^2 – 4y + 13 = 0$ **2 marks**

4b. Solve the following quadratic equation

a) $x^2 – 5x – 6 = 0$,

b) Solve the following quadratic equation:

$10x^2 + 6x = 9$

$5x^2 + 6x – 3 = 0$ **5 marks**

4c In a market survey within Jos, it was discovered that within Ahmadu Bello Way, 14 exercise books and 10 biros cost N144. However at Rayfield, 12 exercise books and 8 biros cost N 132. Determine the price of a biro and an exercise book. **5 marks**

4d Solve the equation by completing the square $y^2 – 8y + 3 = 0$. **3 marks**

5a. i) In an arithmetic progression, the third term is 10 the 7^{th} term of this

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progression is 34. Find the first term and the common difference. (c) Solve the equation $x_2 - 7x + 10 = 0$

ii) How many terms of the series 24, 20, 16 should be so that the sum may be 72?

2 marks

5b. i) Find the sum of the first 20 terms of an arithmetic progression whose series is given as 3 + 10 + 17 + … n

ii) Find the sum of the first 42 terms of an arithmetic progression whose first term is 3, and the common difference is 7. **3 marks**

5c. i) If the third term of a geometric progression is 20 and the seventh term is 320, what is the first term and the common ratio?

ii) The second and third term of a geometric progression are 16 and 64 respectively, find the first term and the common ratio of the progression. **5 marks**

5d. A man starts work with an annual salary of N20, 000 and received annual increase of N450 a year

(i) How much did he receive for the first five years.

(ii) How much will he receive in the tenth year of employment?

5 marks

6a Outline the uses of Statistics and Statistical Information **1 mark**

6b Explain the methods and problems of Data Collection **1 mark**

6c Given the data group into a frequency distribution below

Monthly Rentals of Halls	No. of units
600-799	5
800-999	7
1000-1199	14
1200-1399	24
1400-1599	48
1600-1799	20

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1800-1999	12
2000-2199	10
Total	140

What is the mean and median monthly rental for the group data? List the properties of the median. **5 marks**

6d. a) The following data represents the performance of some students in some courses Mr. Abu.56, 67, 46, 80, 52, 48, 68, 74. Mrs. Wale 72, 43, 59, 71, 50, 58, 90, 44. Determine the correlation between the performances of the two students.

b) The following are the performances of some contractors of some projects completion:
Contractor X's performance: 92%, 55%, 64%, 45%, 56%, 51%.
Contractor Y's performance: 71%, 34%, 40%, 71%, 72%, 64%.
Calculate the rank correlation.

3 marks

6v. An employer of labour wants to find the relationship between the labour input employed and the total output using the following hypothetical data.

Labour input	Output
0.8	28
1.1	31
1.6	29
2.3	20
2.2	37
3.1	35
3.0	40
4.6	56

(a) Establish the least square regression for the above data
(b) Using the average in the data, sketch the regression line.
(c) Assuming the labourer decides to employ 80 workers, estimate the output for his firm. Y on X. **5 marks**

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