



"Investing in Africa's Future"

Faculty of Management and Administration

MMS 100 MATHEMATICS BRIDGING COURSE-CONVENTIONAL

END OF FIRST SEMESTER EXAMINATIONS

NOVEMBER/DECEMBER 2016

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DURATION: (3 HRS)

INSTRUCTIONS

1. Answer all questions in Section A and any *three* from Section B

2. All codes should in VB.Net programming Language

SECTION A {64 Marks}

Answer *all* questions in this section

1. a) Giving your answers as fractions in their lowest terms, evaluate

a. $2\frac{1}{3} - 1\frac{3}{4}$

b. $\frac{2}{5}$ of $1\frac{7}{8}$

b) Find the value of $\sqrt[4]{0.0081}$

[3]

2. Factorise

a. $4ax-6ay$

b. $9d^2-4$

c. x^2+2x-3

[3]

3. The formula for changing from the centigrade scale of temperature to the Fahrenheit scale is $F=32+\frac{9C}{5}$

- Find the Fahrenheit temperature that corresponds to 25°C
- Rearrange the formula to make C subject
- Find the Centigrade temperature corresponding to 68°F

[4]

- Evaluate in base five 431_5-233_5
- Evaluate in base eight 356_8+243_8
- Convert 53_8 to base five

[3]

5. Given that $\log 5 = 0.6990$ and $\log 11 = 1.0414$, find

- $\log 50$
- $\log 25$
- $\log 55$
- $\log 0.2$
- $\log 2.2$

[6]

6. a) express $\frac{6x^2}{x^2-5x} + \frac{x^2}{x^2-25}$ as a single fraction in its simplest terms

b) Solve the equation $\frac{2}{3}(x-4) = \frac{1}{2}(x-5)$

c) When invested for 9 months the interest on \$3600 is \$405. Find the annual rate of interest,

[9]

7. A bag contains 2 green balls, 4 yellow balls and 6 blue balls. Two balls are taken at random. Find the probability that

- a) Both balls are green
- b) Both balls are of the same colour
- c) The two balls are different colours
- d) One ball is yellow the other is green

[7]

8. (a) A school employs 79 teachers of, 52 of whom are males. A total of 42 teachers including all women are below the age of 40.

- (i) Illustrate the information on a clearly labelled Venn diagram.
- (ii) Hence or otherwise find the number of males that are below 40. [4]

(b) Give that $P = \begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix}$, $Q = \begin{pmatrix} 5 & -3 \\ 7 & d \end{pmatrix}$ and $R = \begin{pmatrix} 1/3 & n \\ 0 & 1/2 \end{pmatrix}$, find

- (i) the inverse of P
- (ii) the value of d which makes the determinant of P equal to the determinant of Q
- (iii) The value of n for which $PR = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$

[7]

9 (a) Solve the equation $3x^2 - 5x - 9 = 0$, giving your answer correct to two significant figures. [5]

(b) Given that y varies inversely as the square of x and that $y=3$ when $x=2$,

(i) Find the equation connecting x and y show that it reduces to $x = \sqrt{12/y}$,

(ii) Calculate the value of x when $y=5\frac{1}{3}$.

[5]

10. Answer the whole of this question on a sheet of graph paper.

Triangle A has vertices $(6, -2)$, $(8, -2)$ and $(6, -5)$.

(a) Using a scale of 1 cm to represent 1 unit on each axis, draw axes for values of x and y in the ranges

$$-6 \leq x \leq 12 \text{ and } -6 \leq y \leq 6.$$

Draw and label triangle A .

[1]

(b) The translation T is represented by the column vector.

$$\begin{bmatrix} 3 \\ 4 \end{bmatrix}$$

The translation T maps triangle A onto triangle B , so that $T(A) = B$.

Draw and label triangle B .

[1]

(c) The transformation R is a rotation through 90° clockwise, centre $(3, 4)$.

The transformation R maps triangle A onto triangle C , so that $R(A) = C$.

Draw and label triangle C .

[2]

(d) Given that $TR(A) = D$, draw and label triangle D .

[2]

(e) Triangle E has vertices $(2, -2)$, $(4, -2)$ and $(-4, -5)$.

The **single** transformation H maps triangle A onto triangle E .

Describe fully the transformation H

[2]

SECTION B [36 Marks]

Answer any three questions

11.(a) Express as a single fraction in its simplest form

$$\frac{200}{x} - \frac{200}{x+4}$$

[2]

(b) When driven in town, a car runs x kilometres on each litre of petrol.

(i) Find, in terms of x , the number of litres of petrol used when the car is driven 200 km in town.

[1]

(ii) When driven out of town, the car runs $(x + 4)$ kilometres on each litre of petrol.

It uses 5 litres less petrol to go 200 km out of town than to go 200 km in town.

Use this information to write down an equation involving x , and show that it simplifies to

$$x^2 + 4x - 160 = 0.$$

[3]

(c) Solve the equation $x^2 + 4x - 160 = 0$, giving both answers correct to two decimal places.

[4]

(d) Calculate the **total** volume of petrol used when the car is driven 40 km in town and then 120 km out of town.

[2]

12. Answer the whole of this question on a sheet of graph paper.

The length of time taken by 80 drivers to complete a journey is given in the table below.

Time (t minutes)	$60 < t \leq 80$	$80 < t \leq 90$	$90 < t \leq 95$	$95 < t \leq 100$	$100 < t \leq 110$	$110 < t \leq 130$
Number of drivers	4	10	14	20	24	8

(a) Using a scale of 2 cm to represent 10 minutes, draw a horizontal axis for times between 60 minutes and 130 minutes.

Choose a suitable scale for the vertical axis and draw a histogram to represent the information in the table. [3]

(b) In which interval does the median of the distribution lie? [1]

(c) Calculate an estimate of the mean time taken to complete the journey. [3]

(d) One driver is chosen at random.

Expressing your answer as a fraction in its lowest terms, calculate the probability that she took 90 minutes or less for the journey. [1]

(e) Two drivers are chosen at random.

Expressing each answer as a fraction in its lowest terms, calculate the probability that

(i) both took more than 110 minutes for the journey, [2]

(ii) one took 80 minutes or less for the journey and the other took more than 110 minutes. [2]

13. Answer the whole of this question on a sheet of graph paper.

The table gives some values of x and the corresponding values of y , correct to one decimal place, where $y = 4x + \frac{25}{x^2}$

X	1	1.25	2	2.5	3	3.5	4
y	21.0	17.1	14.3	14.0	14.8	16.0	17.6

(a) Find the value of p . [1]

(b) Using a scale of 4 cm to represent 1 unit, draw a horizontal x -axis for $0 \leq x \leq 4$.

Using a scale of 4 cm to represent 10 units, draw a vertical y -axis for $0 \leq y \leq 30$.

On your axes, plot the points given in the table and join them with a smooth curve. [3]

(c) Use your graph to find a solution of $4x + \frac{25}{x^2} = 20$ [1]

(i)

(ii) the least value of $4x + \frac{25}{x^2}$

[1]

(d) By drawing a tangent, find the gradient of the curve at the point where $x = 1.5$. [2]

(e) On the axes used in part (b), draw the graph of the straight line $y = 25 - 3x$ for values from $x = 0$ to $x = 4$.

[2]

(f) (i) Write down the x coordinates of the points at which the two graphs intersect. [1]

(ii) Find the equation, in the form $ax^3 + bx^2 + cx + d = 0$, which is satisfied by the values of x found in part (f)(i). [1]

END OF PAPER