FACULTY OF MANAGEMENT AND ADMINISTRATION

COURSE TITLE: MMS 100 Mathematics Bridging Course (Parallel-Mutare)

SEMESTER 2:   FINAL EXAMINATION – December, 2013

LECTURER: MR T. MAKAMBWA

TIME: 3 HOURS

INSTRUCTIONS

Answer **ALL** Questions in Section A and any **three** Questions from Section B

Total possible mark is 100

Start **each** question on a new page in your answer Booklet.

The marks allocated to **each** question are shown at the end of the section.

SECTION A (64 Marks)

Answer *all* questions in this section

1. Find the exact value of
   a) 0.2 x0.45
   b) $\sqrt{0.0081}$
   c) $7^3 \times 7^{-3}$

   [3]

2. 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]

3. On four occasions a bus takes the following times to complete a journey.
                1 hours, 1.7 hours, 1 hour 39 minutes, 1 hours.
   By first expressing these times in minutes, write them in order of size, starting with the   smallest   [3]

4. **(a)** Express, correct to **two** significant figures,
       (i) 386.71,
       (ii) 0.02049.
   (b) Hence estimate, correct to **one** significant figure, the value of
       386.71 × 0.02049.

   [3]

5. Factorise completely
   (a) $9a - 12a^2$,
   (b) $4y^2 - 1$,
   (c) $x^2 -7x + 12$ [3]

6. The population of a country was 13.1 million.
   (a) Nine hundred thousand of the population were at least 2 metres tall.
   How many were less than 2 metres tall?
   (b) 0.2% of the population were over 95 years old.
   How many were over 95?   [3]

7. **(a)** Solve the inequality $-5 < 2x + 3 < 1$.
   (b) Write down the largest integer, x, which satisfies $-5 < 2x + 3 < 1$.

   [3]

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8. The numbers 168 and 324, written as the products of their prime factors, are
   $168 = 2^3 \times 3 \times 7$ and $324 = 2^2 \times 3^4$

Find
(a) $\sqrt{324}$
(b) The largest integer which is a factor of both 168 and 324,
(c) The smallest positive integer value of n for which $168n$ is a multiple of 324

   [3]

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9. The distance travelled by an object was 230 m, correct to the nearest 10 m.
The time taken was 7 seconds, correct to the nearest second.
   (a) Complete the statements in the answer space.

...............m ≤ distance ` .... m   [1]
...............s ≤ time ` .... s   [1]

   (b) What was the least possible average speed for the journey?   [1]

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10. Given that $f(x) = \dfrac{2x+5}{x}$, find

   a) $f(2\frac{1}{2})$
   b) $f^{-1}(x)$

   [3]

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11. a) A car travels 144 km in h hours.
   Write down, in its simplest form, an expression in terms of h for its average speed in metres per second.
   (b) Solve the equation
   $3(2x - 7) = 6 - 4(2 - x)$.   [4]

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12. a) Write down $1 \times 2^4 + 1 \times 2^2 + 2^1 + 1$ as number in base 2
   b) If $103_x = 67_{10}$, find the value of x

   [5]

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13. Given $A = \begin{pmatrix} 4 & 3 \\ 2 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & 0 \\ -2 & -1 \end{pmatrix}$
   a) Find A-2B
   b) The determinant of A

c) A^{-1}

[5]

13. a) Out of forty students, 14 are taking English Composition and 29 are taking Chemistry. If five students are in both classes, how many students are in neither class? How many are in either class? What is the probability that a randomly-chosen student from this group is taking only the Chemistry class? [5]

b) Write the set {3, 6, 9, 12……} in set builder form. [2]

14. a) Solve the equation $(x-5)^2 = 81$ [2]
b) Express as a single fraction in its lowest terms $\dfrac{a}{2a-1} - \dfrac{2}{a+1}$ [3]

c) given that A = $h(\ 4m+h)$ express m in terms of h and A [3]

15. Part of a pattern of numbers is shown in the table below.

1	2	3	4	5	………..	n
5	8	11	14	p	………..	x
4	9	16	25	q	………..	y
1	8	27	64	r	………..	z
10	25	54	103	s	……….	t

(a) Study the patterns and write down the value of p, the value of q, the value of r and the value of s. [4]

(b) Find expressions, in terms of n, for each of x, y, z and t. [4]

SECTION B (36 Marks)

Answer any three questions from this section

16.a) i) In 2000 the cost of a packet of nails was $4.20. In 2001 the price had increased to $4.50. Calculate the percentage increase in the cost of a packet of nails.   [2]

ii) A new cereal packet contains 20% more than the old packet. The new packet contains 264 grams of cereal. Calculate the mass of cereal in one of the old packets. [3]

iii) A builder bought a large number of bags of cement. As a result he was given a discount of 7%. The discount was $910, Calculate how much the builder paid for the cement.   [3]

b) On 1 May 1998 William invested $900 for 4 years at 6% per annum simple interest.
 i) Calculate the interest he received on his investment.   [2]

ii) He invested another $900 for 3 years at 6% per annum simple interest on 1 May 1999 then $900 for 2 years at 6% per annum simple interest on 1 May 2000 , and then a final $900 for 1 year at 6% per annum simple interest on 1 May 2001. William withdrew all his money on 1May 2002. Calculate the total sum he withdrew.   [2]

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17. a) Solve the equation $7(2p+1)- 4(3p+2) =0$ [2]
 b) Factorise $2r^2-5r-3$ [2]
 c) Solve the simultaneous equations
  $3x + 5y = 2$
  $2x – 3y = 14$ [3]

 d) Solve the equation $2x^2-9x+3 =0$ giving your answer correct to 2 decimal places
                [5]

18(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]

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21. Answer the whole of this question on a sheet of graph paper.
The height of 500 pupils at a school was measured. The results are shown in the following table:

Height (x cm)	Number of pupils
120<x≤130	10
130<x≤140	50
140<x≤150	120
150<x≤155	90
155<x≤160	80
160<x≤170	110
170<x≤190	40

a) Copy and complete the cumulative frequency below. [1]

Height(x cm)	120	130	140	150	155	160	170	190
Number of pupils whose height is less than and equal to x	0	10						500

b) Using a horizontal scale 2cm to represent a height of 10 cm, for values between 120 cm and 190 cm, and vertical scale of 2 cm to represent 50 pupils, draw a smooth cumulative frequency curve to illustrate this information. [3]
c) Showing your method clearly , use your graph to estimate;
   i) The median height

ii) The lower quartile height,

iii) The inter-quartile range. [3]

d)   i) Use your graph to estimate the number of pupils whose height lies between 145 cm and 165 cm.

ii) One pupil is selected at random from the school. Find the probability that the pupil's height does not lie between 145 cm and 165 cm. [3]

e) Two pupils are selected at random from the school. Find the probability that one has a height less than or equal 130cm and the other has a height greater than 170 cm, showing your method clearly. [2]

22.a) Given $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Solve the quadratic function $3\,x^2 - 4x\ - 5 = 0$ and demonstrate your solution graphically, clearly label the roots, intercept and turning point coordinates. [8]

 b) Solve the following quadratic functions

  I. $36x^2 + 27x\ = 0$
  II. $121 = 11x^2$ [4]

23. The table shows an incomplete municipal bill for a certain household for the month of October 2012.

Date	Details	Amount($)
31/10/2011	Minimum water	99.91
31/10/2011	Excess water(1169-1116) kilolitres	304.34
31/10/2011	Minimum sewer	87.75
31/10/2011	Excess sewer	X
31/10/2011	Refuse (Bin collections)	74.88
31/10/2011	Supplementary charges	161.34

a) Calculate

       i)   The volume of excess water

      ii)   The charge per kilolitre of excess water.   [4]

b) The excess sewer is charged for every kilolitre of excess water used. If the rate for excess sewer was $1.58 per kilolitre, calculate X, the amount charged for excess sewer.

                                                          [3]

c) Refuse is collected four times a month. Calculate the charge per bin collection.

                                                            [2]

d) The minimum water was increase by 15.8% in 2011. Calculate the minimum water charge.

                                                            [3]

END OF PAPER