FACULTY OF SCIENCE

DEPARTMENT OF PURE AND APPLIED MATHEMATICS	
MODULE:	**BASIC MATHEMATICS AND APPLICATIONS IN ECONOMICS AND BUSINESS A – MAEB0A1 and MAEB311**
CAMPUS:	**APK**
ASSESSMENT:	**EXAM**

DATE: 31 MAY 2016

ASSESSORS: MR W VAN REENEN
MR UR KOUMBA

INTERNAL MODERATOR: MR RJ MAARTENS

DURATION: 2 HOURS

79

INITIALS AND SURNAME: _____

STUDENT NUMBER: _____

CONTACT NUMBER: _____

NUMBER OF PAGES: 9 (INCLUDING COVER PAGE)

INSTRUCTIONS:
- **ANSWER ALL THE QUESTIONS IN PEN.**
- **NO PENCIL OR TIPEX ALLOWED.**
- **ALL GRAPHS MUST BE DRAWN IN PEN.**
- **SHOW ALL THE NECCESARY CALCULATIONS CLEARLY.**
- **SCIENTIFIC CALCULATORS ARE ALLOWED.**
- **FINANCIAL CALCULATORS ARE NOT ALLOWED.**
- **IF NECESSARY ROUND OFF TO TWO DECIMAL PLACES.**
- **THE QUESTIONS CAN BE ANSWERED IN ANY ORDER.**

Question 1 [2]

Simplify the following expression:

$$\frac{5^{2x-1} \cdot (3^2)^{x-2}}{(5 \times 3)^{2x-3}}$$

Question 2 [4]

Perform the following operation by making use of long division:

$$(3x^3 - 5x^2 + 10x - 3) \div (3x + 1)$$

Question 3 [2]

Rationalise the denominator of the following fraction:

$$\frac{5}{t - \sqrt{7}}$$

Question 4 [4]

Factorise the following expressions completely:

4.1 $27t^3 - 64$ [2]

4.2 $(x + 4)^3(x - 2) + (x + 4)^2(x - 2)^2$ [2]

Question 5 [8]
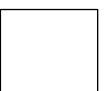
5.1 Simplify the following expression completely: [6]

$$\frac{x^2 + x - 6}{3x^2 - 12x} \div \frac{x^3 - 2x^2}{x^2 - 16} \times \frac{1}{x + 4}$$

5.2 State any restriction(s) that x have in Question 5.1. [2]

Question 6 [8]

Solve for x in the following equations:

6.1 $\dfrac{x+4}{x-2} - \dfrac{x+5}{x-3} = 0$ [3]

6.2 $\sqrt{x+10} = 20 - x$ [5]

Question 7 [4]

Solve for x in the following interval: $-7 \leq \dfrac{1-2x}{3} < 11$

Question 8 [3]

Solve for x and y simultaneously in the following system by making use of substitution:

$$5x - 2y = 6$$
$$3x + 4y = 14$$

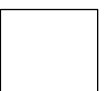## Question 9 [8]

For the following function: $f(x) = x^2 - x - 12$

9.1   Determine the y-intercept. [1]

9.2   Determine the x-intercepts. [2]

9.3   Determine the turning point. [2]

9.4   State the axis of symmetry. [1]

9.5   Graph the function using the information obtained above. You must clearly label all axes, intercepts and the turning point. [2]

Question 10 **[12]**

Solve for x in the following equations:

10.1 $(3^x - 9)(3^x + 9) = 0$ [2]

10.2 $2^{x+2} + 2^x = 40$ [2]

10.3 $\log_2(x + 2) = 5$ [2]

10.4 $\log(x + 2) + \log(x - 1) = 1$ [4]

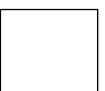10.5 $\ln(2x - 1) - \ln(1) = 0$ [2]

Question 11 [6]

An initial investment of R28,000 in a business guarantees the following cash flows:

Year	Cash Flow
2	R10,000
4	R12,000
6	R14,000

Assume an interest rate of 5.5% per year, compounded monthly. Determine whether the investment is profitable or not by first finding the net present value.

Question 12 [3]

If R1,000 is invested at an annual rate of 10% per year, compounded continuously, determine the value of the investment at the end of 10 years.

Question 13 [3]

ABC Industries manufactures coffee mugs. The combined cost of labour and material is R15 per unit. Fixed costs are R15,000. If the selling price of a mug is R30, how many must be sold for the company to make a profit?

End of Assessment – Total 79 Marks

Use this space if you want to redo a question. Clearly indicate at the question that the answer is on Page 9.