

**SIR ARTHUR LEWIS COMMUNITY COLLEGE**  
**DEPARTMENT OF TECHNICAL EDUCATION & MANAGEMENT STUDIES**

**EXAMINATION SESSION** : December 2004 – **EXAM # 2**

**TUTORS** : S. Toussaint, F. Combie, D. Combie, N. Heeralall

**PROGRAMME CODE** : 3EE – CMS – AD, 3EE – ESC – AD, 3BD – ART- AD,  
3BD – COE – AD, 3BD – QUS – AD, , 3ME – AUT – AD,  
3ME – MEC – AD

**PROGRAMME TITLE** : Computer Systems Engineering, Electronics Engineering  
Architectural Technology, Construction Engineering,  
Quantity Surveying, Automotive Engineering,  
Mechanical engineering

**COURSE CODE** : **MAT110**

~~**COURSE TITLE**~~ : ~~**COLLISE ALGEBRA**~~

**DATE** : 10<sup>th</sup> December, 2004

**COMMENCEMENT TIME** : 9:00 a.m. #  
A9

**DURATION** : 2 hours

**ROOMS** : TRT – R1, R2, R4, TRT – L1, L2, SME – R1

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**INSTRUCTIONS**

- Show all working.
- Write legibly in blue or black ink.
- Number all questions correctly.
- Do either question **eight OR** question **nine NOT BOTH**
- You may request graph paper for question nine.

1. Determine the expansion of  $\left(x - \frac{y}{2}\right)^{16}$  as far as the term containing  $y^4$ . [5]

2. Expand and simplify the expression  $\left(\frac{x}{4} - 7\right)^5$ . [6]

3. How many numbers between 100 and 500, that are divisible by 9. Find their sum [5]

4. How many terms of the series 5, 10, 20, 40, ..... are needed for the sum to just exceed 4 000 000. [6]

5. Solve for  $x$  in the following equation:

$$2^{x+8} \times 4^x = 16 \times 32^{3x-4} \quad [6]$$

6. i.) If  $\log_2 32 = x$ , what is the value of  $x$ ? [3]

ii.) Express as the logarithm of a single expression.

$$\frac{1}{2} \log l - \frac{1}{2} \log g - \frac{1}{2} \log h \quad [5]$$

7. i.) Express with rational denominators.  $\frac{1}{\sqrt{2}-1}$  [3]

ii.) Simplify:  $3\sqrt{27} - 5\sqrt{8} - 2\sqrt{75} + 4\sqrt{18}$  [4]

8. When light passes through a transparent medium, its intensity decreases according to the equation

$$i = I_0 e^{-kd} \text{ Watt/meter}^2 \text{ (W/m}^2\text{)}$$

Where  $i$  is the intensity of the light after passing through a medium

$d$  is the thickness of the transparent medium in centimeters

$I_0$  is the initial intensity of the light in  $\text{W/m}^2$

$k$  is a constant depending on the nature of the medium and the light.

a) If when a beam of light of intensity  $60 \text{ mW/m}^2$  passes through a material of thickness  $15.25 \text{ cm}$ , its intensity reduces to  $24 \text{ mW/m}^2$ , then calculate the constant  $k$ . ... (6 marks)

b) What would be the intensity of the light  $i$ , if the same beam penetrates the same medium a distance of  $50 \text{ cm}$ ? ... (4 marks)

[Total 10 marks]

**OR**

9. The time taken for an electric motor to cool down was carefully monitored and the following table of time in minutes and corresponding temperature in degrees Celsius was recorded.

Time, $t$ (minutes)	12	28	38	52	69	76
Temperature, $\theta$ ( $^{\circ}\text{C}$ )	66.5	44.5	34.6	24.5	16	13.5

The technician believes that the temperature of the motor follows a law of the form

$$\theta = \theta_0 e^{-kt}$$