

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 : **COLLEGE ALGEBRA**

DATE : 10th December, 2004

COMMENCEMENT TIME : 9:00 a.m.

DURATION : 2 hours

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

A9

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.



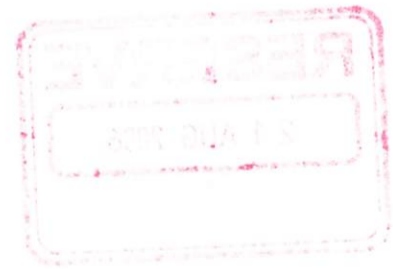
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#11



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 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 mW/m^2 passes through a material of thickness 15.25 cm , its intensity reduces to 24 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 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, θ ($^{\circ}\text{C}$)	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

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

where θ is the temperature after time t

θ_0 is the initial temperature

t is the time in minutes

k is a constant depending on the various physical conditions present.

a) By manipulating the form of the law and plotting the appropriate graph, show that the temperature obeys the law. ... (6 marks)

b) Hence determine the value of the constant k and the initial temperature θ_0 (3 marks)

c) State the law for the cooling of this motor. ... (1 marks)

[Total 10 marks]

