



FACULTY OF SCIENCE

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| SM | |
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DEPARTMENT OF APPLIED PHYSICS AND ENGINEERING MATHEMATICS
NATIONAL DIPLOMA IN *ANALYTICAL CHEMISTRY*

MODULE MAT1AE1

CAMPUS DFC

JUNE EXAMINATION

DATE 11/06/2016

SESSION 12:30 – 15:30

ASSESSORS

MS BP NTSIME

INTERNAL MODERATOR

DR PG DLAMINI

DURATION 2 HOURS

MARKS 80

SURNAME AND INITIALS: _____

STUDENT NUMBER: _____

COURSE: _____

LECTURER: _____

CONTACT NO: _____

NUMBER OF PAGES: 22

INSTRUCTIONS : ANSWER ALL THE QUESTIONS

REQUIREMENTS : INFORMATION BOOKLET
 : NON-PROGRAMMEBLE SCIENTIFIC CALCULATOR
 : ANY WORK WRITTEN ON PENCIL WILL NOT BE MARKED

SECTION A[16]**INSTRUCTIONS**

USE THE TABLE ON PAGE 3 TO MARK THE LETTER (X) CORRESPONDING TO THE CORRECT ANSWER. DO YOUR ROUGH WORK ON THE BLANK PAGES OPPOSITE.

1. The expression $(x^2 + y^2)^2$ is equal to :

A. $x^2 + 2x^2y^2 + y^2$

B. $x^2 + 2xy + y^2$

C. $x^4 + 2xy + y^4$

D. $x^4 + 2x^2y^2 + y^4$

2. The expression $\frac{x^2 - 2x + 1}{x - 1}$ is equal to :

A. $x + y$

B. $x - 1$

B. $(x - y)^2$

D. $(x + y)^2$

3. The remainder of $\frac{x+1}{x-1}$ is equal to

A. -2

B. -1

C. 2

D. 0

4. The expression $\frac{1}{x-1} + \frac{3}{x+1}$ is equal to

A. $\frac{2(x-2)}{x^2-1}$

B. $\frac{2(2-x)}{1-x^2}$

C. $\frac{2(x+2)}{x^2-1}$

D. $\frac{-2(x-2)}{1-x^2}$

5. If $2x + 14 = 5 - x$ then x is equal to

A. -3

B. $\frac{19}{3}$

C. 3

D. $\frac{9}{2}$

6. The third term of the expression $(x^2 + 3y)^8$ is equal to

A. $4x^{12}y^2$

B. $36x^2y^2$

C. $13x^{12}y^2$

D. $36x^{12}y^2$

7. $\begin{vmatrix} \ln e & 1 \\ -1 & -1 \end{vmatrix} =$

A. -2

B. -1

C. $\ln e$

D. 0

8. If $3^x = 81$, then x is equal to

A. 3

B. 9

C. 81

D. $\frac{1}{3}$

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|----|---|---|---|---|
| 1. | A | B | C | D |
| 2. | A | B | C | D |
| 3. | A | B | C | D |
| 4. | A | B | C | D |
| 5. | A | B | C | D |
| 6. | A | B | C | D |
| 7. | A | B | C | D |
| 8. | A | B | C | D |

SECTION B[27]**INSTRUCTIONS**

GIVE ONLY THE FINAL SIMPLIFIED ANSWER IN THE SPACE PROVIDED. WHERE APPLICABLE, GIVE ANSWERS CORRECT TO 2 DECIMAL PLACES. DO YOUR ROUGH WORK ON THE BLANK PAGES OPPOSITE.

NOTE: USE A PEN TO WRITE AND TO DRAW GRAPHS. ANYTHING WRITTEN IN PENCIL WILL NOT BE MARKED.

9. Expand $\sqrt{2-y^2}$, to three terms

(3)

10. Solve the following trigonometric equation.

$$\sin 2 = \cos x$$

(2)

11.

11.1. If $5^{2x} = 1$ then $x =$

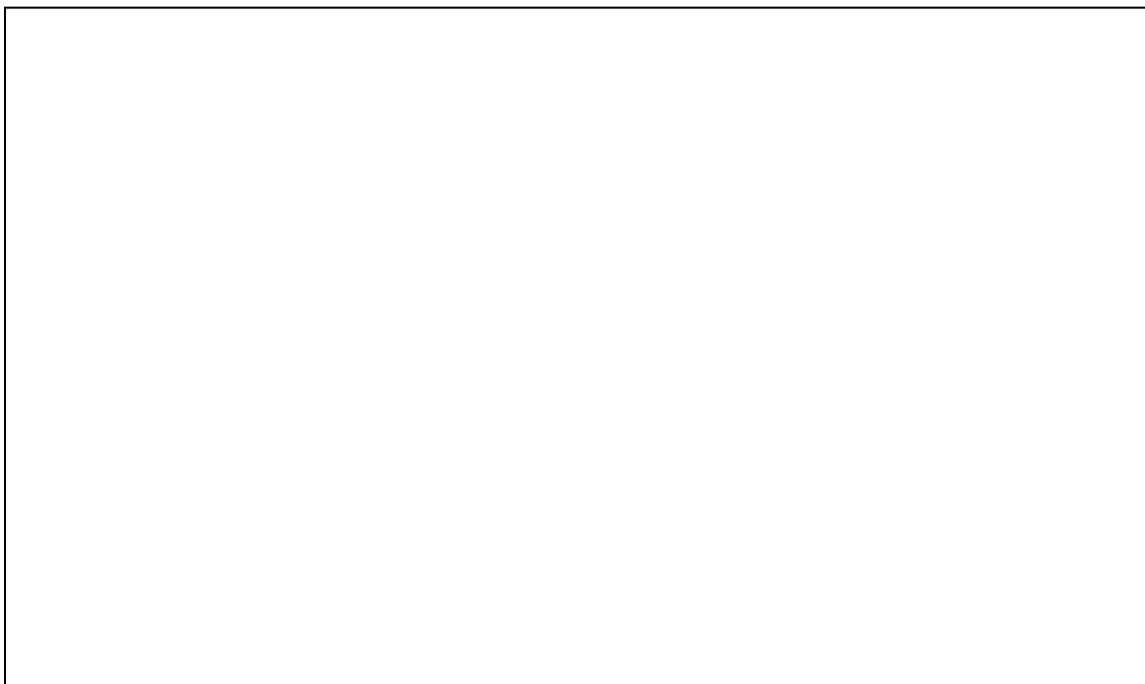
(1)

11.2 $7^{\log_7 x} = -2$ $x =$

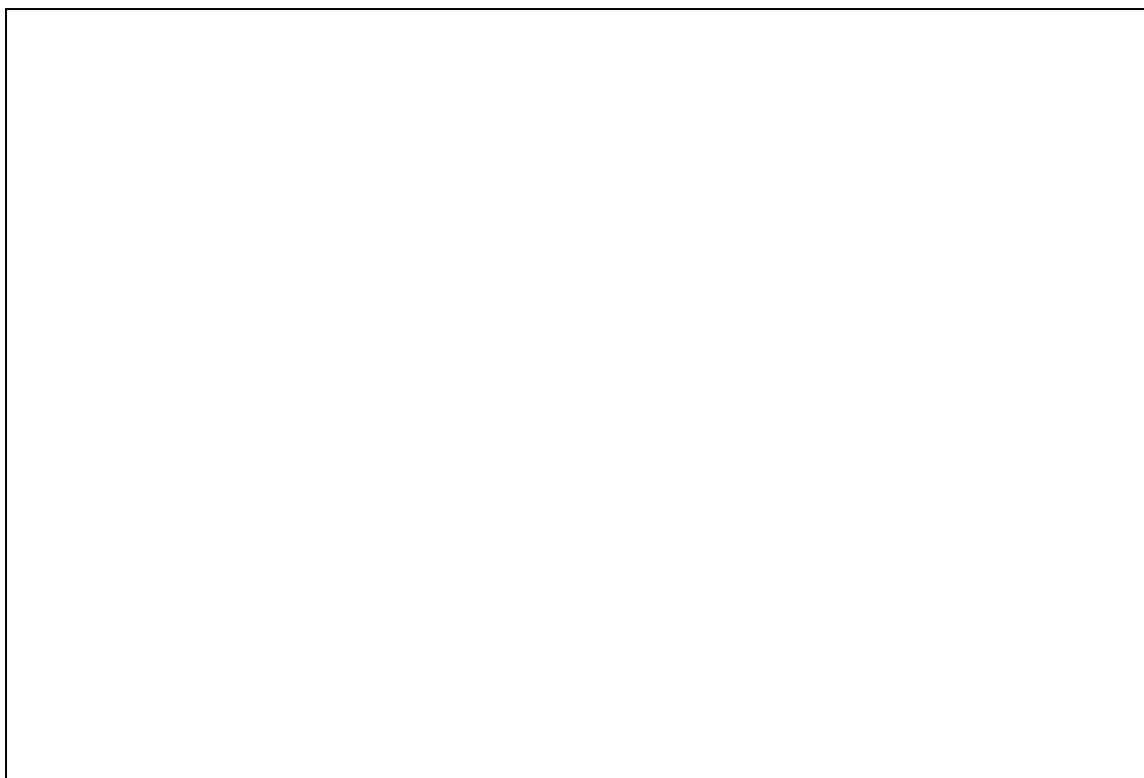
(1)

12. Draw the graphs of the following:

12.1 $y = 7.2^{4x}$ (3)



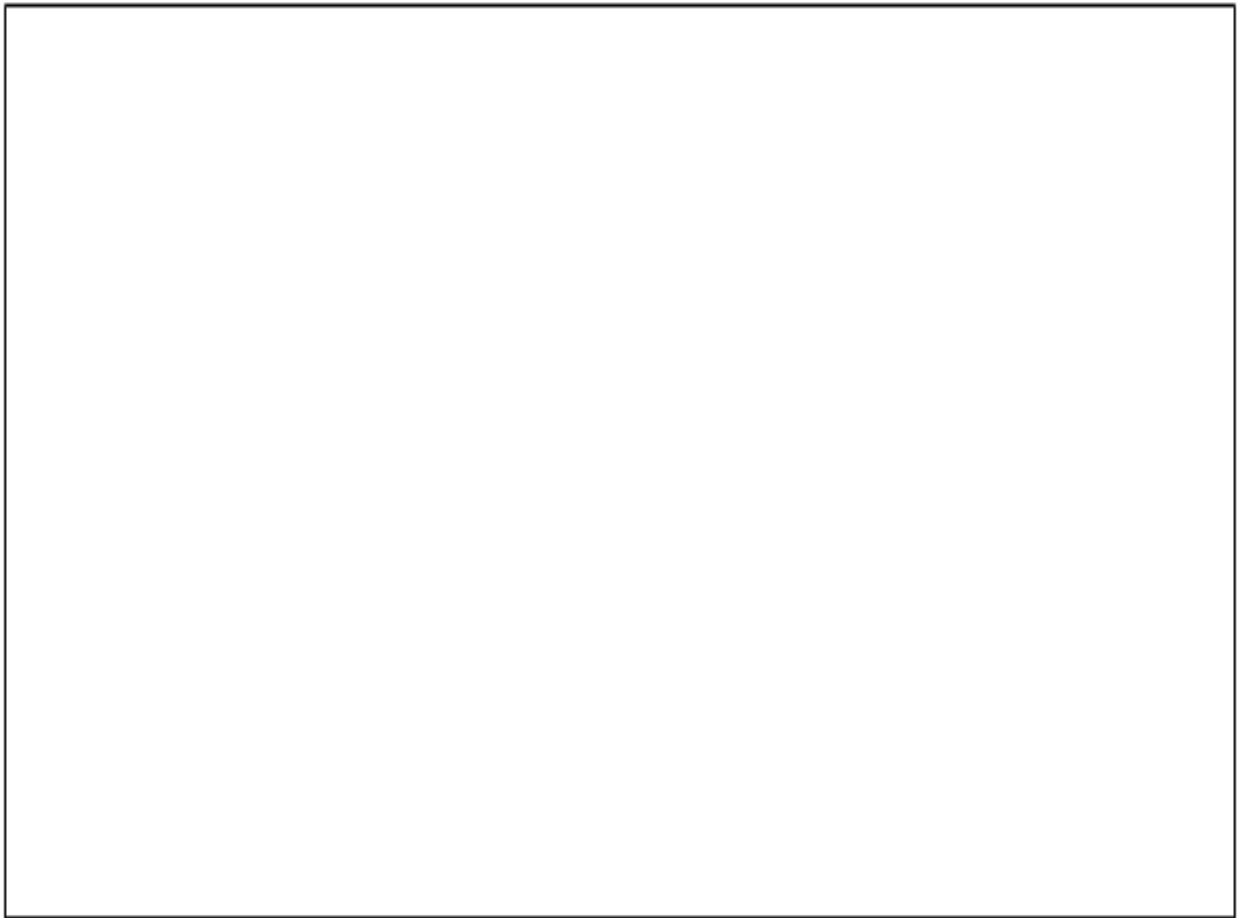
12.2 $y^2 + x^2 = 9$ (3)



12.3

$$y = x^2 + 5x + 6$$

(4)



13. An alternating current is given by $i = 3\sin(t + 2)$

13.1 The current i when $t = 0$




(1)

13.2 Find the frequency



(1)

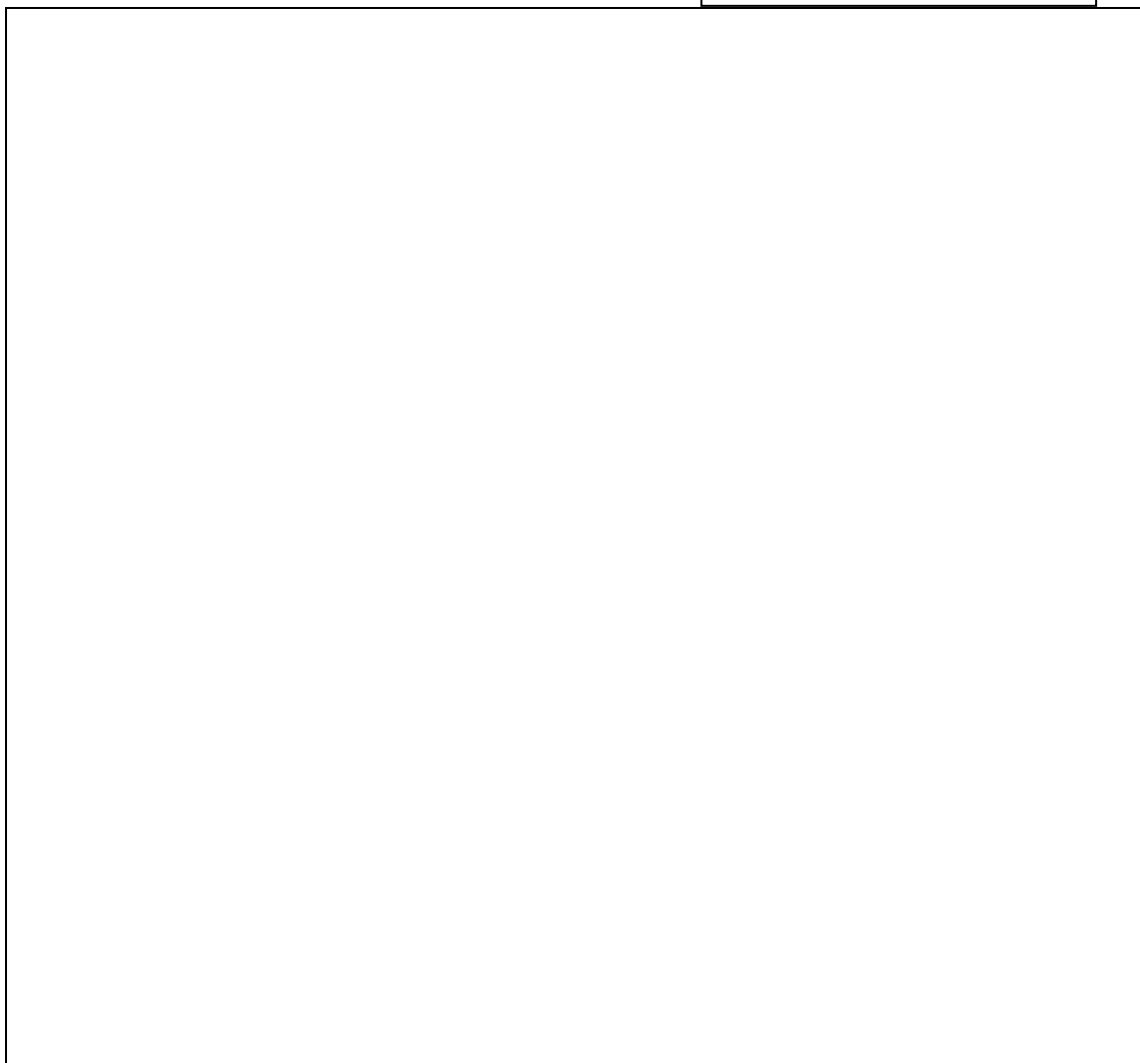
13.3 The period of the graph



(1)

13.4 Sketch one cycle of the graph of the function

(5)



[27]

INSTRUCTIONS

14. Use Cramer's rule to solve for the value of x only

$$3x + 2y - z = -4$$

(5)

[illegible]

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15. Simplify

$$15.1. \quad \frac{e^{4n} \times e^{-2}}{e^{2n} \times e \times e^{2n} \times e^{-3} \times e} \quad (3)$$

[illegible]

[illegible]

$$15.3 \quad \frac{2}{x+y} + \frac{1}{x+2} - \frac{1}{x+1} \quad (5)$$

[illegible]

16. Solve for x :

$$16.1 \quad (x+1)^2 - 2x = (x+3)(x-2) - 3 \quad (2)$$

[illegible]

$$16.2 \quad \frac{x+2}{x^2-2x} = \frac{2}{x-2} \quad (3)$$

[illegible]

16.3

$$2^{x+3} + 2^{x-1} + 2^{x-2} = 70$$

(4)

[illegible]

[illegible]

16.4

$$3^{2x} - 5.3^x + 6 = 0$$

(4)

[illegible]

- 17 Decompose into partial fractions: $\frac{76x^2 - x - 1}{x(x-1)}$ (5)

[illegible]

18 Consider a circle with a diameter of 12cm and centre angle of 30° .

Determine:

18.1 the length of the arc subtending angle 30° .

(2)

[illegible]

18.2 the area of the minor segment formed.

(2)

[illegible]

18.3 the area of the major sector formed.

(3)

[illegible]

- 19 Solve for x given that : $\sin 2x + \sin x = 0$, $0 < x < 2\pi$
(Hint: $\sin 2x = 2\sin x \cos x$) (3)

[illegible]

AVAILABLE MARKS [108][illegible]

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