



FACULTY OF SCIENCE

SM	
EM	
FM	

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

MODULE MAT1AE1

CAMPUS DFC

SUPPLEMENTARY EXAMINATION

DATE JULY 2016

ASSESSORS

Dr SM SIMELANE

INTERNAL MODERATOR

Dr PG DLAMINI

DURATION 2 HOURS

MARKS 80

SURNAME AND INITIALS: _____

STUDENT NUMBER: _____

COURSE: _____

LECTURER: _____

CONTACT NO: _____

NUMBER OF PAGES: 12

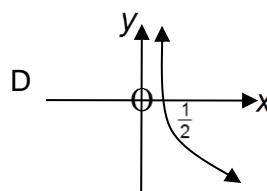
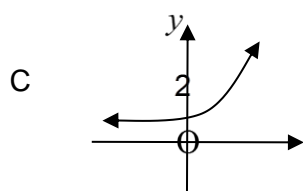
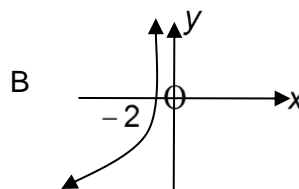
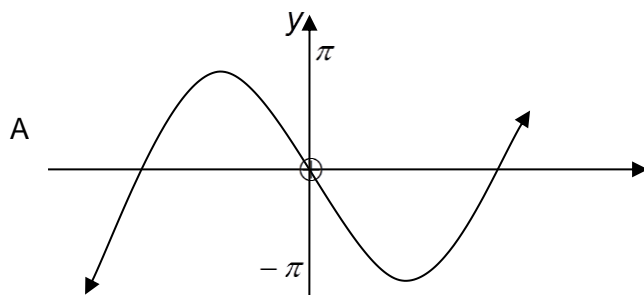
INSTRUCTIONS : ANSWER ALL THE QUESTIONS

REQUIREMENTS : INFORMATION BOOKLET
 : NON-PROGRAMMEBLE SCIENTIFIC CALCULATOR

SECTION A [20]**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.

1. The graph of $y = 2(\cos 2\pi)2^x$ is represented by:



2. If $h(t) = 3\ln(t+2)$, then $h^{-1}(1)$ is equal to :

A 3.395
C 0.604

B -0.604
D 0.35

3. The gradient of the line perpendicular to the line $2x + 2y = 4$ is equal to:

A 1
C -1

B 2
D $\frac{1}{2}$

4. The graph of $0 = (x+5)^2 - y$ is represented by:

A circle
C semicircle

B hyperbola
D ellipse

5. The value of $\sin^{-1}(-0,64) - \cot^{-1}[\cos(0,32)]$, is equal to:

A 0.117
C -0.117

B -1.51
D -1.17

6. If $g(x) = x^2 + 1$ and $h(x) = e^x$ the $(g \circ h)(x)$ is given by

A e^{x^2+1}

B $e^{x^2} + 1$

C $e^{2x} + 1$

D e^{2x+1}

7. The third term in the Binomial expansion of $\frac{-1}{\sqrt{x - \frac{3}{y^2}}}$ is equal to

A $\frac{9}{8y^4\sqrt{x^3}}$

B $\frac{-9}{8y^4\sqrt{x^3}}$

C $\frac{27}{8y^4\sqrt{x^5}}$

D $\frac{-27}{8y^4\sqrt{x^5}}$

8. The function $y = 0.5 \sin \pi(3x + 4)$, has period

A 1.5

B 0.67

B 1

D 2

9. Given that $\log_4(x+3)^2 = e$, then x is equal to:

A $3 + \sqrt{4^e}$

B $-3 \pm \sqrt{4^e}$

C $-3 - \sqrt{4^e}$

D $-3 + \sqrt{4^e}$

10. The gradient of the line parallel to the line given by $v(t) = 2t + \pi$ is

A $2t$

B $2 + \pi$

C 2

D $t + \pi$

[20]

1.	A	B	C	D	6.	A	B	C	D
2.	A	B	C	D	7.	A	B	C	D
3.	A	B	C	D	8.	A	B	C	D
4.	A	B	C	D	9.	A	B	C	D
5.	A	B	C	D	10.	A	B	C	D

SECTION B [29]**INSTRUCTIONS**

GIVE ONLY THE FINAL SIMPLIFIED ANSWER (CORRECT TO TWO DECIMAL PLACES WHERE APPLICABLE) IN THE SPACE PROVIDED. DO YOUR ROUGH WORK ON THE BLANK PAGES.

11. Expand $(2x + y)^{-5}$ to the first **four** simplified terms using the Binomial Theorem. Also indicate the conditions for validity. (4)

12. Simplify $\frac{\sec^2 \theta - 1}{1 + \tan^2 \theta}$ (2)

13. Make neat sketch graph of each of the following indicating clearly the turning point, the x and y intercepts

13.1 $f(y) = -y^2 + 3y + 4$ (4)

$$13.2 \quad y = -\sqrt{9 - x^2} \quad (4)$$

[illegible]

14. Solve for x in each case:

$$14.1 \quad \ln 2 = 3^{-\pi\alpha+2} \quad (2)$$

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$$14.2 \quad \sin(ex) = \cos(0,1) \quad (2)$$

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15. Given $i = 3\sin(0,5\pi t + 1)$, find:

15.1 The frequency. (2)

15.2 The first time when the current first reaches the maximum.	(1)
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15.3 Sketch only one cycle and indicate all essential points. (5)

[illegible]

16. Factorize $m^4 - 5m^2$ (3)

[29]

INSTRUCTIONS

17. The equation for the currents i_1 , i_2 and i_3 in the electric current is given by

$$3i_2 + i_3 + 1 = 0$$

(5)

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18. Solve for x

18.1 $\frac{3 \cdot 2^{2x-1} - 2^{2x+1}}{4^x} = 2^{-2x} - 1$ (4)

18.2 $a = \cot^{-1}(e^{\cos 2x})$ (4)

19. The **area of a sector** is $2.88m^2$ and its **arc length** is $3.33m$. Determine its radius and the angle subtended at the centre of the circle. (5)

[illegible]

20. Solve the trigonometric equation $\cos^2 \theta - \sin 2\theta = 0$, $0 \leq \theta \leq \pi$ (4)

[illegible]

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21. Make θ the subject of the formula: $\sec e^{a \tan \theta} = \ln x$ (4)

22. Decompose into partial fractions: (8)

$$\frac{x^4 - 2x^3 - 7x^2 + 5x - 24}{x^2 - 2x - 8}$$

[illegible]

RE-DO ANY QUESTION THAT YOU MAY HAVE CANCELLED:

TOTAL MARKS :80
AVAILABLE MARKS: 83