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FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS
NATIONAL DIPLOMA IN ANALYTICAL CHEMISTRY:

MODULE MAT1AE1
MATHEMATICS 1(Analytical Chemistry – 4 years).

CAMPUS DFC

JUNE EXAMINATION2014

DATE : 7 JUNE2014SESSION: 12H30 – 15H00

ASSESSOR **MS M BJORKMAN**

INTERNAL MODERATOR **Mr MP SELOANE**

DURATION 2½ HOURS **MARKS 90**

SURNAME AND INITIALS:_____

STUDENT NUMBER:_____

COURSE:_____

LECTURER: _____

CONTACT NO: _____

NUMBER OF PAGES: 12

INSTRUCTIONS: ANSWER ALL THE QUESTIONS
: ENSURE THAT YOUR PAPER HAS ALL THE PAGES
REQUIREMENTS: INFORMATION BOOKLET
: NON-PROGRAMMABLE SCIENTIFIC CALCULATOR

SECTION A[20]

INSTRUCTIONS

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

1. The simplified form of $\frac{3}{x} + \frac{2}{y}$ is equal to:

   A $\frac{5}{x+y}$ B $\frac{2x+3y}{xy}$

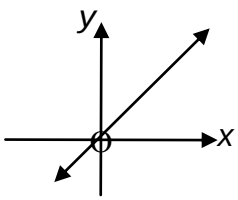
   C $\frac{6}{xy}$ D 2x + 3y

2. If $f(x) = x^2 + 2$, then $f(x – 2)$ is equal to:

   A $x^2 – 4x + 6$ B $x^3 – 2x^2 + 2x – 4$

   C $x^2 + 4x$ D $x^3 – 4$

3. The equation of the graph below is given by:



   A 2y + x = 0 B y – ½ x = 0

   C y + x = 1 D y + 2x = 0

4. The factorised form of $(9x^2 – 42xy + 49y^2) – 16$ is

   A [(3x – 7y) – 4] [(3x – 7y) + 4] B (3x – 7y – 4)(3x + 7y + 4)

   C (9x – 7y – 4)(x – 7y + 4) D None of the above

5. The second term in the binomial expansion of $(1 – 2x)^5$ is

   A –10x B -32x

   C $10x^2$ D 32x

6. If f(x) = $\frac{x-2}{x+2}$, then $f^{-1}(x)$ =

A $\frac{x-1}{2x}$ B $\frac{x+2}{x-2}$

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

7. If f(x) = $\sqrt[3]{x}$ and g(x) = $\frac{1}{x^3-1}$, then $(g \circ f)(x) =$

A $\frac{1}{x-1}$ B $\sqrt[3]{x^3-1}$

C $\frac{1}{\sqrt[3]{x^3-1}}$ D $\frac{1}{\sqrt[3]{x-1}}$

8. The gradient of a line <u>perpendicular</u> to the line x – 3y = – 4 is

A $\frac{1}{3}$ B 3

C $\frac{-1}{3}$ D – 3

9. $\begin{vmatrix} p & \frac{-t}{3} \\ -3 & 1 \end{vmatrix}$ =

A -p – t B t + p

C t – p D p – t

10. If f(x) = $\sqrt[3]{x}$ and g(x) = $\frac{1}{x^3+1}$, then $(g \times f)(1) =$

A ½ B ¼

C undefined D 2

[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 [31]

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. Factorise

11.1 $x^2 - (7a - 3b)x - 21ab$ (2)

11.2 $x^3 - x^2 - x + 1$ (2)

12. Use the Binomial Theorem to expand the following to its **first three simplified** terms: $\sqrt{3 - x}$ (3)

13. Make neat sketch graphs of the following. **Show intercepts with axes**, if any.

13.1 $5xy - 3 = 0$ (3)

13.2 $4y^2 - 6x^2 - 24 = 0$ (3)

13.3 $y = 2(x - 1)^2 - 8$ (3)

14. Evaluate $\begin{vmatrix} -3 & -2 & 0 \\ 5 & 4 & 0 \\ 0 & -1 & -7 \end{vmatrix}$ (3)

15. Solve for x:

15.1 $\frac{x+2}{x^2-2x} - \frac{2}{x-2} = 3$ (3)

15.2 $\frac{x^2+1}{x-3} \geq 0$ (3)

16. Find the partial fractions of $\frac{x-8}{x^2-x-6}$ (3)

17. Solve for x and y if $x^2 + 2x - y = 0$ & $x - y + 2 = 0$ (3)

SECTION C [41]

INSTRUCTIONS

SHOW ALL THE IMPORTANT STEPS AND GIVE YOUR FINAL ANSWERS CORRECT TO TWO DECIMAL PLACES WHERE APPLICABLE. USE THE LAST PAGE TO RE-DO ANY QUESTION YOU MAY HAVE CANCELLED.

18. Use Cramer's rule to solve for z only:

$$x + 2y + 2z = 4$$
$$y = 3x + 4z - 25$$
$$z - 4 = 2y + 3x$$

(5)

19. Solve for x:

19.1 $\frac{1}{x-5} \leq \frac{-2x}{x+4}$ (5)

19.2 $\frac{2x}{2x-3} = \frac{4x}{x+3} + 1$ (4)

20. Simplify: $\dfrac{4-8x}{4x^2-4x+1} \div \dfrac{2x+2}{1-2x^2-x}$ (5)

21. Write as partial fractions: $\dfrac{x^4-3x^3-x^2+6x-5}{x^2-4x+3}$ (8)

22. Expand $\left(x + \frac{2}{y^2}\right)^8$ to 3 terms (4)

23. Find the equation of the line through (-2; -1) and (-5; 0) (4)

24. If f(x) = $\frac{x}{1+x^2}$ and g(x) = $\frac{-1}{x}$ find

24.1 $(g \circ f)(x)$ (3)

24.2 (f/g)(2) (3)

Use this page to re-do any question that you have cancelled.