ASSIGNMENT OF MATHEMATICS FOR L5 I.C.T

Q1.

On the same graph, sketch the curves of functions $y = x^2 - 5x + 4$ and $y = -2x^2 + 5x + 1$.
Hence, find the area of the region enclosed between the two curves. **(15 marks)**

Q2.

Given the function f of real variable x defined by

$$f(x) = x + |x| + 1 - \frac{1}{x+2}$$

a) What is the domain of definition of $f(x)$? **(1 mark)**

b) Write $f(x)$ without the symbol of absolute value. **(2 marks)**

c) Calculate the limit on boundaries of domain of definition and deduce equation of asymptotes. **(3 marks)**

d) Compute the first derivative and indicate the interval of increasing or decreasing. **(2 marks)**

e) Construct the table of variation. **(2 marks)**

f) Establish the direction of concavity. **(2 marks)**

g) Plot the curve in Cartesian plane. **(3 marks)**

Q3.

Given the function f of real variable x defined by:

$$f(x) = \frac{x^2 - 1}{x^2 - 4}$$

a) Determine the domain of definition of $f(x)$. **(2 marks)**

b) Calculate the limits at the boundaries of the domain. **(3 marks)**

c) State any asymptotes. **(2 marks)**

d) Make the variation table. **(3 marks)**

e) Find the x-intercepts and y-intercepts for the graph of f. **(2 marks)**

f) Sketch the graph of f in a Cartesian plane. **(3 marks)**

Q4.

Solve the equation in the complex number set and the system in $\mathbb{R}^2$.

a) $z^4-(8i-1)z^2-8i=0$ **(11 marks)**

b) $\begin{cases} 1+\log_2(-x+2y)=\log_2(2x-3y) \\ 3^{5x+y}=\dfrac{81}{3^{-x-7y}} \end{cases}$ **(4 marks)**

Q5.

Given the function f of real variable x defined by $f(x)=\dfrac{x^2-1}{x^2-4}$ **15marks**

a) What is the domain of definition of $f(x)$?

b) State any asymptotes

c) Determine the nature of the turning point

d) Find the coordinates of the point at which the curve C_f cuts the coordinates axes;

e) Sketch the graph of the curve in Cartesian plan.

Q6.

The curves $y = 2x^2 - 3x$ and $y = x^2$ intersect at two points.

i. Find these points of intersection.

ii. Find the equation of the straight line joining these points.

Q7.

The values of the resistance of 90 carbon resistors were determined:

Resistance x (MΩ)	2.35	2.36	2.37	2.38	2.9	2.40	2.41
Frequency (f)	3	10	19	20	18	13	7

Calculate: (i) the mode

(ii) the standard deviation

Q8. In a class of 40 students, the number of absences for each one along the year are collected in the table below:

8 11 13 8 7 11 11 14 10 13

8 12 14 9 13 15 13 17 9 14

7 10 17 16 8 13 12 18 7 17

9 15 16 7 7 12 11 15 7 18

a) Group these data in classes of amplitude 2 each as follows [7-9) to [16-18) /9mks

b) Find the:

i) mean deviation / 2mk

ii) Variance 2mk

iii) Standard deviation /2mk

Q9.

Given the following table relating marks obtained in mathematics and physics

$x(Maths)$	5	7	12	16	20
$y(Physics)$	4	12	18	21	24

a) Calculate $\bar{x}$ and $\bar{y}$ **(4marks)**

b) Fill the following table **(6marks)**

$x(Maths)$	$y(Physics)$	$x_i - \bar{x}$	$y_i - \bar{y}$	$(x_i - \bar{x})(y_i - \bar{y})$
5	4			
7	12			
12	18			
16	21			
20	24			
$\sum_{i=1}^{5} x_i =$	$\sum_{i=1}^{5} y_i =$			$\sum_{i=1}^{5} (x_i - \bar{x})(y_i - \bar{y}) =$

c) Obtain the covariance $cov(x, y)$ **(2marks)**

d) Plot the scatter plot of these values and guess the sign of the correlation between these two courses. **(3marks)**

Q10.

Given function $f(x) = \frac{x+3}{x-2}$

a) Find domain of definition and boundary limits **(3marks)**
b) Find asymptotes to the curve. **(3marks)**
c) Compute the first derivative and study its sign. **(2.5marks)**
d) Compute the second derivatives and study its sign. **(2.5marks)**
e) Find intercept points if any. **(2marks)**
f) Sketch the graph. **(2marks)**

Q11.

Consider the function defined by $y = x^2 + 1$ and the line $D \equiv x + y = 3$ on the interval [0,2].

a) Find the intersection points between the line and the curve of the function. **(5marks)** **(5marks)**
b) Draw the function and the line in the same plane.
c) Use integration to calculate the area bounded by the two curves. **(5marks)**

18. Given the function: $y = xlnx$, find:
a) Find domain of definition; **/1mark.**
b) Calculate limits at boundaries of domain; **/3marks.**
c) Find the first derivative and study signs; **/4marks.**
d) Find the second derivative and the inflection point; **/4marks.**
e) Sketch the graph of the given function above on a). **/3marks.**

16. Given that: $f(x) = e^{-2x}$, find:
a) The domain of definition, **/1marks**
b) All possible asymptotes, **/4marks**
c) The interval for which the function is increasing or decreasing; **/3marks**
d) The coordinates of its extrema points and state whether they are minimum or maximum; **/3marks**
e) sketch the graph of the given function. **/4marks**

END