HARRISON COLLEGE INTERNAL EXAMINATION MARCH 2020
CARIBBEAN ADVANCED PROFICIENCY EXAMINATION
SCHOOL BASED ASSESSMENT
PURE MATHEMATICS
UNIT II – TEST 3
1 hour 20 minutes

NAME OF STUDENT: _____

SCHOOL CODE: <u>030014</u>

DATE: _____

This examination paper consists of 8 printed pages and 2 blank pages for extra working.
This paper consists of **6** questions.
The maximum mark for this examination is **60**.

<u>INSTRUCTIONS TO CANDIDATES</u>

1. Write your name clearly in the space provided above.

2. Answer **ALL** questions in the **SPACES PROVIDED**.

   If you need to rewrite any answer and there is not enough space to do so on the original page,

   you must use the extra page(s) provided. You must also write your name and candidate

   number clearly on any additional paper used.

3. Number your questions carefully and **DO NOT write your solutions to different**

   questions beside each other.

4. Unless otherwise stated in the question, any numerical answer that is not <u>exact</u>, **MUST** be

   written correct to <u>three</u> (3) significant figures

<u>EXAMINATION MATERIALS ALLOWED</u>
(a) Mathematical formulae
(b) Scientific calculator (non-programmable, non-graphical)

1) (a) Find the total number of permutations of the letters of the word **ISOSCELES**.   [2]

   (b) Find the number of these permutations which

   (i) start and finish with **E**.   [2]

   (ii) have the letters **S**, **S**, **S** together.

   (iii) have no TWO of the letters **C**, **L**, **S**, **S**, **S** consecutive.   [2]

2) A tennis club has 10 members, 6 are men and 4 are women. A team of 4 members is

   selected to play in a tournament.

(a) Find the number of different ways of selecting the team if

   (i) all the players are to be of the same sex.   [2]

   (ii) there must be an equal number of men and women.   [2]

(b) Given that the 6 men include 2 brothers, find the total number of ways in which the team

   can be selected if either of the brothers, but not both, must be included.   [3]

3) An agricultural officer measures the heights of the trees in a recreational park, and records

   the type of tree in the table below.

	Height, h, of tree in metres		
	$h < 3$	$3 < h < 8$	$h > 8$
Flowering	3	36	21
Non-flowering	18	27	45

   A dendrologist chooses a tree at random for monitoring.

   Determine the probability that the chosen tree is

   (a) Non-flowering.   [1]

   (b) Over 8 metres high.   [1]

   (c) Flowering and less than 8 metres high.   [1]

   (d) Over 3 metres high, given that it is flowering.   [2]

4) (a) Solve for x, $\begin{vmatrix} 5 & x & 3 \\ x+2 & 2 & 1 \\ -3 & 2 & x \end{vmatrix} = 0$ [10]

(b) Given the system of equations $\begin{aligned} x + 2y + 3z &= 7 \\ 2x + 2y - z &= 0 \\ 3x - 4y + 2z &= 7 \end{aligned}$

    (i) Write the augmented matrix. [2]

    (ii) Reduce the augmented matrix to echelon form. [3]

    (iii) Hence, solve the system of equations. [3]

5) (i) Find the general solution of the differential equation $\frac{dy}{dx} - 3x^2 y = xe^{x^3}$. [6]

(ii) Find the particular solution for which $y = 1$ when $x = 0$. [2]

6) (i) Solve for x in terms of t, $\frac{d^2 x}{dt^2} + 2\frac{dx}{dt} + 5x = 4\sin 5t$. [11]

(ii) Given that when $t = 0$, $x = 0$ and $\frac{dx}{dt} = 0$, find the particular solution. [5]

End of Test