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**A. M. E. C. E. A**

**MAIN EXAMINATION**

**JANUARY – APRIL 2022**

**FACULTY OF SCIENCE**

**DEPARTMENT OF MATHEMATICS AND ACTUARIAL SCIENCE**

**REGULAR PROGRAMME**

**DMAT 100: BASIC MATHEMATICS**

**DCHD 113: COLLEGE MATHEMATICS**

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| **Date: APRIL 2022 Duration: 2 Hours** |
| **INSTRUCTIONS: Answer Question ONE and any TWO Questions** |

Q1

1. Solve the equation

**(4 marks)**

1. The sum of 7 terms of an Arithmetic Progression is 35 and the common difference is 1.2. Determine the first term of the series.

**(3 marks)**

1. Evaluate

**(3 marks)**

1. Three numbers are in arithmetic progression. Their sum is 15 and their product is 80. Determine the three numbers.

**(4 marks)**

1. Simplify

**(3 marks)**

1. Determine the quotient and remainder when the polynomial is divided by .

**(3 marks)**

1. Evaluate .

**(3 marks)**

1. Solve

**(3 marks)**

1. Express in the form

**(4 marks)**

Q2.

1. Find the middle term of

**(5 marks)**

1. The first, twelfth and last term of an arithmetic progression are , , and respectively. Determine
2. the number of terms in the series,

**(2 marks)**

1. the sum of all the terms

**(2 marks)**

1. Given , illustrate that 

**(5 marks)**

1. Determine the remainder when is divided by:
2. and
3. . Hence factorize the cubic expression.

**(6 marks)**

Q3.

1. A shed is 4.0m long and 2.0m wide. A concrete path of constant width is laid all the way around the shed. If the area of the path is calculate its width to the nearest centimetre.

**(5 marks)**

1. Solve  by completing the square method

**(5 marks)**

1. Use the factor theorem to determine the factors of and hence solve the cubic equation

**(6 marks)**

1. Find the number of terms of the series 5, 8,11, . . . of which the sum is 1025.

**(4 marks)**

Q4.

1. The resonant frequency of a vibrating shaft is given by: where k is the stiffness and is the inertia of the shaft. Use the binomial theorem to determine the approximate percentage error in determining the frequency using the measured values of and when the measured value of is 4% too large and the measured value of is 2% too small.

**(6 marks)**

1. Let and ,compute . Hence determine 

**(5 marks)**

1. Given the roots of a quadratic equation as  and determine the quadratic equation in y.

**(3 marks)**

1. Determine the value of , correct to 6 significant figures using the binomial theorem.

**(6 marks)**

Q5.

1. Using the following functions and show that

**(6 marks)**

**(6 marks)**

1. A committee of 5 people is to be chosen from a group of 6 men and 4 women. How many committees are possible?
2. If there to be 3 men and 2 women?

**(4 marks)**

1. If the majority have to be women?

**(4 marks)**

**\*END\***