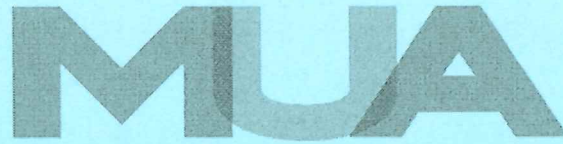


The
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UNDERGRADUATE UNIVERSITY EXAMINATIONS

SCHOOL OF MANAGEMENT AND LEADERSHIP

DEGREE OF BACHELOR OF EDUCATION ARTS

MTH 424: ORDINARY DIFFERENTIAL EQUATION

DATE: 2ND DECEMBER 2024

DURATION: 2 HOURS

MAXIMUM MARKS: 70

INSTRUCTIONS:

1. Write your registration number on the answer booklet.
2. **DO NOT** write on this question paper.
3. This paper contains **SIX (6)** questions.
4. Question **ONE** is compulsory.
5. Answer any other **THREE** questions.
6. Question **ONE** carries **25 MARKS** and the rest carry **15 MARKS** each.
7. Write all your answers in the Examination answer booklet provided

QUESTION FIVE

- a) Determine whether the functions

$$f_1(t) = 1, f_2(t) = 2 + t, f_3(t) = 3 - t^2, \text{ and } f_4(t) = 4t + t^2$$

are linearly independent or dependent on any interval I **(7marks)**

- b) Find the general solutions of $y^{(4)} + 2y'' + y = 0$ **(8 marks)**

QUESTION SIX

- a) Determine a lower bound for the radius of convergence of series solutions of the differential equation

$$(1+x^2)y'' + 2xy' + 4x^2y = 0 \text{ about the point } x = 0, \text{ about the point } x = -\frac{1}{2}$$

(7marks)

- b) Solve $x^2y'' + 5xy' + 4y = 0, x > 0$

(8marks)