

**FINAL EXAMINATION**  
**MARCH 2023**

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<b>COURSE TITLE</b>	<b>MATHEMATICS FOR SOCIAL SCIENCE</b>
<b>COURSE CODE</b>	<b>RMAT2223</b>
<b>DATE/DAY</b>	<b>21 JUNE 2023 / WEDNESDAY</b>
<b>TIME/DURATION</b>	<b>05:00 PM - 07:00 PM / 02 Hour(s) 00 Minute(s)</b>

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**INSTRUCTIONS TO CANDIDATES :**

1. Please read the instruction under each section carefully.
2. Candidates are reminded not to bring into examination hall/room any form of written materials or electronic gadget except for stationery that is permitted by the Invigilator.
3. Students who are caught breaching the Examination Rules and Regulation will be charged with an academic dishonesty and if found guilty of the offence, the maximum penalty is expulsion from the University.

(This Question Paper consists of 4 Printed Pages including front page)

**\*\*\*DO NOT OPEN THE QUESTION PAPER UNTIL YOU ARE TOLD TO DO SO\*\*\***

There are TEN (10) questions. Answer ALL questions in the answer booklet provided.  
[100 MARKS]

1. For each of the following:

a) Express  $f(x) = 2x^2 + 6x - 8$  in the form  $f(x) = (x + p)^2 + q$  (4 marks)

b) The function  $h(x) = \lg(x + 2)$  and  $k(x) = 5 + \sqrt{x - 1}$

i. Find  $hk(10)$  (2 marks)

ii. Find  $k^{-1}$  (3 marks)

2. It is given that  $2x - 1$  is a factor of the expression  $4x^3 + ax^2 - 11x + b$  and the remainder when the expression is divided by  $x + 2$  is 25. Find value of  $a$  and  $b$ . (7 marks)

3. The points A (2,11), B (-2,3) and C(2,-1) are vertices of a triangle:

a) Find the equation of the perpendicular bisector of AB (4 marks)

b) The line through A parallel to BC intersects the perpendicular bisector AB at the point D. Find the coordinates of D. (4 marks)

4. Express in partial fraction  $\frac{x^2 - 5x + 6}{(x+1)(x-1)^2}$  (10 marks)

5. Find the following:

a) Two variables  $x$  and  $y$  are related by the equation  $y = 6x^2 + \frac{32}{x^3}$ , obtain the expression for  $\frac{dy}{dx}$ . (3 marks)

b) Given the curve has a equation  $y = x^2 + 64\sqrt{x}$ , find the coordinates of the point on the curve where  $\frac{d^2y}{dx^2} = 0$ . (5 marks)

6. Find the equations of tangent and normal to the curve  $y = (x^2 - 3)(3 - x)$  at the point  $(-1, -4)$ . (20 marks)
7. Given  $u = \log_5 y$  find in its simplest form
- a)  $x$  (3 marks)
- b)  $\log_5 \frac{25}{x}$  (3 marks)
8. Given  $f(x) = 2x - 7$  and  $g(x) = x - 4$ , find
- a)  $fg(4)$  (3 marks)
- b)  $gf(-2)$  (3 marks)
9. Find the nature of the roots
- a)  $x^2 - 2x - 5 = 0$  (3 marks)
- b)  $x(1 - 3x) = 2$  (3 marks)
10. Express in partial fraction  $\frac{28 - 7x}{(3+x)(1-2x)}$ . Hence find  $\int \frac{28 - 7x}{(3+x)(1-2x)} dx$  (20 marks)

\*\*\* END OF QUESTION PAPER \*\*\*

**List of Formulas**

*Differentiation*

Product Rule

$$\frac{dy}{dx} = u \frac{dv}{dx} + v \frac{du}{dx}$$

Quotient Rule

$$\frac{dy}{dx} = \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}$$

  
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