UNIRAZAK
UNIVERSITI TUN ABDUL RAZAK

FINAL EXAMINATION
MARCH 2023

COURSE TITLE   MATHEMATICS FOR SOCIAL SCIENCE

COURSE CODE   RMAT2223

DATE/DAY   21 JUNE 2023 / WEDNESDAY

TIME/DURATION   05:00 PM - 07:00 PM / 02 Hour(s) 00 Minute(s)

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 only in the answer booklet provided. [100 MARKS]

1. For the following questions

   a) Express $f(x) = x^2 + 6x - 1$ in the form $f(x) = (x + p)^2 + q$ (5 marks)

   b) Factorize $f(x) = x^3 - x^2 - 14x + 24$. (7 marks)

2. Find the remainder and quotient when $3x^3 - 2x^2 - 4x + 3$ divided by $x^2 - x - 1$ (5 marks)

3. The cubic polynomial $f(x) = 6x^3 - 7x^2 - 11x + d$ has a factor of $(x - 1)$. Find the value of d. (5 marks)

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

5. Find the nature of the roots for the followings

   a) $x^2 - 2x - 5 = 0$ (3 marks)

   b) $x(1 - 3x) = 2$ (3 marks)

6. Given $f(x) = 3x - 7$ and $g(x) = x - 3$, find

   a) $fg(4)$ (3 marks)

   b) $gf(-2)$ (3 marks)

7. Given $u = \log_4 x$ find in its simplest form

   a) x (3 marks)

   b) $\log_4 \dfrac{16}{x}$ (3 marks)

8. For each of the following:

    a) Find the gradient of the curve $y = \frac{2x-5}{x-3}$ at the point $(2,1)$ (5 marks)

    b) Find the $\frac{dy}{dx}$ of $y = \sqrt{x}\,(3-x)^2$ (5 marks)

9. Express in partial fraction $\frac{28-7x}{(3+x)(1-2x)}$ .Hence find $\int \frac{28-7x}{(3+x)(1-2x)}\,dx$ (20 marks)

10. Find the equations of tangent and normal to the curve $y = (x^2 - 3)(3 - x)$ at the point $(-1, -4)$ (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

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