

Second Semester FYUGP Degree (Reg/Sup/Imp) Examination

April 2026

**KU2MDCMAT102 - MATHEMATICS FOR SOCIAL
SCIENCE**

2024 Admission onwards

Time : 1.5 hours

Maximum Marks : 50

Section A

Answer any 6 questions. Each carry 2 marks.

1. Calculate $\lim_{x \rightarrow 2} 3x^2 + 5x - 8$.
2. Calculate $\lim_{x \rightarrow 1} \frac{3x^3 - 8}{x - 2}$.
3. Verify that $F(x) = \frac{1}{3}x^3 + 5x + 2$ is an antiderivative of $f(x) = x^2 + 5$.
4. Find $\int \sqrt{5t} dx$.
5. Let $A = \begin{bmatrix} 2 & 5 \\ 7 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 \\ 1 & 0 \end{bmatrix}$. Find $A + B$ and $A - B$.
6. Determine the inverse of the matrix $A = \begin{bmatrix} 2 & 7 \\ 9 & 2 \end{bmatrix}$.
7. If $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5, 6\}$, $C = \{5, 6, 7, 8\}$, find $A \cup B \cup C$.
8. Determine the composite function $f \circ g$ if $f(u) = 3u^2 + 2u - 6$ and $g(x) = x + 2$.

Section B

Answer any 4 questions. Each carry 6 marks.

9. Find the minors of the elements of the second row of the matrix $\begin{bmatrix} 4 & 2 & -3 \\ 1 & 3 & -6 \\ -5 & 0 & -7 \end{bmatrix}$.
10. If $A = \begin{bmatrix} 3 & 0 \\ 2 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}$, verify that $(AB)^T = B^T A^T$.
11. Show that the matrix $A = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 1 & 2 \\ 2 & 1 & 1 \end{bmatrix}$ satisfies the relation $A^2 - 4A - 5I = 0$, where I is identity matrix.

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12. Let $U = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$, $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 6, 8\}$ and $C = \{3, 4, 5, 6\}$. Determine the following sets.
 - (a) A^c
 - (b) B^c
 - (c) $A \cup C^c$
 - (d) $A \cap B^c$
 - (e) $A - B$.
13. A manufacturer's total cost consists of a fixed overhead of 200 dollars plus production costs of 50 dollars per unit. Express the total cost as a function of the number of units produced and draw the graph.
14. If $f(x) = (x - 1)^2 + 2(x - 1) + 3$, find functions $g(u)$ and $h(x)$ such that $f(x) = g(h(x))$.

Section C

Answer any 1 questions. Each carry 14 marks.

15. (a) Define reciprocal power rules for limits.
 (b) Compute $\lim_{x \rightarrow +\infty} \frac{2x^2 + 3x + 1}{3x^2 - 5x + 2}$.
 (c) Compute $\lim_{x \rightarrow +\infty} \frac{-x^3 + 2x + 1}{x - 1}$.
16. (a) Evaluate the integrals:
 - (i) $\int \ln(e^{-x^2}) dx$.
 - (ii) $\int (e^{-0.13t} + 4) dt$.
 - (iii) $\int (\sqrt{x^3} + \sqrt{2}) dx$.
 (b) The slope $f'(x)$ at the point $(1, 2)$ on a curve $y = f(x)$ is given by $f'(x) = 4x + 1$. Find $f(x)$.