**QP CODE: D1BMT2403**

**Name: .....**
**Reg.No.: .....**

# FIRST SEMESTER FYUGP EXAMINATION NOVEMBER 2024

## MINOR

## MAT1MN102 DIFFERENTIAL CALCULUS

**Time : 2 Hrs** **Maximum Marks : 70**

BL - Bloom's Taxonomy Level (1 to 6) CO - Course Outcome

### Section A — Ceiling Marks : 24

Answer all questions. Each carries 3 marks.

| No. | Question | M | BL | CO |
|---|---|---|---|---|
| 1. | Find $\lim_{x\to 1}(x^7-2x^5+1)^{35}$ | 3 | 2 | CO1 |
| 2. | Find $\lim_{x\to -4}\dfrac{2x+8}{x^2+x-12}$ | 3 | 5 | CO1 |
| 3. | What 3 conditions are satisfied if $f$ is continuous at $x=c$ | 3 | 1 | CO1 |
| 4. | Define horizontal asymptote and give an example | 3 | 3 | CO1 |
| 5. | Find $\frac{dy}{dx}$ if $y=3x^8-2x^5+6x+1$ | 3 | 1 | CO2 |
| 6. | Find $\frac{dy}{dx}$ if $y=e^{(\sqrt{1+5x^3})}$ | 3 | 6 | CO2 |
| 7. | Find $\frac{dy}{dx}$ if $y=sin^{-1}x+cos^{-1}x$ | 3 | 2 | CO2 |
| 8. | Find $\frac{dy}{dx}$ if $y=cos^{-1}(\frac{x+1}{2})$ | 3 | 5 | CO2 |
| 9. | Define second derivative test | 3 | 2 | CO3 |
| 10. | Define stationary point and find stationary points of $f(x)=x^4-6x^2+5$ | 3 | 4 | CO2 CO3 |

### Section B — Ceiling Marks : 36

Answer all questions. Each question carries 6 marks.

| No. | Question | M | BL | CO |
|---|---|---|---|---|
| 11. | Let $f(x)=\begin{cases}x-1 & x\le 3\\ 3x-7 & x>3\end{cases}$<br>Find<br>(a) $\lim_{x\to 3^-}f(x)$ (b) $\lim_{x\to 3^+}f(x)$ (c) $\lim_{x\to 3}f(x)$ | 6 | 5 | CO1 |
| 12. | Find $\lim_{x\to+\infty}\dfrac{5x^3-2x^2+1}{1-3x}$ | 6 | 6 | CO1 |
| 13. | Find $\frac{dy}{dx}$ if $y=(x^2+x)(x^2-x)$ | 6 | 1 | CO2 |
| 14. | Find $\frac{d^2y}{dx^2}$ if $y=xcosx$ | 6 | 5 | CO2 |
| 15. | Find $\lim_{x\to+\infty}\dfrac{x^{100}}{e^x}$ | 6 | 1 | CO2 |
| 16. | Find the intervals on which $f(x)=x^2-4x+3$ is increasing and the intervals on which it is decreasing | 6 | 4 | CO2 CO3 |
| 17. | Find the intervals on which $f(x)=x^3$ is concave up and the interval on which it is concave down | 6 | 5 | CO2 CO3 |
| 18. | (a) Define critical points and Find critical points of $f(x)=x^3-6x+2$<br>(b) Define stationary point and find stationary points of $f(x)=2-x+2x^2-x^3$ | 6 | 4 | CO2 CO3 |

| Section C<br>Answer any 1 question. Each carries 10 marks. (1x10=10 marks) | | | | |
|---|---|---|---|---|
| **No.** | **Question** | **M** | **BL** | **CO** |
| **19.** | (a) At what points, if any does the graph of $y = \frac{1}{3}x^3 - \frac{3}{2}x^2 + 2x$ have a horizontal tangent.<br><br>(b) Find $\frac{dy}{dx}$ if $y = \frac{x^{\frac{3}{2}}+2}{x}$ | 10 | 3 | CO1 |
| **20.** | (a) Find $\frac{d}{dx}\left[ln(\frac{x^2 sinx}{\sqrt{1+x}})\right]$<br><br>(b) find $\frac{dy}{dx}$ if $y = cos(lnx)$ | 10 | 4 | CO2 |

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