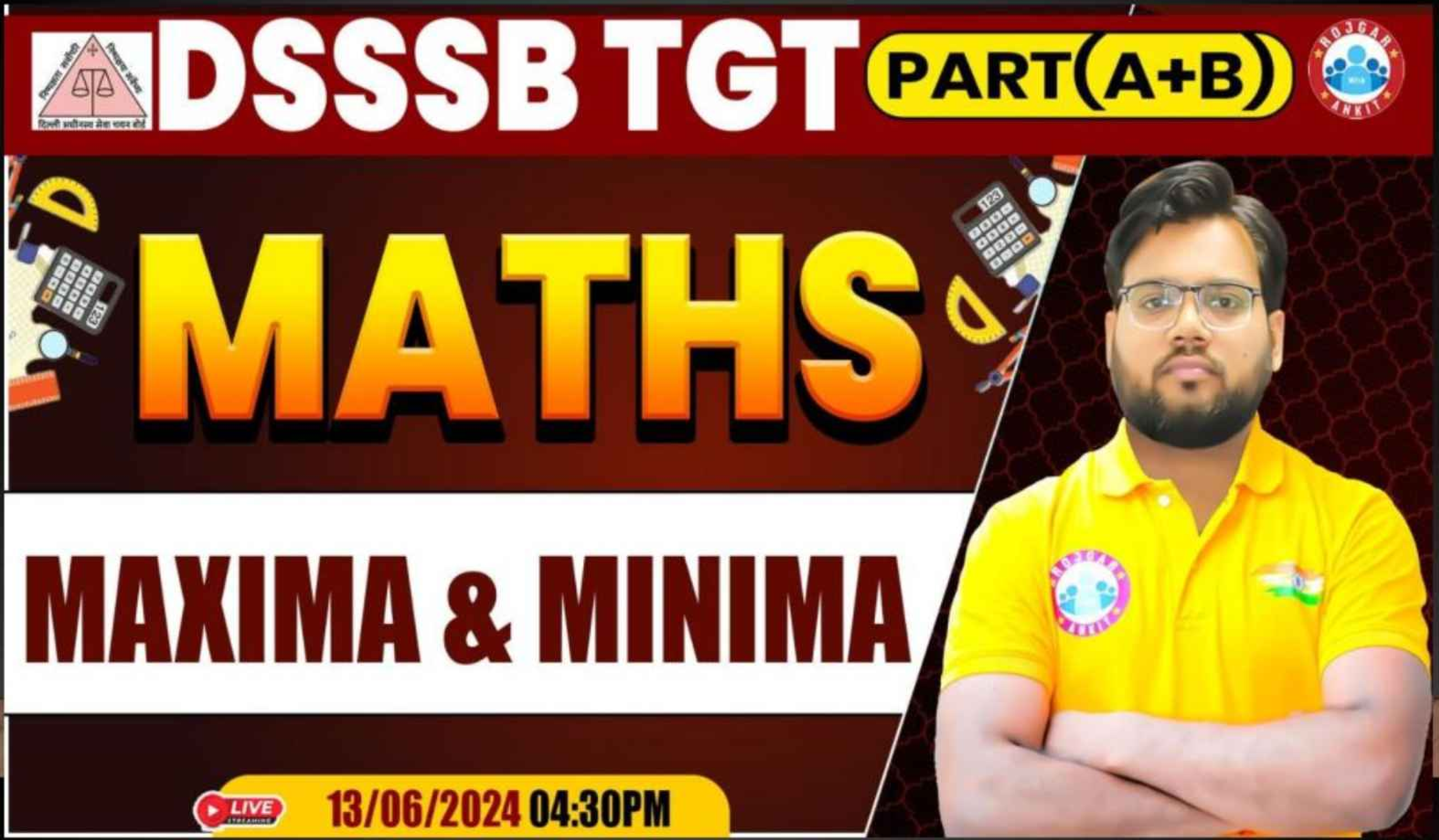
DSSSB TGT
PART(A+B)
MATHS
MAXIMA & MINIMA
LIVE
13/06/2024 04:30PM

First Derivative Test →

Step-1 → $f'(x) = 0$

Step→2 → Extreme point को Number line पर रखना

Step→3 → Extreme points को Number रेखा पर रखने के बाद
प्राप्त Domain में Left to Right
$f'(x)$ का sign चेक करते हैं

+ve → -ve → +ve

pt of max

pt of minima

point of Inflaxion

+ve → +ve → +ve

-ve → -ve → -ve

Second derivative Test

STEP-1 → $f'(x) = 0$

↳ यहाँ से extreme points मिलेंगे (x की values)

$x = c_1$

$x = c_2$

$x = c_3$

STEP-2 → $f''(x)\big|_{x=c_1} < 0$

Case-1 → c_1 is called as pt of Maxima

Case-2 → $f''(x)\big|_{x=c_2} > 0$

c_2 is called as pt of minima.

Case-III → $f''(x)\big|_{x=c_3} = 0$

go to first derivative test

$$f''(x) = 36x^2 + 24x - 24$$

$$f''(x)\Big|_{x=1} = 36 > 0$$

$x = 1$ (pt of Minima)

$$f''(x)\Big|_{x=0} = -24 < 0$$

$x = 0$ (pt of maxima)

$$f''(x)\Big|_{x=-2} > 0$$

($x = -2$ pt of Minima)

$f(x) = 3x^4 + 4x^3 - 12x^2 + 12$

$$f'(x) = \underbrace{12x^3 + 12x^2 - 24x}_{} = 0$$

$$x^3 + x^2 - 2x = 0$$

$$x = 1, 0$$

$$x^2(x-1) + 2x(x-1) = 0$$

$$(x-1)(x^2+2x) = 0$$

$x - 1 = 0$ $\quad$ $x^2 + 2x = 0$

$x = 1,$ $\quad$ $x(x+2) = 0$

$$x = 0, 2$$

1. The minimum value of $4\cos\theta + 3$ is.

$4\cos\theta + 3$ का न्यूनतम मान है

(a) -3

(b) -1

(c) 0

(d) 1

$\cos\theta = -1$

$4(-1)+3$

$-4+3$

$\Rightarrow -1$

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2. The function $f(x) = 2x^3 - 3x^2 - 12x + 4$, has-

फलन $f(x) = 2x^3 - 3x^2 - 12x + 4$, के है-

(a) two points of local maximum सीमित उच्चिष्ठ के दो बिन्दु

(b) two points of local minimum सीमित अल्पिष्ठ के दो बिन्दु

(c) one maxima and one minima एक अत्यधिक और एक न्यूनतम

(d) no maxima or minima कोई अत्यधिक या न्यूनतम नहीं

SECTION B PGT TIER-I 31.11.2014

$f(x) = 2x^3 - 3x^2 - 12x + 4$

$f'(x) = 6x^2 - 6x - 12 = 0$

$x^2 - x - 2 = 0$

$x^2 - 2x + x - 2 = 0$

$x(x-2) + 1(x-2) = 0$

$(x-2)(x+1) = 0$

$x = -1, 2$

$f'(x)$: +ve, -ve, +ve

-2, -1, 0, 2, 3

Maxima minima

$y = x^4 - 6x^2 + 8x + 11$

$\frac{dy}{dx} = 4x^3 - 12x + 8 = 0$

$x^3 - 3x + 2 = 0$

$x = 1$

$x^2(x-1) + x(x-1) - 2(x-1) = 0$

$(x-1)(x^2 + x - 2) = 0$

$(x-1)$ $+2 \; -1$

$x = 1, -2$

$f'(x)$ $-ve$ $+ve$

$-3 \quad -2 \quad 0 \quad 1 \quad 2$

$x = -2$

3. The function $y = x^4 - 6x^2 + 8x + 11$ has a minimum at x equal to–

$y = x^4 - 6x^2 + 8x + 11$ फलन न्यूनतम होता है जब इसके बराबर होता है-

(a) 1 (b) -2

(c) 3 (d) 4

JDD-75-PGT TIER II-X-15 28.06.2015

4. The slope of the normal to the curve $y = x^2 + 3x + 2$ at the point (-2, 0) is-

(- 2, 0) बिन्दु पर सामान्य से $y = x^2 + 3x + 2$ वक्र तक की ढलान है-

(a) -1 (b) 1

(c) $\frac{1}{2}$ (d) $\frac{-1}{2}$

JDD-75-PGT TIER II-X-15 28.06.2015

$y = x^2 + 3x + 2$

$\frac{dy}{dx} = m = 2x + 3$ (slope of tangent)

$m)_{(-2,0)} = 2(-2) + 3 \Rightarrow -1$

Slope of Normal $\Rightarrow -\frac{1}{\text{slope of tangent}}$

$\Rightarrow \frac{-1}{-1} = 1$

Slope of normal $= -\frac{1}{\text{slope of Tangent}}$

$m_2 = \frac{-1}{m_1}$

5. **The normal at the point (1, 1) on the curve $2y = 3 - x^2$ is:**

बिन्दु (1, 1) पर वक्र $2y = 3 - x^2$ का अभिलम्ब है

(a) x + y = 0

(b) x + y + 1 = 0

(c) x - y + 1 = 0

(d) x - y = 0

PGT 2011

$2y = 3 - x^2$

$\cancel{2}\frac{dy}{dx} = -\cancel{2}x$

$\frac{dy}{dx} = m = -x$

$(m)_{(1,1)} = -1$

Equation of normal

$\Rightarrow y - y_1 = -\frac{1}{m_1}(x - x_1)$

$m_1 \Rightarrow$ Slope of tangent

$y - 1 = +\frac{1}{+1}(x - 1)$

$y - \cancel{1} = x - \cancel{1}$

$-x + y = 0$

$x - y = 0$

6. If x is real, the minimum value of $x^2 - 8x + 17$ is.

यदि x वास्तविक है तो $x^2 - 8x + 17$ का न्यूनतम मूल्य है-

(a) -1 (b) 0

(c) 1 (d) 2

$f'(x) = 2x - 8 = 0$

$\boxed{x = 4}$

$f''(x) = 2 > 0$

$\forall x \in (a, b)$

$f(x) = x^2 - 8x + 17$

$f(4) = 4^2 - 8 \times 4 + 17$

$\Rightarrow 16 - 32 + 17 \Rightarrow 33 - 32$

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7. The least possible value of 'a' for which the function $f(x) = x^2 + ax + 1$ may be increasing in the interval [1, 2] is.

'a' का संभव न्यूनतम मान, जिसके लिये फलन $f(x) = x^2 + ax + 1$ अंतराल [1, 2] में वर्धमान हो, है

(a) 2 (b) 1

(c) 0 (d) -2

UP PGT-2016 (02-02-2019)

$f(x) = x^2 + ax + 1$

for increasing f^n

$f'(x) > 0$

$2x + a > 0$

$2x > -a$

$\boxed{x > -\frac{a}{2}}$

$x > -\frac{(-2)}{2}$

$x > 1$

$a = -2$