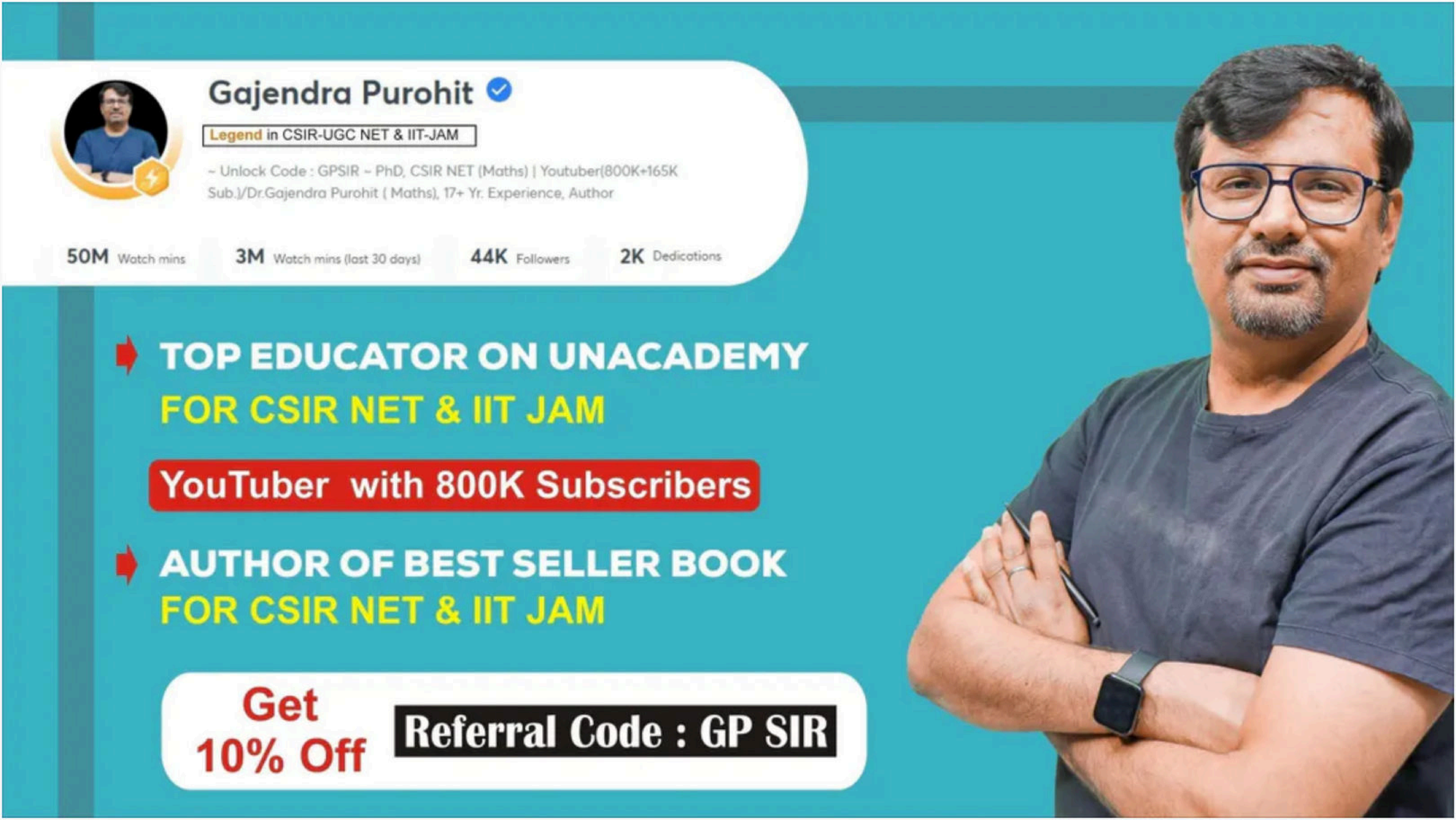
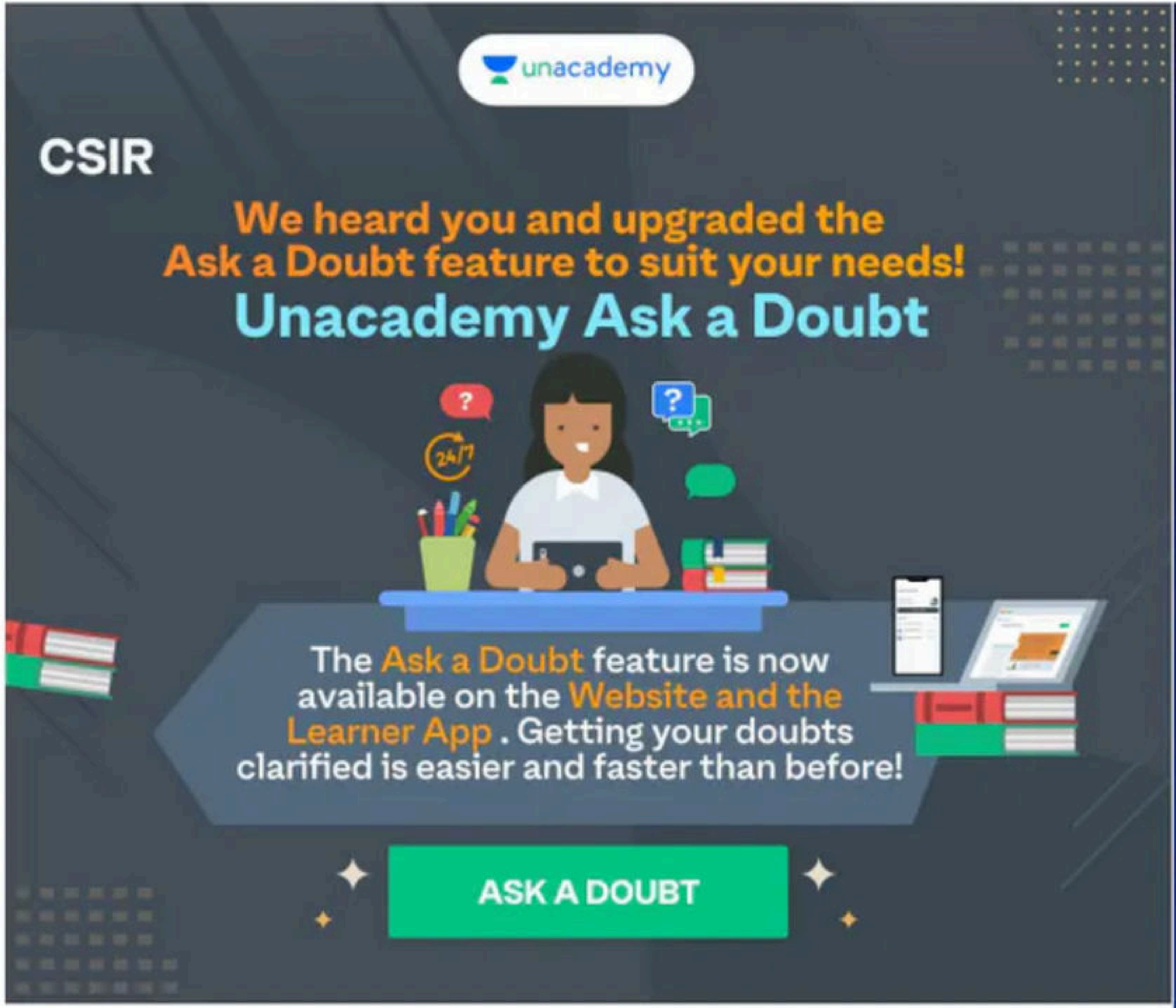
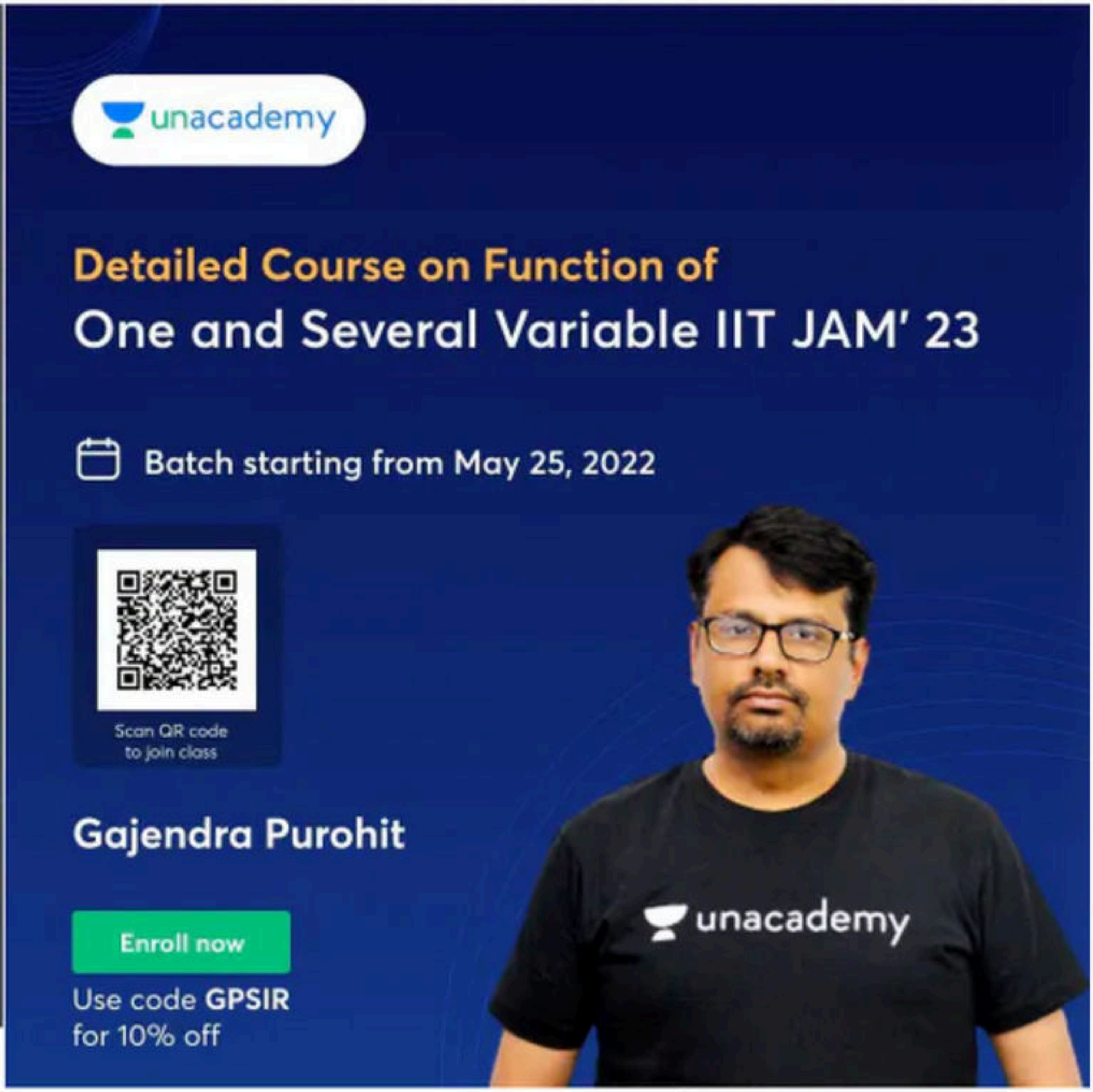
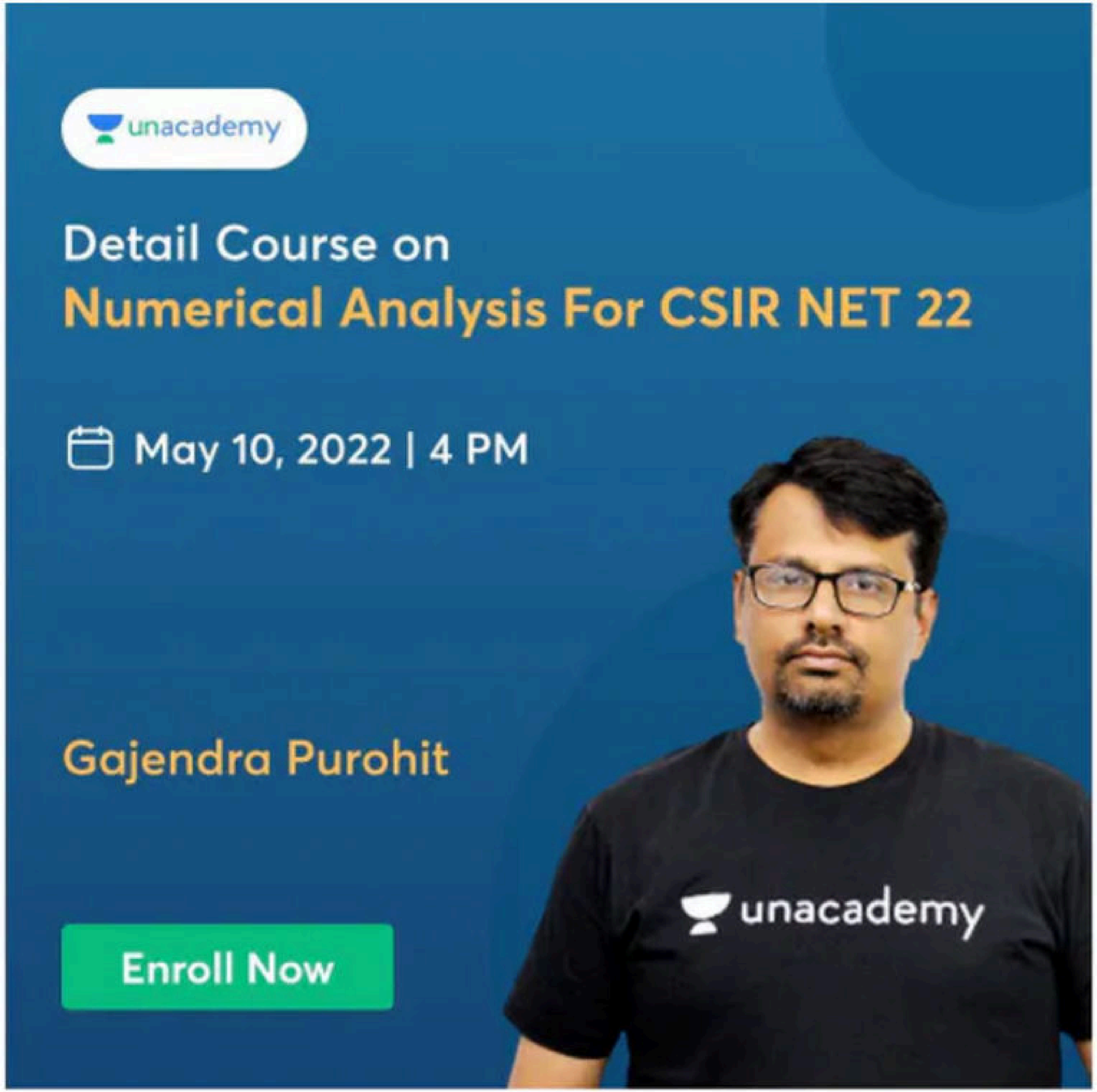


Gajendra Purohit
Legend in CSIR-UGC NET & IIT-JAM
~ Unlock Code : GPSIR ~ PhD, CSIR NET (Maths) | Youtuber(800K+165K Sub.)/Dr.Gajendra Purohit (Maths), 17+ Yr. Experience, Author
50M Watch mins
3M Watch mins (last 30 days)
44K Followers
2K Dedications
TOP EDUCATOR ON UNACADEMY
FOR CSIR NET & IIT JAM
YouTuber with 800K Subscribers
AUTHOR OF BEST SELLER BOOK
FOR CSIR NET & IIT JAM
Get 10% Off
Referral Code : GP SIR

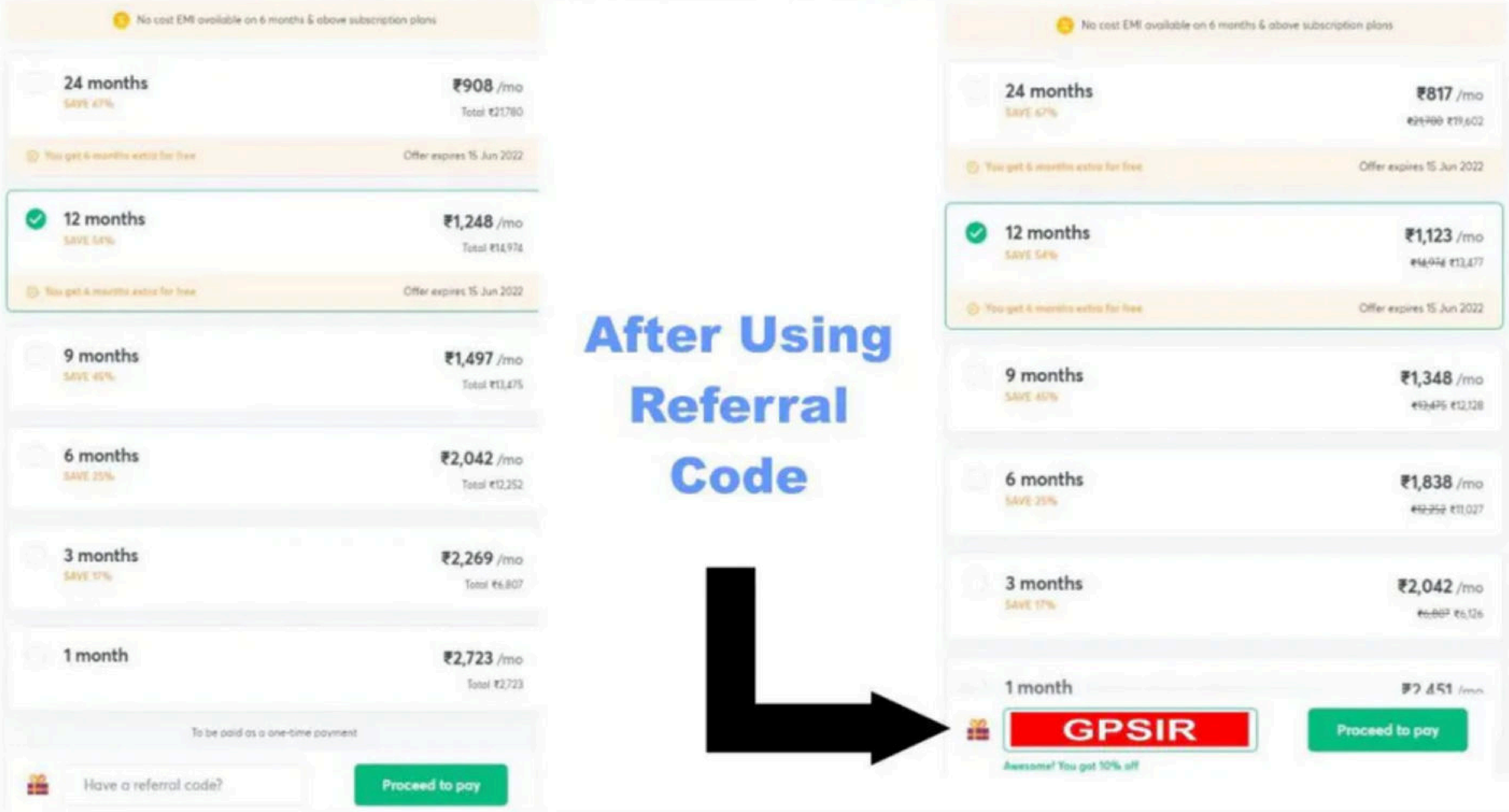

unacademy
CSIR
We heard you and upgraded the
Ask a Doubt feature to suit your needs!
Unacademy Ask a Doubt
24/7
The Ask a Doubt feature is now available on the Website and the Learner App . Getting your doubts clarified is easier and faster than before!
ASK A DOUBT


unacademy
Detailed Course on Function of
One and Several Variable IIT JAM' 23
Batch starting from May 25, 2022
Scan QR code to join class
Gajendra Purohit
Enroll now
Use code GPSIR
for 10% off
unacademy

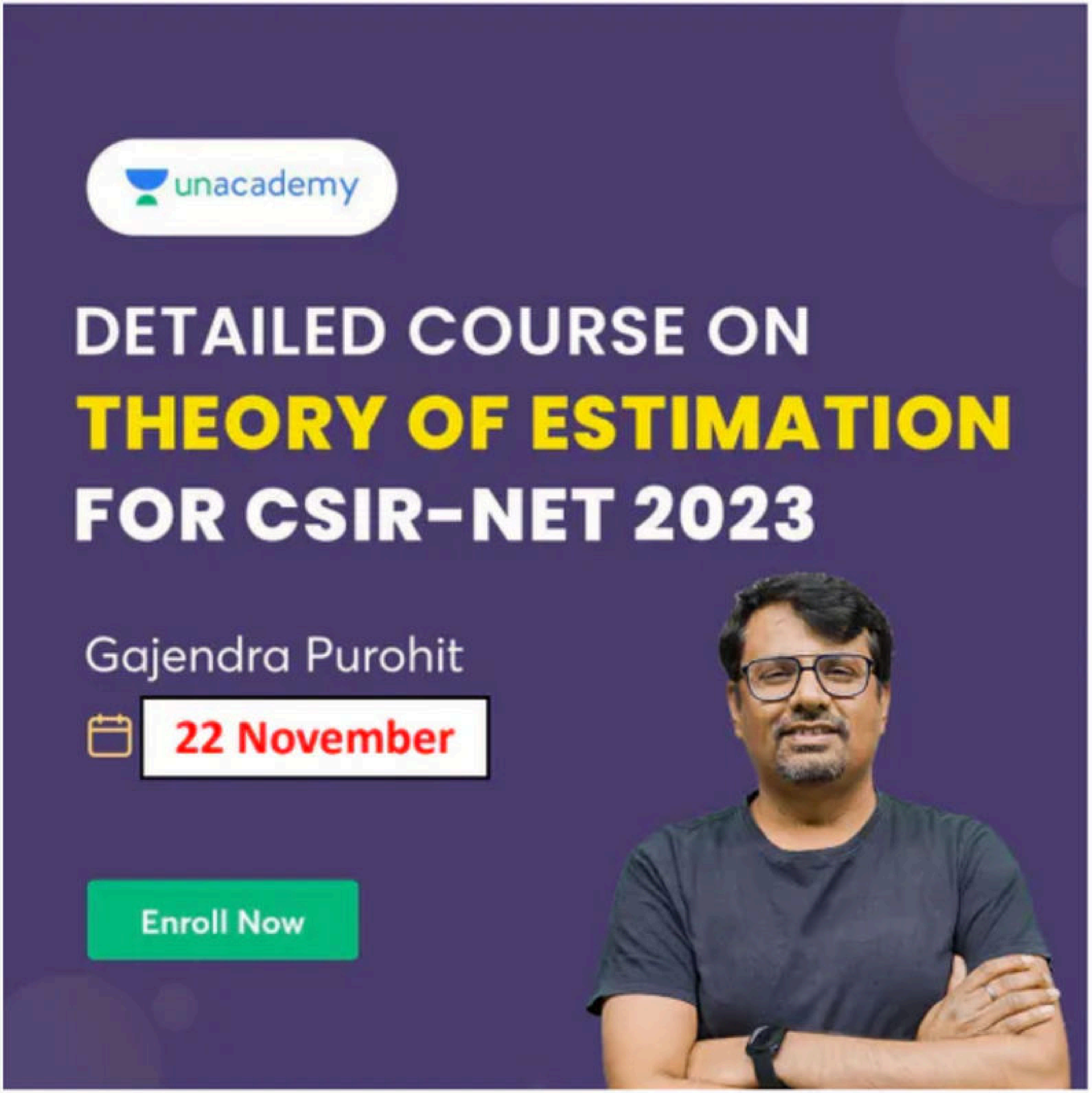

unacademy
Detail Course on
Numerical Analysis For CSIR NET 22
May 10, 2022 | 4 PM
Gajendra Purohit
unacademy
Enroll Now


unacademy
Detail Course on
Real Analysis For CSIR NET 22
May 4, 2022 | 9 PM
Gajendra Purohit
unacademy
Enroll Now

FEE DETAILS FOR IIT JAM SUBSCRIPTION




Gajendra Purohit
Legend in CSIR-UGC NET & IIT JAM
~ Unlock Code : GPSIR ~ PhD, CSIR NET (Maths) | Youtuber (1000k+230K Sub.)/Dr.Gajendra Purohit (Maths), 17+ Yr. Experience, Author
77M Watch mins
4M Watch mins (last 30 days)
54K Followers
3K Dedications
USE CODE
GPSIR
GET 10% OFF
TOP EDUCATOR
ON UNACADEMY
FOR CSIR-NET & IIT JAM
1M SUBSCRIBERS ON YOUTUBE
AUTHOR OF BEST SELLER BOOK OF CSIR-NET & IIT JAM


unacademy
DETAILED COURSE ON
THEORY OF ESTIMATION
FOR CSIR-NET 2023
Gajendra Purohit
22 November
Enroll Now


unacademy
DETAILED COURSE 2.0 ON
INTEGRAL CALCULUS
FOR IIT-JAM 2023
1 December | 9:00 AM
Gajendra Purohit
Enroll Now
Use code GPSIR for 10% off
*T&C apply, as available on the platform.

FEE DETAILS FOR IIT JAM SUBSCRIPTION

No cost EMI available on 6 months & above subscription plans

24 months Save 67% You get 6 months extra for free	₹ 908 / mo Total ₹ 21,780 Offer expires 15 Jun 2022
12 months Save 54% You get 6 months extra for free	₹ 1,248 / mo Total ₹ 14,974 Offer expires 15 Jun 2022
9 months Save 45%	₹ 1,497 / mo Total ₹ 13,475
6 months Save 25%	₹ 2,042 / mo Total ₹ 12,252
3 months Save 17%	₹ 2,269 / mo Total ₹ 6,807
1 month	₹ 2,723 / mo Total ₹ 2,723

To be paid as a one-time payment

Have a referral code? Proceed to pay

Get 10% Off

After Using My Referral Code

No cost EMI available on 6 months & above subscription plans

24 months Save 67% You get 6 months extra for free	₹ 817 / mo ₹ ~~21,780~~ ₹ 19,602 Offer expires 15 Jun 2022
12 months Save 54% You get 6 months extra for free	₹ 1,123 / mo ₹ ~~14,974~~ ₹ 13,477 Offer expires 15 Jun 2022
9 months Save 45%	₹ 1,348 / mo ₹ ~~13,475~~ ₹ 12,128
6 months Save 25%	₹ 1,838 / mo ₹ ~~12,252~~ ₹ 11,027
3 months Save 17%	₹ 2,042 / mo ₹ ~~6,807~~ ₹ 6,126

GPSIR

Awesome! You get 10% off

Proceed to pay

Directional Derivative :

Let f be a function of n-variables defined on D and let u = $(u_1, u_2, ..., u_n)$ be a unit vector then the directional derivative of f at $\alpha = (x_1, x_2, ..., x_n)$ in the direction of u denoted by $D_u f(x_1, x_2, ..., x_n)$ is defined by

$$D_u f(\alpha) = \lim_{h \to 0} \frac{f(\alpha + hu) - f(\alpha)}{h} \text{ if limit exist,}$$

Where $\alpha = (x_1, x_2, ...,x_n)$, $u = (u_1, u_2, ..., u_n)$

$$\alpha + hu = (x_1 + hu_1, x_2 + hu_2 ..... x_n + hu_n)$$

Note :

(1) If direction is not unit vector, then firstly we convert into unit vector.

(2) If direction is not mention in question then we take arbitrary direction as

$$u = \cos\theta\ \hat{i} + \sin\theta\ \hat{j}$$

‘Some important result :

(1) If $f(x, y)$ is differentiable at (a, b) then all directional derivative exist at (a, b) but converse need not be true.

(2) If $f(x, y)$ is continuous at (a, b) then all directional derivative of f at (a, b) but converse need not be true.

(3) If partial derivative exist and continuous at (a,b) then f is differentiable at (a, b)

Q1. Let f : $R^2 \to R$ be a function. Then which of the following statements is/are TRUE? **IIT-JAM 2017**

(a) If f is differentiable at (0, 0), then all directional derivatives of f exists at (0, 0)

(b) If all directional of f exists at (0, 0), then f is differentiable at (0, 0)

(c) If all directional derivative of f exists at (0, 0), then f is continuous at (0, 0)

(d) If the partial derivatives $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ exists and are continuous in a disc centred at (0,0) then f is differentiable at (0,0)

Q2. Let $f(x,y)=\begin{cases}\dfrac{x^3+y^3}{x^2-y^2}, & x^2-y^2\neq 0\\ 0, & x^2-y^2=0\end{cases}$.

Then the directional derivative of f at (0, 0) in the direction of $\frac{4}{5}\hat{i}+\frac{3}{5}\hat{j}$ is **IIT-JAM 2019**

(a) 2.5 to 2.7 (b) 2.4 to 2.8

(c) 2.6 to 2.6 (d) 2.8 to 2.9

$\alpha + hu = (0,0) + h(4/5, 3/5)$

$= (4h/5, 3h/5)$

$\alpha = (0,0)$

$u = \left(\frac{4}{5}, \frac{3}{5}\right)$

$D_u(\alpha) = \lim_{h\to 0}\frac{f(\alpha+hu)-f(\alpha)}{h}$

$= \lim_{h\to 0}\frac{f(4h/5, 3h/5)-f(0,0)}{h}$

$= \lim_{h\to 0}\frac{(4h/5)^3+(3h/5)^3}{\left((4h/5)^2-(3h/5)^2\right)h}$

$= \frac{(4^3/5^3+3^3/5^3)}{(4^2/5^2-3^2/5^2)} = \frac{64+27}{5(16-9)} = \frac{91}{5\times 7}$

Q3. Let $f : R^2 \to R$ be defined by

$$f(x,y)=\begin{cases}\left(1+\dfrac{x}{y}\right)^2, & y\neq 0\\ 0, & y=0\end{cases}.$$

If the directional derivative of f at (0, 0) exists along the direction $\cos\alpha\,\hat{i}+\sin\alpha\,\hat{j}$, where $\sin\alpha \neq 0$, then the value of cot α is **IIT-JAM 2015**

(a) 1 (b) -1

(c) 2 (d) 0

$1+\cot\alpha=0$

$\cot\alpha=-1$

COMPLETE COURSE ON

MATHEMATICS

FOR IIT-JAM 2022

TOPICS TO BE COVERED

- REAL ANALYSIS
- FUNCTION OF ONE & TWO VARIABLE
- LINAER ALGEBRA
- MODERN ALGEBRA

TOPICS TO BE COVERED

- SEQUENCE & SERIES
- INTEGRAL CALCULUS
- VECTOR CALCULUS
- DIFFERENTIAL EQUATION

FEE DETAILS FOR IIT JAM SUBSCRIPTION
No cost EMI available on 6 months & above subscription plans
24 months ₹ 908 / mo
Save 67% Total ₹ 21,780
You get 6 months extra for free Offer expires 15 Jun 2022
12 months ₹ 1,248 / mo
Save 54% Total ₹ 14,974
You get 6 months extra for free Offer expires 15 Jun 2022
9 months ₹ 1,497 / mo
Save 45% Total ₹ 13,475
6 months ₹ 2,042 / mo
Save 25% Total ₹ 12,252
3 months ₹ 2,269 / mo
Save 17% Total ₹ 6,807
1 month ₹ 2,723 / mo
Total ₹ 2,723
To be paid as a one-time payment
Have a referral code?
Proceed to pay
Get 10% Off
After Using My Referral Code
GPSIR
Awesome! You get 10% off
No cost EMI available on 6 months & above subscription plans
24 months ₹ 817 / mo
Save 67% ₹ ~~21,700~~ ₹ 19,602
You get 6 months extra for free Offer expires 15 Jun 2022
12 months ₹ 1,123 / mo
Save 54% ₹ ~~14,974~~ ₹ 13,477
You get 6 months extra for free Offer expires 15 Jun 2022
9 months ₹ 1,348 / mo
Save 45% ₹ ~~13,475~~ ₹ 12,128
6 months ₹ 1,838 / mo
Save 25% ₹ ~~12,252~~ ₹ 11,027
3 months ₹ 2,042 / mo
Save 17% ₹ ~~6,807~~ ₹ 6,126
Proceed to pay

Maxima and minima of two variables function

1. Maxima of function :

Let (a, b) be a point in the domain of f(x, y), then f(x, y) has a maxima at (a, b) iff (a, b) ≥ f(x, y); for all (x, y) ∈ domain

$f(x, y) = x^2 + y^2$

$D = \{(x, y) \mid x^2 + y^2 \leq 1\}$

$f(0, 0) = 0$

$f(1, 1) = \cancel{2}$

$f(0, 1) = 1$

$f(\tfrac{1}{2}, \tfrac{1}{4}) = \ldots$

2. Minima of function :

Let (a, b) be a point in the domain of $f(x, y)$, then $f(x, y)$ has a minima at (a, b) iff $f(a, b) \leq f(x, y)$; for all $(x, y) \in$ domain

3. **Extremum point :**

$f(x, y)$ is said to have an extremum at a point (a, b) if it has either a maximum and minimum at (a, b).

4. Critical point :

A point (a, b) is said to be a critical point for the function f(x, y) if $f_x(a, b) = 0$ & $f_y(a, b) = 0$

Note : A critical point is an extremum point of function but converse may not true.

$(0,0)$

$(1,0)$

$(0,1)$

$f = x^2 + y^2$

$\frac{\partial f}{\partial x} = 2x = 0$

$\frac{\partial f}{\partial y} = 2y = 0$

$x = 0$

$y = 0$

Procedure of finding maxima & minima

Let $f(x, y)$ be a function of two variables and $r = f_{xx}(a, b)$, $s = f_{xy}(a, b)$, $t = f_{yy}(a, b)$, then

$\frac{\partial f}{\partial x} = 0$

$\frac{\partial f}{\partial y} = 0$

$rt - s^2 = 0$

(i) f has a minima at (a, b) if $rt - s^2 > 0$ & $r > 0$

$rt - s^2 < 0$

(ii) f has a maxima at (a, b) if $rt - s^2 > 0$ & $r < 0$

(iii) f has neither maxima nor minima at (a, b) if $rt - s^2 < 0$

$r = \frac{\partial^2 f}{\partial x^2}$

(iv) f may or may not have an extrema if $rt - s^2 = 0$

$s = \frac{\partial^2 f}{\partial x \partial y}$

$rt - s^2 > 0$

$t = \frac{\partial^2 f}{\partial y^2}$

min
$r > 0$

max
$r < 0$

$$f = 1 - x^2 - y^2$$

$$\frac{\partial f}{\partial x} = -2x = 0$$

$$\frac{\partial f}{\partial y} = -2y = 0$$

$x = 0$

$y = 0$

$(0, 0)$

$$r = \frac{\partial^2 f}{\partial x^2} = -2$$

$$s = \frac{\partial^2 f}{\partial x \partial y} = 0$$

$$t = \frac{\partial^2 f}{\partial y^2} = -2$$

$$rt - s^2 = 4 - 0 > 0$$

$$r = -2 < 0$$

Maxima

$(0, 0)$ there is maximal

$$\text{Max } f = 1 - 0 - 0$$
$$= 1$$

$$z = x^3 - 3xy^2$$

$$\frac{\partial z}{\partial x} = 3x^2 - 3y^2 = 0 \Rightarrow x = \pm y$$

$$\frac{\partial z}{\partial y} = -6xy = 0$$

$x = 0,\ y = 0$

$y = 0,\ x = 0$

$(0,0)$

$$r = \frac{\partial^2 z}{\partial x^2} = 6x$$

$$s = \frac{\partial^2 z}{\partial x \partial y} = -6y$$

$$t = \frac{\partial^2 z}{\partial y^2} = -6x$$

at $(0,0)$

$r = 0$

$s = 0$

$t = 0$

$f(0,0) = 0$

$f(1,0) = 1$

$f(1,1) = -2$

$rt - s^2 = 0$

Saddle Point :

A point (a, b) is said to be saddle point if it is neither maxima nor minima.

Q.1. Consider the function $f(x, y) = 5 - 4\sin x + y^2$ for $0 < x < 2\pi$ and $y \in \mathbb{R}$. The set of critical points of $f(x, y)$ consists of **IIT JAM – 2017**

(a) a point of local maxima and a point of local minima

(b) a point of local maxima and a saddle point

(c) a point of local maxima, a point of local minima and a saddle point

(d) a point of local minima and a saddle point.

$\frac{\partial f}{\partial x} = -4\cos x = 0$

$\frac{\partial f}{\partial y} = 2y = 0$

$y = 0$

$\frac{\pi}{2}, \frac{3\pi}{2}$

$(\pi/2, 0), (3\pi/2, 0)$

$r = \frac{\partial^2 f}{\partial x^2} = 4\sin x$

$s = \frac{\partial^2 f}{\partial x \partial y} = 0$

$t = \frac{\partial^2 f}{\partial y^2} = 2$

at $(\pi/2, 0)$

$r = 4,\ s = 0,\ t = 2$

$rt - s^2 = 8 > 0$

minima

at $(3\pi/2, 0)$

$r = -4,\ s = 0,\ t = 2$

$rt - s^2 = -8 < 0$

Q.2 $f(x, y) = x^3 - y^3 - 3x^2 + 3y^2 + 7$, $(x, y) \in R^2$. Then the local minimum(m) and local Maximum (M) of f are given by **IIT JAM – 2017**

(a) $m = 3, M = 7$ (b) $m = 4, M = 11$

(c) $m = 7, M = 11$ (d) $m = 3, M = 11$

$\frac{\partial f}{\partial x} = 3x^2 - 6x = 0$, $x = 0, 2$

$\frac{\partial f}{\partial y} = -3y^2 + 6y = 0$, $y = 0, 2$

$(0, 0)$: $r = -6$, $s = 0$, $t = 6$, $rt - s^2 = -36 < 0$

$(0, 2)$: $r = -6 < 0$, $s = 0$, $t = -6$, $rt - s^2 = 36 > 0$, $\max f = -8 + 12 + 7$, $M = 11$

$(2, 0)$: $r = 6$, $s = 0$, $t = 6$, $rt - s^2 = 36 > 0$, $\min f = 8 - 12 + 7$, $m = 3$

$(2, 2)$: $r = 6$, $s = 0$, $t = -6$, $rt - s^2 = -36 < 0$

$r = \frac{\partial^2 f}{\partial x^2} = 6x - 6$

$s = \frac{\partial^2 f}{\partial x \partial y} = 0$

$t = \frac{\partial^2 f}{\partial y^2} = -6y + 6$

Q3. Let f given by $f(x, y) = x^2 + xy + y^2 - x - 100$. Find the points of local maxima and local minima (if any) of f. **IIT JAM – 2011**

(a) Only $\left(\frac{2}{3}, -\frac{1}{3}\right)$ (b) Only $\left(-\frac{2}{3}, -\frac{1}{3}\right)$

(c) $\left(\frac{2}{3}, \frac{1}{3}\right)$ (d) None of these

$\left(\frac{2}{3}, -\frac{1}{3}\right)$

$\frac{\partial f}{\partial x} = 2x + y - 1 = 0$

$\frac{\partial f}{\partial y} = x + 2y = 0$

$x = -2y$

$-4y + y - 1 = 0$

$-3y = 1$

$y = -\frac{1}{3}$, $x = \frac{2}{3}$

$r = \frac{\partial^2 f}{\partial x^2} = 2$

$s = \frac{\partial^2 f}{\partial x \partial y} = 1$

$t = \frac{\partial^2 f}{\partial y^2} = 2$

$rt - s^2 = 4 - 1 = 3 > 0$

$r = 2 > 0$

Q4. Let $f(x, y) = x^3 + y^3 + 3xy$ is a function of two variables. Which of the following is true?

IIT – JAM 2012

(a) maxima at (-1, -1)

(b) minima at (-1, -1)

(c) maxima at (0, 0)

(d) saddle point at (-1, -1)

$\frac{\partial f}{\partial x} = 3x^2 + 3y = 0$

$\frac{\partial f}{\partial y} = 3y^2 + 3x = 0$

$3x^2 = -3y$

$3y^2 = -3x$

$x = +y$

$(0, 0), (-1, -1)$

$r = \frac{\partial^2 f}{\partial x^2} = 6x$

$s = \frac{\partial^2 f}{\partial x \partial y} = 3$

$t = \frac{\partial^2 f}{\partial y^2} = 6y$

at (0, 0)

$r = 0$

$s = 3$

$t = 0$

$rt - s^2 = -9 < 0$

at (-1, -1)

$r = -6$

$s = 3$

$t = -6$

$rt - s^2 = 36 - 9 > 0$

Q5. Let $f(x, y) = x^4 - 2x^2y^2 + y^4 + x^2 - 6xy + 9y^2$

then which of the following is true

(a) f has a minima (global) at $(0,1)$

(b) f has a minima (global) at $(0,0)$

(c) f has a minima (global) at $(2,0)$

(d) None of these

Q6. The critical point of $f(x, y) = x^3 + y^2 - 12x - 6y + 40$ are **IIT JAM – 2006**

(a) saddle point (b) maxima

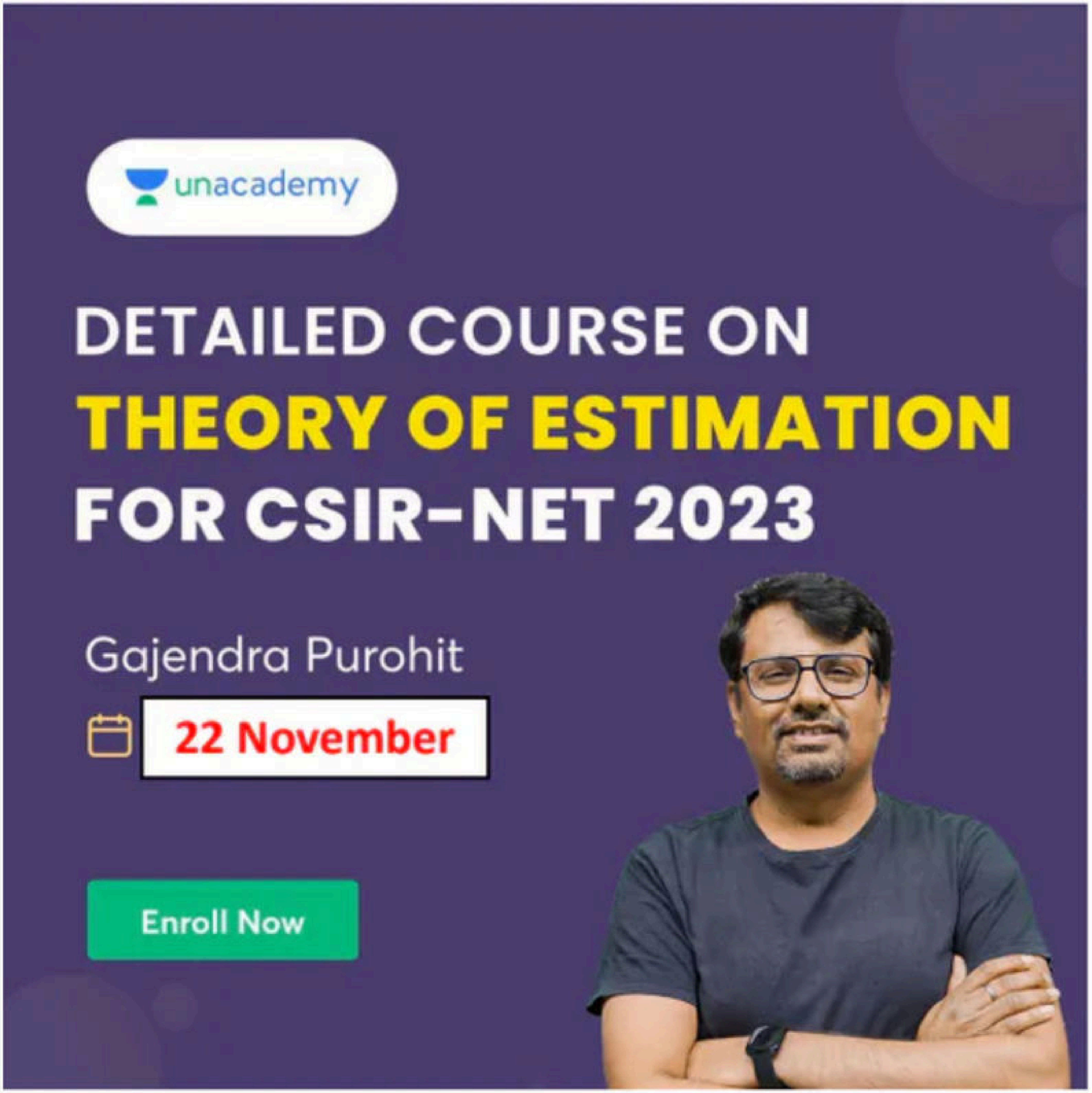
(c) minima (d) none of thes

Q7. Let $f(x, y) = 4xy - x^3y - xy^3$ for $(x, y) \in R^2$. The value of f at local minimum in the rectangular region $R = \left\{(x, y) \in R^2 \mid |x| < \frac{3}{2}, |y| < \frac{3}{2}\right\}$ is

(a) -2 (b) -3

(c) -7/8 (d) 0

FOUNDATION COURSE OF
MATHEMATICS
FOR CSIR-NET


unacademy
DETAILED COURSE ON
THEORY OF ESTIMATION
FOR CSIR-NET 2023
Gajendra Purohit
22 November
Enroll Now


unacademy
DETAILED COURSE 2.0 ON
INTEGRAL CALCULUS
FOR IIT-JAM 2023
1 December | 9:00 AM
Gajendra Purohit
Enroll Now
Use code GPSIR for 10% off
*T&C apply, as available on the platform.

unacademy   CSIR-UGC NET   Search   Login

Educator Profile

Gajendra Purohit

#5 Educator in CSIR-UGC NET

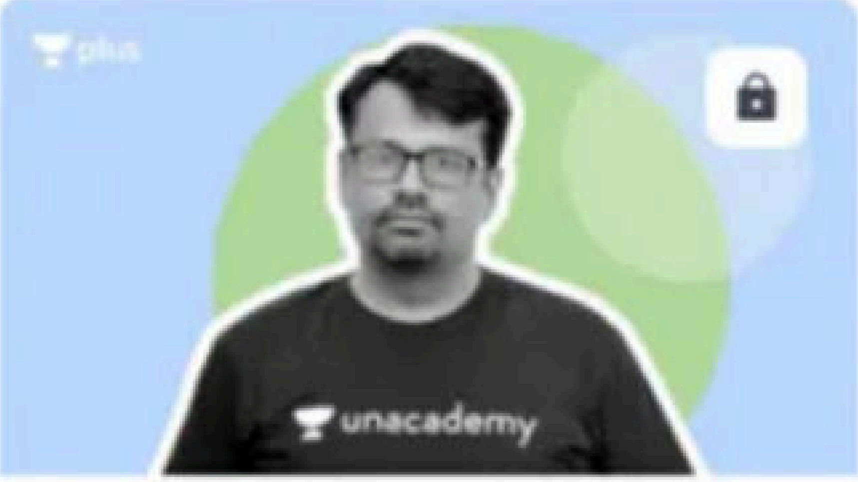
Dr.Gajendra Purohit PhD, CSIR NET (Maths) | Youtuber(330K+30k Sub.)/Dr.Gajendra Purohit (Maths), 17+ Yr. Experience, Author of Bestseller

Follow

11M Watch mins | **1M** Watch mins (last 30 days) | **22k** Followers | **1k** Dedications

CSIR-UGC NET

SEE ALL



HINDI MATHEMATICAL SCIENCES

Course on Linear Algebra, Partial Diff. Equation & Calculus

Starts on Mar 1, 2021 • 24 lessons

Gajendra Purohit

HINDI MATHEMATICAL SCIENCES

Course on Complex Analysis & Integral Equation

Starts on Jan 14, 2021 • 16 lessons

Gajendra Purohit

HINDI MATHEMATICAL SCIENCES

Foundation Course on Mathematics for CSIR 2021

Starts on Dec 7, 2020 • 20 lessons

Gajendra Purohit

Educator highlights

- Works at **Pacific Science College**
- Studied at **M.Sc., NET, PhD(Algebra), MBA(Finance), BEd**
- PhD, NET | Plus Educator For CSIR NET | Youtuber (260K+Subs.) | Director Pacific Science College |
- Lives in **Udaipur, Rajasthan, India**
- Unacademy Educator since

FEE DETAILS FOR IIT JAM SUBSCRIPTION

No cost EMI available on 6 months & above subscription plans

Plan	Price	Total	Offer
24 months Save 67%	₹ 908 / mo	Total ₹ 21,780	You get 6 months extra for free — Offer expires 15 Jun 2022
12 months Save 54%	₹ 1,248 / mo	Total ₹ 14,974	You get 6 months extra for free — Offer expires 15 Jun 2022
9 months Save 45%	₹ 1,497 / mo	Total ₹ 13,475	
6 months Save 25%	₹ 2,042 / mo	Total ₹ 12,252	
3 months Save 17%	₹ 2,269 / mo	Total ₹ 6,807	
1 month	₹ 2,723 / mo	Total ₹ 2,723	

To be paid as a one-time payment

Have a referral code?

Proceed to pay

Get 10% Off

After Using My Referral Code

GPSIR

Awesome! You get 10% off

No cost EMI available on 6 months & above subscription plans

Plan	Price	Total	Offer
24 months Save 67%	₹ 817 / mo	~~₹ 21,780~~ ₹ 19,602	You get 6 months extra for free — Offer expires 15 Jun 2022
12 months Save 54%	₹ 1,123 / mo	~~₹ 14,974~~ ₹ 13,477	You get 6 months extra for free — Offer expires 15 Jun 2022
9 months Save 45%	₹ 1,348 / mo	~~₹ 13,475~~ ₹ 12,128	
6 months Save 25%	₹ 1,838 / mo	~~₹ 12,252~~ ₹ 11,027	
3 months Save 17%	₹ 2,042 / mo	~~₹ 6,807~~ ₹ 6,126	

Proceed to pay

Maxima and minima of two variables function

1. Maxima of function :

Let (a, b) be a point in the domain of $f(x, y)$, then $f(x, y)$ has a maxima at (a, b) iff $(a, b) \geq f(x, y)$; for all $(x, y) \in$ domain

2. Minima of function :

Let (a, b) be a point in the domain of $f(x, y)$, then $f(x, y)$ has a minima at (a, b) iff $f(a, b) \le f(x, y)$; for all $(x, y) \in$ domain

3. Extremum point :

f(x, y) is said to have an extremum at a point (a, b) if it has either a maximum and minimum at (a, b).

4. Critical point :

A point (a, b) is said to be a critical point for the function $f(x, y)$ if $f_x(a, b) = 0$ & $f_y(a, b) = 0$

Note : A critical point is an extremum point of function but converse may not true.

Procedure of finding maxima & minima

Let $f(x, y)$ be a function of two variables and $r = f_{xx}(a, b)$, $s = f_{xy}(a, b)$, $t = f_{yy}(a, b)$, then

(i) f has a minima at (a, b) if $rt - s^2 > 0$ & $r > 0$

(ii) f has a maxima at (a, b) if $rt - s^2 > 0$ & $r < 0$

(iii) f has neither maxima nor minima at (a, b) if $rt - s^2 < 0$

(iv) f may or may not have an extrema if $rt - s^2 = 0$

Saddle Point :

A point (a, b) is said to be saddle point if it is neither maxima nor minima.

Q.1. Consider the function $f(x, y) = 5 - 4 \sin x + y^2$ for $0 < x < 2\pi$ and $y \in R$. The set of critical points of $f(x, y)$ consists of **IIT JAM – 2017**

(a) a point of local maxima and a point of local minima

(b) a point of local maxima and a saddle point

(c) a point of local maxima, a point of local minima and a saddle point

(d) a point of local minima and a saddle point.

COMPLETE COURSE ON

MATHEMATICS

FOR IIT-JAM 2022

TARGETED AUDIENCE

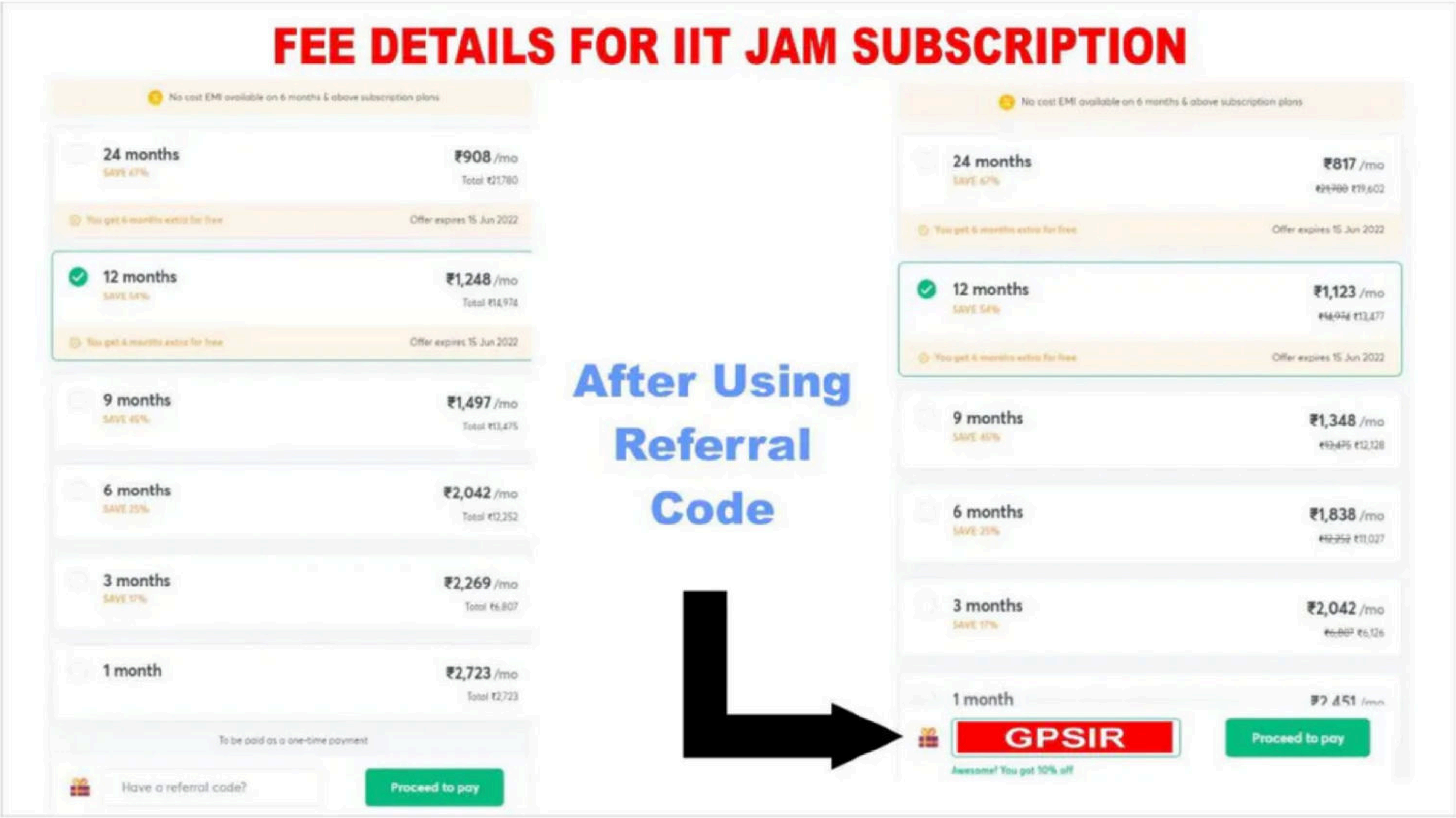
- IIT-JAM
- M.Sc. Entrance Exam

TOPICS TO BE COVERED

- REAL ANALYSIS
- FUNCTION OF ONE & TWO VARIABLE
- LINAER ALGEBRA
- MODERN ALGEBRA

TOPICS TO BE COVERED

- SEQUENCE & SERIES
- INTEGRAL CALCULUS
- VECTOR CALCULUS
- DIFFERENTIAL EQUATION



FEE DETAILS FOR IIT JAM SUBSCRIPTION
No cost EMI available on 6 months & above subscription plans
24 months
SAVE 67%
₹908 /mo
Total ₹21,780
Offer expires 15 Jun 2022
12 months
SAVE 54%
₹1,248 /mo
Total ₹14,974
Offer expires 15 Jun 2022
9 months
SAVE 45%
₹1,497 /mo
Total ₹13,475
6 months
SAVE 25%
₹2,042 /mo
Total ₹12,252
3 months
SAVE 17%
₹2,269 /mo
Total ₹6,807
1 month
₹2,723 /mo
Total ₹2,723
To be paid as a one-time payment
Have a referral code?
Proceed to pay
After Using Referral Code
No cost EMI available on 6 months & above subscription plans
24 months
SAVE 67%
₹817 /mo
~~₹21,780~~ ₹19,602
Offer expires 15 Jun 2022
12 months
SAVE 54%
₹1,123 /mo
~~₹14,974~~ ₹13,477
Offer expires 15 Jun 2022
9 months
SAVE 45%
₹1,348 /mo
~~₹13,475~~ ₹12,128
6 months
SAVE 25%
₹1,838 /mo
~~₹12,252~~ ₹11,027
3 months
SAVE 17%
₹2,042 /mo
~~₹6,807~~ ₹6,126
1 month
₹2,451 /mo
GPSIR
Proceed to pay
Awesome! You got 10% off

Q.2 $f(x, y) = x^3 - y^3 - 3x^2 + 3y^2 + 7, (x, y) \in R^2$. Then the local minimum(m) and local Maximum (M) of f are given by **IIT JAM – 2017**

(a) $m = 3, M = 7$ (b) $m = 4, M = 11$

(c) $m = 7, M = 11$ (d) $m = 3, M = 11$

Q3. Let f given by $f(x, y) = x^2 + xy + y^2 - x - 100$. Find the points of local maxima and local minima (if any) of f. **IIT JAM – 2011**

(a) Only $\left(\frac{2}{3}, -\frac{1}{3}\right)$ (b) Only $\left(-\frac{2}{3}, -\frac{1}{3}\right)$

(c) $\left(\frac{2}{3}, \frac{1}{3}\right)$ (d) None of these

Q4. Let $f(x, y) = x^3 + y^3 + 3xy$ is a function of two variables. Which of the following is true?

IIT – JAM 2012

(a) maxima at (-1, -1)

(b) minima at (-1, -1)

(c) maxima at (0, 0)

(d) saddle point at (-1, -1)

Q5. Let $f(x, y) = x^4 - 2x^2y^2 + y^4 + x^2 - 6xy + 9y^2$

then which of the following is true

(a) f has a minima (global) at (0,1)

(b) f has a minima (global) at (0,0)

(c) f has a minima (global) at (2,0)

(d) None of these

Q6. The critical point of $f(x, y) = x^3 + y^2 - 12x - 6y + 40$ are **IIT JAM – 2006**

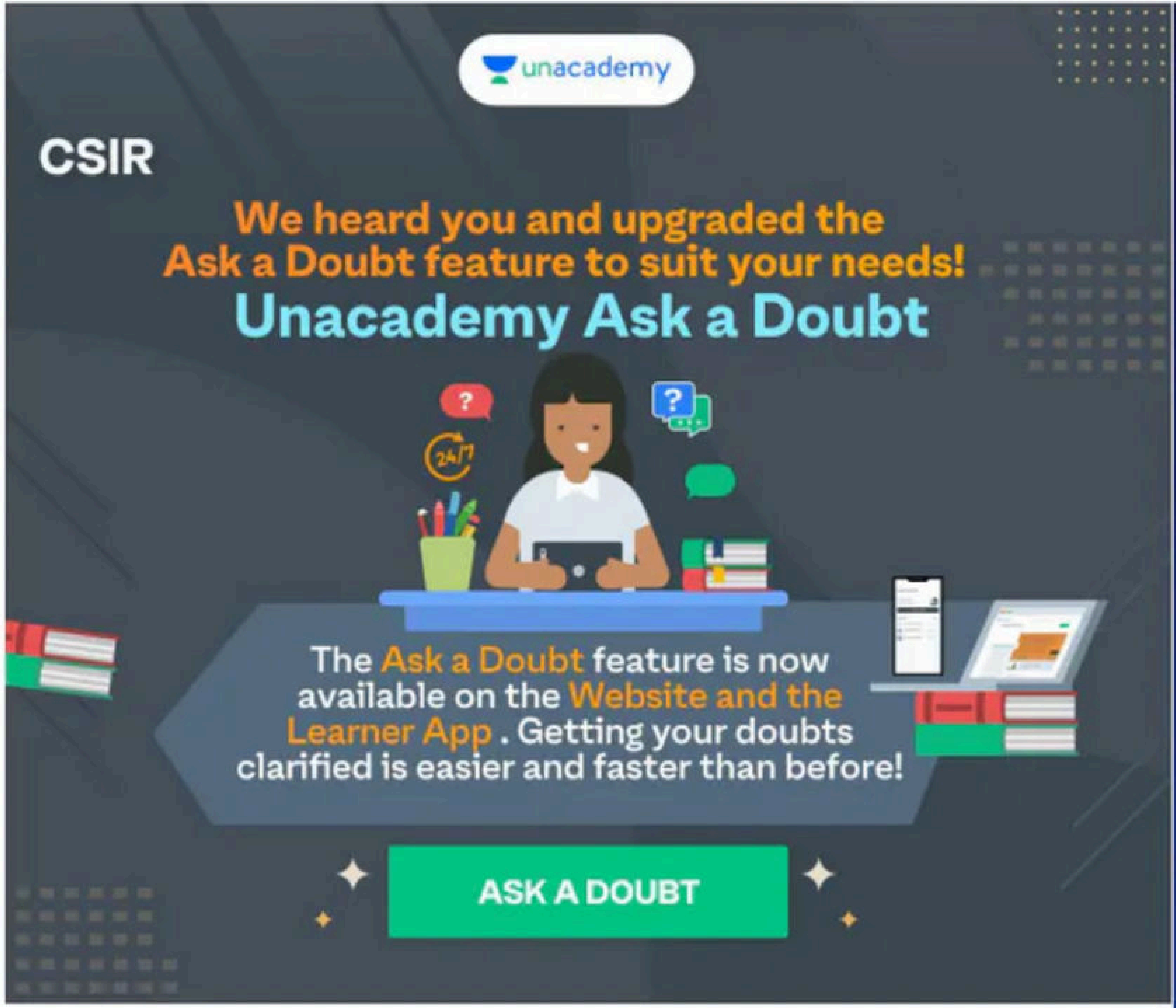
(a) saddle point (b) maxima

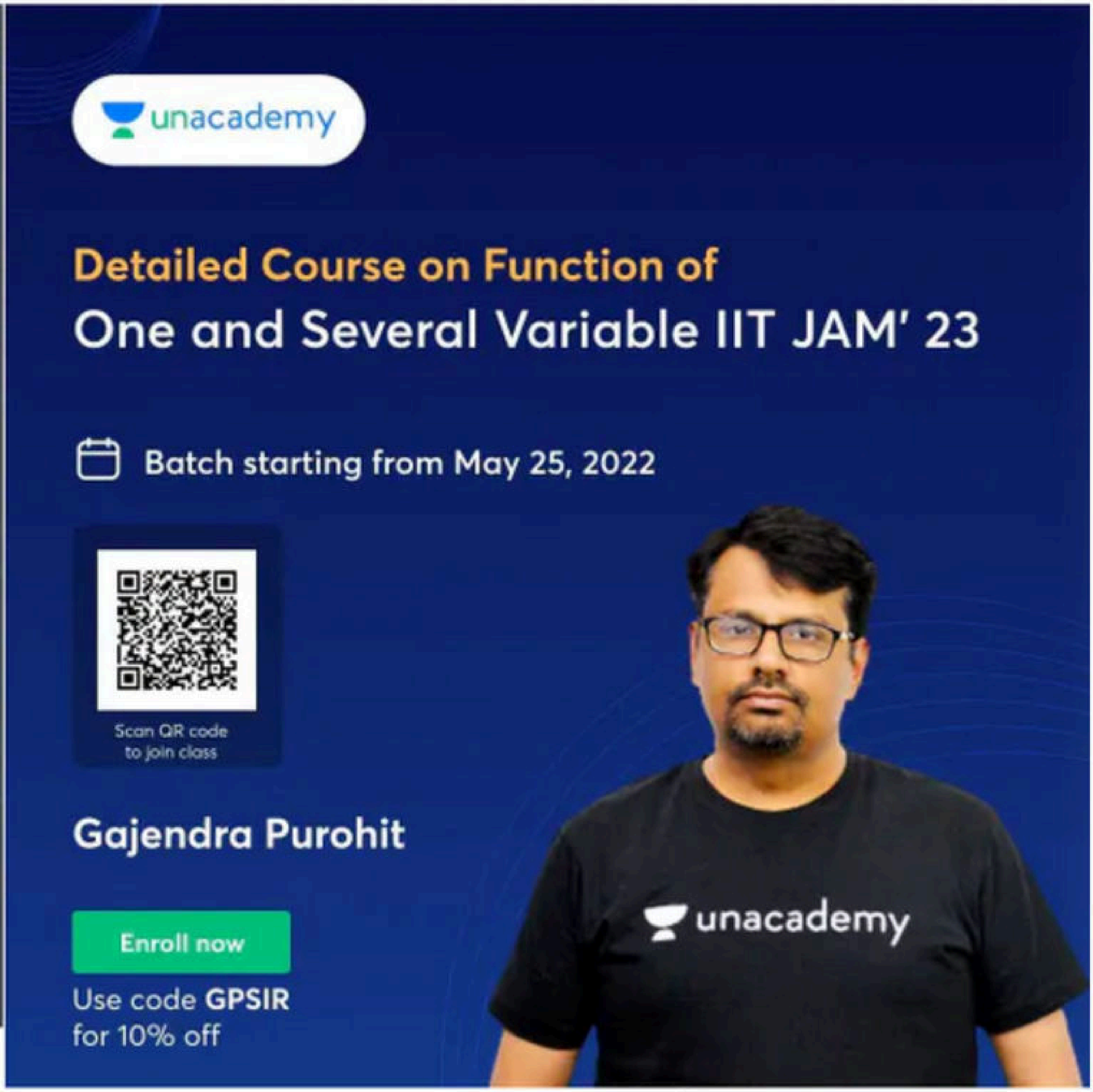
(c) minima (d) none of thes

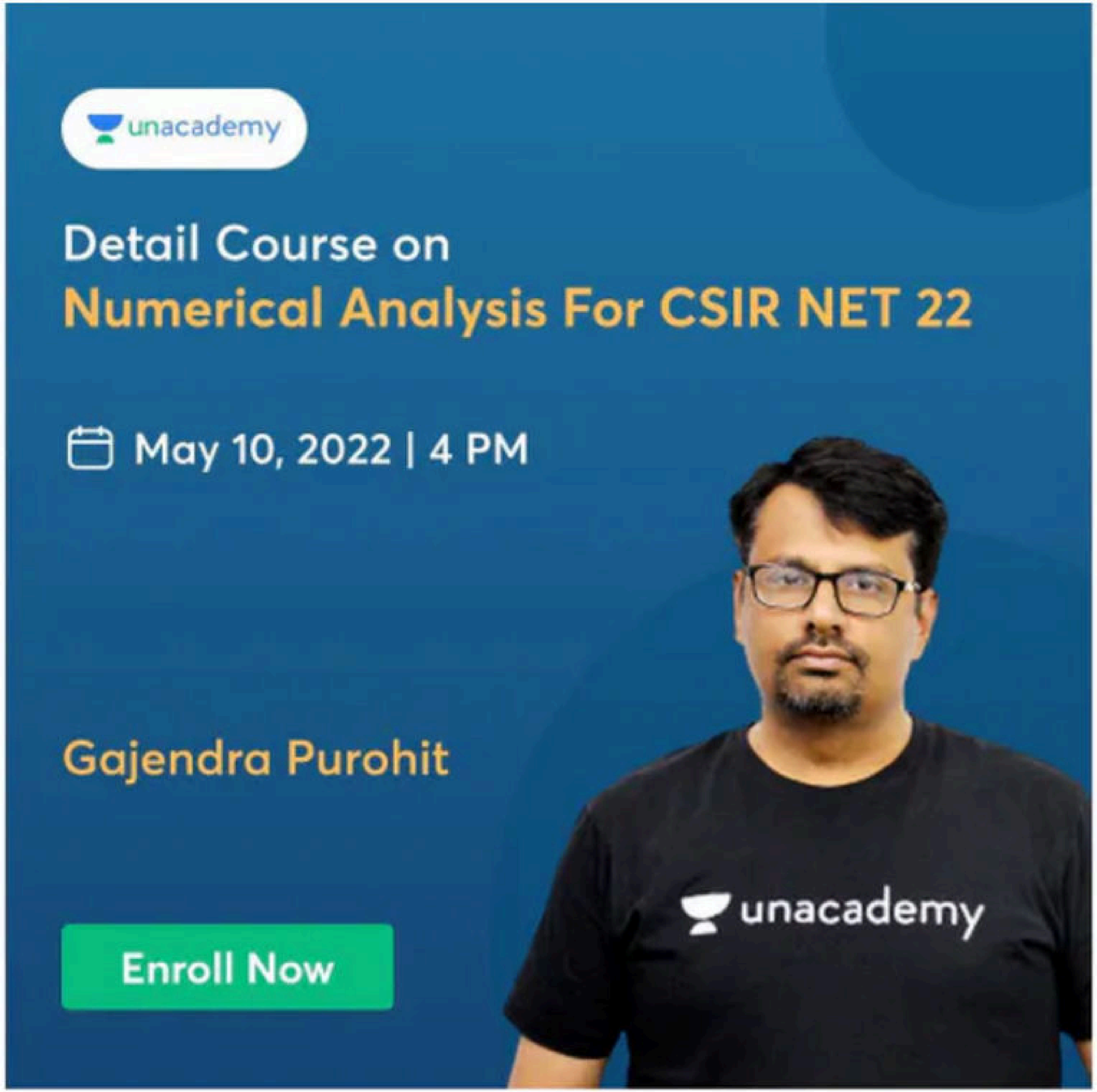
Q7. Let $f(x, y) = 4xy - x^3y - xy^3$ for $(x, y) \in R^2$. The value of f at local minimum in the rectangular region $R = \left\{(x, y) \in R^2 \mid |x| < \frac{3}{2}, |y| < \frac{3}{2}\right\}$ is

(a) -2 (b) -3

(c) -7/8 (d) 0


unacademy
CSIR
We heard you and upgraded the
Ask a Doubt feature to suit your needs!
Unacademy Ask a Doubt
?
?
24/7
The Ask a Doubt feature is now available on the Website and the Learner App . Getting your doubts clarified is easier and faster than before!
ASK A DOUBT


unacademy
Detailed Course on Function of
One and Several Variable IIT JAM' 23
Batch starting from May 25, 2022
Scan QR code to join class
Gajendra Purohit
Enroll now
Use code GPSIR for 10% off
unacademy


unacademy
Detail Course on
Numerical Analysis For CSIR NET 22
May 10, 2022 | 4 PM
Gajendra Purohit
unacademy
Enroll Now


unacademy
Detail Course on
Real Analysis For CSIR NET 22
May 4, 2022 | 9 PM
Gajendra Purohit
unacademy
Enroll Now

FEE DETAILS FOR IIT JAM SUBSCRIPTION