4 Engineering Mathematics: Calculus (66)

4.0.1 GATE Overflow Test Series | Mock GATE | Test 3 | Question: 59

If the function $f(x) = \begin{cases} \alpha\sqrt{x+1} & ;0 \leq x \leq 3 \\ \beta x + 2 & ;3 < x \leq 5 \end{cases}$ is differentiable, then the value of $\alpha - \beta$ is _____

go2025-mockgate-3 numerical-answers calculus

Answer key

4.1 Continuity (8)

4.1.1 Continuity: GATE CSE 1996 | Question: 3

Let f be a function defined by

$$f(x) = \begin{cases} x^2 & \text{for } x \leq 1 \\ ax^2 + bx + c & \text{for } 1 < x \leq 2 \\ x + d & \text{for } x > 2 \end{cases}$$

Find the values for the constants a, b, c and d so that f is continuous and differentiable everywhere on the real line.

gate1996 calculus continuity differentiation normal descriptive

Answer key

4.1.2 Continuity: GATE CSE 1998 | Question: 1.4

Consider the function $y = |x|$ in the interval $[-1, 1]$. In this interval, the function is

A. continuous and differentiable
B. continuous but not differentiable
C. differentiable but not continuous
D. neither continuous nor differentiable

gate1998 calculus continuity differentiation easy

Answer key

4.1.3 Continuity: GATE CSE 2007 | Question: 1

Consider the following two statements about the function $f(x) = |x|$:

- P. $f(x)$ is continuous for all real values of x.
- Q. $f(x)$ is differentiable for all real values of x .

Which of the following is **TRUE**?

A. P is true and Q is false.
B. P is false and Q is true.
C. Both P and Q are true.
D. Both P and Q are false.

gatecse-2007 calculus continuity differentiation easy

Answer key

4.1.4 Continuity: GATE CSE 2013 | Question: 22

Which one of the following functions is continuous at $x = 3$?

A. $f(x) = \begin{cases} 2, & \text{if } x = 3 \\ x-1 & \text{if } x > 3 \\ \frac{x+3}{3} & \text{if } x < 3 \end{cases}$

B. $f(x) = \begin{cases} 4, & \text{if } x = 3 \\ 8-x & \text{if } x \neq 3 \end{cases}$

C. $f(x) = \begin{cases} x+3, & \text{if } x \leq 3 \\ x-4 & \text{if } x > 3 \end{cases}$

D. $f(x) = \{ \frac{1}{x^3-27} \quad \text{if } x \neq 3$

gatecse-2013 calculus continuity normal

Answer key

4.1.5 Continuity: GATE CSE 2014 Set 1 | Question: 47

A function $f(x)$ is continuous in the interval $[0,2]$. It is known that $f(0) = f(2) = -1$ and $f(1) = 1$. Which one of the following statements must be true?

A. There exists a y in the interval $(0,1)$ such that $f(y) = f(y+1)$
B. For every y in the interval $(0,1), f(y) = f(2-y)$
C. The maximum value of the function in the interval $(0,2)$ is 1
D. There exists a y in the interval $(0,1)$ such that $f(y) = -f(2-y)$

gatecse-2014-set1 calculus continuity normal

Answer key

4.1.6 Continuity: GATE CSE 2015 Set 2 | Question: 26

Let $f(x) = x^{-(\frac{1}{3})}$ and A denote the area of region bounded by $f(x)$ and the X-axis, when x varies from -1 to 1. Which of the following statements is/are TRUE?

I. f is continuous in $[-1,1]$
II. f is not bounded in $[-1,1]$
III. A is nonzero and finite

A. II only B. III only C. II and III only D. I, II and III

gatecse-2015-set2 continuity functions normal

Answer key

4.1.7 Continuity: GATE CSE 2021 Set 2 | Question: 25

Suppose that $f : \mathbb{R} \to \mathbb{R}$ is a continuous function on the interval $[-3,3]$ and a differentiable function in the interval $(-3,3)$ such that for every x in the interval, $f'(x) \leq 2$. If $f(-3) = 7$, then $f(3)$ is at most

_____

gatecse-2021-set2 numerical-answers calculus continuity 1-mark

Answer key

4.1.8 Continuity: GATE2010 ME

The function $y = |2 - 3x|$

A. **is continuous** $\forall x \in R$ and differentiable $\forall x \in R$
B. **is continuous** $\forall x \in R$ and differentiable $\forall x \in R$ except at $x = \frac{3}{2}$
C. **is continuous** $\forall x \in R$ and differentiable $\forall x \in R$ except at $x = \frac{2}{3}$

D. **is continuous** $\forall x \in R$ except $x = 3$ and differentiable $\forall x \in R$

calculus gate2010me engineering-mathematics continuity

Answer key

4.2 Convergence (2)

4.2.1 Convergence: GATE CSE 1993 | Question: 01.6

Which of the following improper integrals is (are) convergent?

A. $\int_0^1 \frac{\sin x}{1-\cos x} dx$

B. $\int_0^\infty \frac{\cos x}{1+x} dx$

C. $\int_0^\infty \frac{x}{1+x^2} dx$

D. $\int_0^1 \frac{1-\cos x}{\frac{x^5}{2}} dx$

gate1993 calculus integration convergence out-of-gatecse-syllabus multiple-selects

Answer key

4.2.2 Convergence: GATE CSE 1993 | Question: 02.2

The radius of convergence of the power series

$$\sum^{\infty} \frac{(3m)!}{(m!)^3} x^{3m}$$

is: _____

gate1993 calculus convergence normal out-of-gatecse-syllabus fill-in-the-blanks

4.3 Definite Integral (3)

4.3.1 Definite Integral: GATE CSE 2023 | Question: 21

The value of the definite integral

$$\int_{-3}^{3} \int_{-2}^{2} \int_{-1}^{1} \left(4x^2y - z^3\right) \mathrm{d}z \, \mathrm{d}y \, \mathrm{d}x$$

is _____. (Rounded off to the nearest integer)

gatecse-2023 calculus definite-integral numerical-answers 1-mark

Answer key

4.3.2 Definite Integral: GATE CSE 2024 | Set 2 | Question: 6

Let $f(x)$ be a continuous function from $\mathbb{R}$ to $\mathbb{R}$ such that

$$f(x) = 1 - f(2 - x)$$

Which one of the following options is the CORRECT value of $\int_0^2 f(x)dx$?

A. 0 B. 1 C. 2 D. -1

gatecse2024-set2 calculus definite-integral

Answer key

4.3.3 Definite Integral: GATE Overflow Test Series | Mock GATE | Test 6 | Question: 31

The value of $\int_0^{\frac{\pi}{2}} \sin^4 x \cos^4 x dx$ is _____

A. $\left(\frac{3\pi}{256}\right)$ B. $\left(\frac{5\pi}{768}\right)$ C. $\left(\frac{7\pi}{768}\right)$ D. $\left(\frac{3\pi}{384}\right)$

go2025-mockgate-6 calculus definite-integral 1-mark

Answer key

4.4 Differential Equation (1)

4.4.1 Differential Equation: GATE CSE 1993 | Question: 01.2

The differential equation $\frac{d^2y}{dx^2} + \frac{dy}{dx} + \sin y = 0$ is:

A. linear
B. non- linear
C. homogeneous
D. of degree two

gate1993 calculus differential-equation easy out-of-gatecse-syllabus multiple-selects

Answer key

4.5 Differentiation (6)

4.5.1 Differentiation: GATE CSE 1996 | Question: 1.6

The formula used to compute an approximation for the second derivative of a function f at a point x_0 is

A. $\frac{f(x_0+h)+f(x_0-h)}{2}$ B. $\frac{f(x_0+h)-f(x_0-h)}{2h}$

C. $\frac{f(x_0+h)+2f(x_0)+f(x_0-h)}{h^2}$ D. $\frac{f(x_0+h)-2f(x_0)+f(x_0-h)}{h^2}$

gate1996 calculus differentiation normal

Answer key

4.5.2 Differentiation: GATE CSE 2014 Set 1 | Question: 46

The function $f(x) = x \sin x$ satisfies the following equation:

$$f''(x) + f(x) + t \cos x = 0$$

The value of t is_____.

gatecse-2014-set1 calculus easy numerical-answers differentiation

Answer key

4.5.3 Differentiation: GATE CSE 2014 Set 1 | Question: 6

Let the function

$$f(\theta) = \begin{vmatrix} \sin\theta & \cos\theta & \tan\theta \\ \sin(\frac{\pi}{6}) & \cos(\frac{\pi}{6}) & \tan(\frac{\pi}{6}) \\ \sin(\frac{\pi}{3}) & \cos(\frac{\pi}{3}) & \tan(\frac{\pi}{3}) \end{vmatrix}$$

where

$\theta \in \left[\frac{\pi}{6}, \frac{\pi}{3}\right]$ and $f'(\theta)$ denote the derivative of f with respect to θ. Which of the following statements is/are **TRUE**?

I. There exists $\theta \in \left(\frac{\pi}{6}, \frac{\pi}{3}\right)$ such that $f'(\theta) = 0$
II. There exists $\theta \in \left(\frac{\pi}{6}, \frac{\pi}{3}\right)$ such that $f'(\theta) \neq 0$

A. I only B. II only C. Both I and II D. Neither I nor II

gatecse-2014-set1 calculus differentiation normal

Answer key

4.5.4 Differentiation: GATE CSE 2016 Set 2 | Question: 02

Let $f(x)$ be a polynomial and $g(x) = f'(x)$ be its derivative. If the degree of $(f(x) + f(-x))$ is 10, then the degree of $(g(x) - g(-x))$ is _____.

gatecse-2016-set2 calculus normal numerical-answers differentiation

Answer key

4.5.5 Differentiation: GATE CSE 2017 Set 2 | Question: 10

If $f(x) = R\ \sin(\frac{\pi x}{2}) + S, f'\left(\frac{1}{2}\right) = \sqrt{2}$ and $\int_0^1 f(x)dx = \frac{2R}{\pi}$, then the constants R and S are

A. $\frac{2}{\pi}$ and $\frac{16}{\pi}$ B. $\frac{2}{\pi}$ and 0 C. $\frac{4}{\pi}$ and 0 D. $\frac{4}{\pi}$ and $\frac{16}{\pi}$

gatecse-2017-set2 engineering-mathematics calculus differentiation

Answer key

4.5.6 Differentiation: GATE CSE 2024 | Set 1 | Question: 1

Let $f : \mathbb{R} \to \mathbb{R}$ be a function such that $f(x) = \max\left\{x, x^3\right\}, x \in \mathbb{R}$, where $\mathbb{R}$ is the set of all real numbers. The set of all points where $f(x)$ is NOT differentiable is

A. $\{-1, 1, 2\}$ B. $\{-2, -1, 1\}$ C. $\{0, 1\}$ D. $\{-1, 0, 1\}$

gatecse2024-set1 calculus differentiation

Answer key

4.6 GO Mockgate 1 (1)

4.6.1 GO Mockgate 1: GATE Overflow | Mock GATE | Test 1 | Question: 19

Evaluate the limit:

$$\lim_{x \to -3} \frac{\sqrt{2x + 22} - 4}{x + 3}$$

A. $\frac{1}{2}$ B. $\frac{1}{4}$ C. $\frac{1}{8}$ D. $\frac{1}{16}$

go-mockgate-1 limits calculus

Answer key

4.7 Integration (12)

4.7.1 Integration: GATE CSE 1993 | Question: 02.6

The value of the double integral $\int_0^1 \int_0^{\frac{1}{x}} \frac{x}{1+y^2} dxdy$ is_____.

gate1993 calculus integration normal fill-in-the-blanks

Answer key

4.7.2 Integration: GATE CSE 1998 | Question: 8

a. Find the points of local maxima and minima, if any, of the following function defined in $0 \leq x \leq 6$.

$$x^3 - 6x^2 + 9x + 15$$

b. Integrate

$$\int_{-\pi}^{\pi} x \cos x dx$$

gate1998 calculus maxima-minima integration normal descriptive

Answer key

4.7.3 Integration: GATE CSE 2000 | Question: 2.3

Let $S = \sum_{i=3}^{100} i \log_2 i$, and $T = \int_2^{100} x \log_2 x dx$.
Which of the following statements is true?

A. $S > T$
B. $S = T$
C. $S < T$ and $2S > T$
D. $2S \leq T$

gatecse-2000 calculus integration normal

Answer key

4.7.4 Integration: GATE CSE 2009 | Question: 25

$\int_0^{\pi/4} (1 - \tan x)/(1 + \tan x)\, dx$

A. 0
B. 1
C. $\ln 2$
D. $1/2 \ln 2$

gatecse-2009 calculus integration normal

Answer key

4.7.5 Integration: GATE CSE 2011 | Question: 31

Given $i = \sqrt{-1}$, what will be the evaluation of the definite integral $\int_0^{\pi/2} \frac{\cos x + i \sin x}{\cos x - i \sin x} dx$?

A. 0
B. 2
C. $-i$
D. i

gatecse-2011 calculus integration normal

Answer key

4.7.6 Integration: GATE CSE 2014 Set 3 | Question: 47

The value of the integral given below is

$$\int_0^{\pi} x^2 \cos x \, dx$$

A. -2π B. π C. $-\pi$ D. 2π

gatecse-2014-set3 calculus limits integration normal

Answer key

4.7.7 Integration: GATE CSE 2014 Set 3 | Question: 6

If $\int_0^{2\pi} |x \sin x| dx = k\pi$, then the value of k is equal to _____.

gatecse-2014-set3 calculus integration limits numerical-answers easy

Answer key

4.7.8 Integration: GATE CSE 2015 Set 1 | Question: 44

Compute the value of:

$$\int_{\frac{1}{\pi}}^{\frac{2}{\pi}} \frac{\cos(1/x)}{x^2} dx$$

gatecse-2015-set1 calculus integration normal numerical-answers

Answer key

4.7.9 Integration: GATE CSE 2015 Set 3 | Question: 45

If for non-zero x, $af(x) + bf(\frac{1}{x}) = \frac{1}{x} - 25$ where $a \neq b$ then $\int_1^2 f(x)dx$ is

A. $\frac{1}{a^2-b^2}\left[a(\ln 2 - 25) + \frac{47b}{2}\right]$
B. $\frac{1}{a^2-b^2}\left[a(2\ln 2 - 25) - \frac{47b}{2}\right]$
C. $\frac{1}{a^2-b^2}\left[a(2\ln 2 - 25) + \frac{47b}{2}\right]$
D. $\frac{1}{a^2-b^2}\left[a(\ln 2 - 25) - \frac{47b}{2}\right]$

gatecse-2015-set3 calculus integration normal

Answer key

4.7.10 Integration: GATE CSE 2018 | Question: 16

The value of $\int_0^{\pi/4} x\cos(x^2)dx$ correct to three decimal places (assuming that $\pi = 3.14$) is ____

gatecse-2018 calculus integration normal numerical-answers 1-mark

Answer key

4.7.11 Integration: GATE IT 2005 | Question: 35

What is the value of $\int_0^{2\pi} (x-\pi)^2 (\sin x)dx$

A. -1 B. 0 C. 1 D. π

gateit-2005 calculus integration normal

Answer key

4.7.12 Integration: GATE Overflow Test Series | Mock GATE | Test 1 | Question: 12

Assuming $i = \sqrt{-1}$ and t is a real number ,

$$I = \int_0^{\frac{\pi}{3}} e^{it} dt$$

A. $\frac{\sqrt{3}}{2} + i\frac{1}{2}$
B. $\frac{\sqrt{3}}{2} - i\frac{1}{2}$
C. $\frac{1}{2} + i\frac{\sqrt{3}}{2}$
D. $\frac{1}{2} + \left(1 - \frac{\sqrt{3}}{2}\right)$

go2025-mockgate-1 integration calculus

Answer key

4.8 Limits (13)

4.8.1 Limits: GATE CSE 1993 | Question: 02.1

$\lim_{x \to 0} \frac{x(e^x - 1) + 2(\cos x - 1)}{x(1 - \cos x)}$ is _____

gate1993 limits calculus normal fill-in-the-blanks

Answer key

4.8.2 Limits: GATE CSE 1995 | Question: 7(B)

Compute without using power series expansion $\lim_{x \to 0} \frac{\sin x}{x}$.

gate1995 calculus limits numerical-answers

Answer key

4.8.3 Limits: GATE CSE 2008 | Question: 1

$\lim_{x \to \infty} \frac{x - \sin x}{x + \cos x}$ equals

A. 1
B. -1
C. ∞
D. $-\infty$

gatecse-2008 calculus limits easy

Answer key

4.8.4 Limits: GATE CSE 2010 | Question: 5

What is the value of $\lim_{n \to \infty} \left(1 - \frac{1}{n}\right)^{2n}$?

A. 0
B. e^{-2}
C. $e^{-1/2}$
D. 1

gatecse-2010 calculus limits normal

Answer key

4.8.5 Limits: GATE CSE 2015 Set 1 | Question: 4

$\lim_{x \to \infty} x^{\frac{1}{x}}$ is

A. ∞ B. 0 C. 1 D. Not defined

gatecse-2015-set1 calculus limits normal

Answer key

4.8.6 Limits: GATE CSE 2015 Set 3 | Question: 9

The value of $\lim_{x \to \infty} (1+x^2)^{e^{-x}}$ is

A. 0 B. $\frac{1}{2}$ C. 1 D. ∞

gatecse-2015-set3 calculus limits normal

Answer key

4.8.7 Limits: GATE CSE 2016 Set 1 | Question: 3

$$\lim_{x \to 4} \frac{\sin(x-4)}{x-4} = \_\_\_\_\_$$

gatecse-2016-set1 calculus limits easy numerical-answers

Answer key

4.8.8 Limits: GATE CSE 2017 Set 1 | Question: 28

The value of $\lim_{x \to 1} \frac{x^7 - 2x^5 + 1}{x^3 - 3x^2 + 2}$

A. is 0 B. is -1 C. is 1 D. does not exist

gatecse-2017-set1 calculus limits normal

Answer key

4.8.9 Limits: GATE CSE 2019 | Question: 13

Compute $\lim_{x \to 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$

A. 1
B. $53/12$
C. $108/7$
D. Limit does not exist

gatecse-2019 engineering-mathematics calculus limits 1-mark

Answer key

4.8.10 Limits: GATE CSE 2021 Set 1 | Question: 20

Consider the following expression.

$$\lim_{x \to -3} \frac{\sqrt{2x+22} - 4}{x+3}$$

The value of the above expression (rounded to 2 decimal places) is _____.

gatecse-2021-set1 calculus limits numerical-answers 1-mark

Answer key

4.8.11 Limits: GATE CSE 2022 | Question: 24

The value of the following limit is _____.

$$\lim_{x \to 0^+} \frac{\sqrt{x}}{1 - e^{2\sqrt{x}}}$$

gatecse-2022 numerical-answers calculus limits 1-mark

Answer key

4.8.12 Limits: GATE DS&AI 2024 | Question: 50

Evaluate the following limit:

$$\lim_{x \to 0} \frac{\ln\left(\left(x^2 + 1\right) \cos x\right)}{x^2} =$$

gate-ds-ai-2024 numerical-answers limits engineering-mathematics

Answer key

4.8.13 Limits: GATE Data Science and Artificial Intelligence 2024 | Sample Paper | Question: 5

$\lim_{x \to 2} \frac{\sqrt{x} - \sqrt{2}}{x - 2}$

A. 0 B. $\sqrt{2}$ C. $\frac{1}{2\sqrt{2}}$ D. $\frac{1}{\sqrt{2}}$

gateda-sample-paper-2024 limits

Answer key

4.9 Maxima Minima (13)

4.9.1 Maxima Minima: GATE CSE 1987 | Question: 1-xxvi

If $f(x_i).\, f(x_{i+1}) < 0$ then

A. There must be a root of $f(x)$ between x_i and x_{i+1}
B. There need not be a root of $f(x)$ between x_i and x_{i+1}
C. There fourth derivative of $f(x)$ with respect to x vanishes at x_i
D. The fourth derivative of $f(x)$ with respect to x vanishes at x_{i+1}

gate1987 calculus maxima-minima

Answer key

4.9.2 Maxima Minima: GATE CSE 1995 | Question: 1.21

In the interval $[0, \pi]$ the equation $x = \cos x$ has

A. No solution
B. Exactly one solution
C. Exactly two solutions
D. An infinite number of solutions

gate1995 calculus normal maxima-minima

Answer key

4.9.3 Maxima Minima: GATE CSE 1995 | Question: 25a

Find the minimum value of $3 - 4x + 2x^2$.

gate1995 calculus maxima-minima easy descriptive

Answer key

4.9.4 Maxima Minima: GATE CSE 1997 | Question: 4.1

What is the maximum value of the function $f(x) = 2x^2 - 2x + 6$ in the interval $[0,2]$?

A. 6 B. 10 C. 12 D. 5.5

gate1997 calculus maxima-minima normal

Answer key

4.9.5 Maxima Minima: GATE CSE 2008 | Question: 25

A point on a curve is said to be an extremum if it is a local minimum or a local maximum. The number of distinct extrema for the curve $3x^4 - 16x^3 + 24x^2 + 37$ is

A. 0 B. 1 C. 2 D. 3

gatecse-2008 calculus maxima-minima easy

Answer key

4.9.6 Maxima Minima: GATE CSE 2012 | Question: 9

Consider the function $f(x) = \sin(x)$ in the interval $x = \left[\frac{\pi}{4}, \frac{7\pi}{4}\right]$. The number and location(s) of the local minima of this function are

A. One, at $\frac{\pi}{2}$
B. One, at $\frac{3\pi}{2}$
C. Two, at $\frac{\pi}{2}$ and $\frac{3\pi}{2}$
D. Two, at $\frac{\pi}{4}$ and $\frac{3\pi}{2}$

gatecse-2012 calculus maxima-minima normal

Answer key

4.9.7 Maxima Minima: GATE CSE 2015 Set 2 | Question: GA-3

Consider a function $f(x) = 1 - |x|$ on $-1 \leq x \leq 1$. The value of x at which the function attains a maximum, and the maximum value of the function are:

A. $0, -1$ B. $-1, 0$ C. $0, 1$ D. $-1, 2$

gatecse-2015-set2 set-theory&algebra functions normal maxima-minima

Answer key

4.9.8 Maxima Minima: GATE CSE 2020 | Question: 1

Consider the functions

I. e^{-x}
II. $x^2 - \sin x$
III. $\sqrt{x^3 + 1}$

Which of the above functions is/are increasing everywhere in $[0,1]$?

A. III only
B. II only
C. II and III only
D. I and III only

gatecse-2020 engineering-mathematics calculus maxima-minima 1-mark

Answer key

4.9.9 Maxima Minima: GATE CSE 2023 | Question: 18

Let

$$f(x) = x^3 + 15x^2 - 33x - 36$$

be a real-valued function.

Which of the following statements is/are TRUE?

A. $f(x)$ does not have a local maximum.
B. $f(x)$ has a local maximum.
C. $f(x)$ does not have a local minimum.
D. $f(x)$ has a local minimum.

gatecse-2023 calculus maxima-minima multiple-selects 1-mark

Answer key

4.9.10 Maxima Minima: GATE DS&AI 2024 | Question: 5

For any twice differentiable function $f : \mathbb{R} \to \mathbb{R}$, if at some $x^* \in \mathbb{R}, f'(x^*) = 0$ and $f''(x^*) > 0$, then the function f necessarily has a _____ at $x = x^*$.

Note: $\mathbb{R}$ denotes the set of real numbers.

A. local minimum
B. global minimum
C. local maximum
D. global maximum

gate-ds-ai-2024 calculus maxima-minima

Answer key

4.9.11 Maxima Minima: GATE IT 2008 | Question: 31

If $f(x)$ is defined as follows, what is the minimum value of $f(x)$ for $x \in (0, 2]$?

$$f(x) = \begin{cases} \frac{25}{8x} & \text{when } x \leq \frac{3}{2} \\ x + \frac{1}{x} & \text{otherwise} \end{cases}$$

A. 2
B. $2\frac{1}{12}$
C. $2\frac{1}{6}$
D. $2\frac{1}{2}$

gateit-2008 calculus maxima-minima normal

Answer key

4.9.12 Maxima Minima: GATE Overflow Test Series | Mock GATE | Test 2 | Question: 18

The minimum value of the function

$$f(x) = \frac{x^2}{2} - x$$

occurs at (Mark all the appropriate choices)

A. $x = -1$
B. $x = 1$
C. $x = 0$
D. $x = \frac{1}{\sqrt{2}}$

go2025-mockgate-2 maxima-minima multiple-selects

Answer key

4.9.13 Maxima Minima: GATE Overflow Test Series | Mock GATE | Test 4 | Question: 21

The minimum value of the function

$$f(x) = \frac{x^4}{4} - x^2 - 3$$

occurs at

A. $x = 1$ B. $x = \sqrt{2}$ C. $x = 0$ D. $x = \frac{1}{\sqrt{4}}$

go2025-mockgate-4 maxima-minima calculus

Answer key

4.10 Out of Gatecse Syllabus (4)

4.10.1 Out of Gatecse Syllabus: GATE CSE 1993 | Question: 01.5

Fourier series of the periodic function (period 2π) defined by

$$f(x) = \begin{cases} 0, -p < x < 0 \\ x, 0 < x < p \end{cases} \text{ is}$$

$$\frac{\pi}{4} + \sum \left[\frac{1}{\pi n^2} (\cos n\pi - 1) \cos nx - \frac{1}{n} \cos n\pi \sin nx \right]$$

But putting $x = \pi$, we get the sum of the series

$$1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \cdots \text{ is}$$

A. $\frac{\pi^2}{4}$ B. $\frac{\pi^2}{6}$ C. $\frac{\pi^2}{8}$ D. $\frac{\pi^2}{12}$

gate1993 calculus normal out-of-gatecse-syllabus multiple-selects

Answer key

4.10.2 Out of Gatecse Syllabus: GATE CSE 1993 | Question: 01.7

The function $f(x, y) = x^2y - 3xy + 2y + x$ has

A. no local extremum
B. one local minimum but no local maximum
C. one local maximum but no local minimum
D. one local minimum and one local maximum

gate1993 calculus maxima-minima normal out-of-gatecse-syllabus multiple-selects

Answer key

4.10.3 Out of Gatecse Syllabus: GATE CSE 1993 | Question: 02.8

Given $\vec{v} = x\cos^2 y\hat{i} + x^2e^z\hat{j} + z\sin^2 y\hat{k}$ and S the surface of a unit cube with one corner at the origin and edges parallel to the coordinate axes, the value of integral $\int^1 \int_s \vec{V}.\hat{n}dS$ is _____.

gate1993 calculus normal out-of-gatecse-syllabus fill-in-the-blanks

4.10.4 Out of Gatecse Syllabus: GATE CSE 1995 | Question: 2.18

The solution of differential equation $y'' + 3y' + 2y = 0$ is of the form

A. $C_1e^x + C_2e^{2x}$
B. $C_1e^{-x} + C_2e^{3x}$
C. $C_1e^{-x} + C_2e^{-2x}$
D. $C_1e^{-2x} + C_2e^{-x}$

gate1995 calculus out-of-gatecse-syllabus

Answer key

4.11 Polynomials (2)

4.11.1 Polynomials: GATE CSE 1987 | Question: 1-xxii

The equation $7x^7 + 14x^6 + 12x^5 + 3x^4 + 12x^3 + 10x^2 + 5x + 7 = 0$ has

A. All complex roots
B. At least one real root
C. Four pairs of imaginary roots
D. None of the above

gate1987 calculus polynomials

Answer key

4.11.2 Polynomials: GATE CSE 1995 | Question: 2.8

If the cube roots of unity are $1, \omega$ and ω^2, then the roots of the following equation are

$$(x-1)^3 + 8 = 0$$

A. $-1, 1+2\omega, 1+2\omega^2$
B. $1, 1-2\omega, 1-2\omega^2$
C. $-1, 1-2\omega, 1-2\omega^2$
D. $-1, 1+2\omega, -1+2\omega^2$

gate1995 calculus normal polynomials

Answer key

Answer Keys

4.0.1	1.2	4.1.1	N/A	4.1.2	B	4.1.3	A	4.1.4	A
4.1.5	A	4.1.6	C	4.1.7	19 : 19	4.1.8	C	4.2.1	Q-Q
4.2.2	N/A	4.3.1	0	4.3.2	B	4.3.3	A	4.4.1	A
4.5.1	D	4.5.2	-2	4.5.3	C	4.5.4	9	4.5.5	C
4.5.6	D	4.6.1	B	4.7.1	N/A	4.7.2	N/A	4.7.3	A
4.7.4	D	4.7.5	D	4.7.6	A	4.7.7	4	4.7.8	-1
4.7.9	A	4.7.10	0.288 : 0.289	4.7.11	B	4.7.12	A	4.8.1	1
4.8.2	1	4.8.3	A	4.8.4	B	4.8.5	C	4.8.6	C
4.8.7	1	4.8.8	C	4.8.9	C	4.8.10	0.25 : 0.25	4.8.11	-0.5
4.8.12	0.5	4.8.13	C	4.9.1	A	4.9.2	B	4.9.3	1
4.9.4	B	4.9.5	B	4.9.6	D	4.9.7	C	4.9.8	A
4.9.9	B;D	4.9.10	A	4.9.11	B	4.9.12	B	4.9.13	B
4.10.1	C	4.10.2	A	4.10.3	N/A	4.10.4	C	4.11.1	B
4.11.2	C								