

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



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

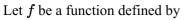
go2025-mockgate-3 numerical-answers calculus

Answer key 🖟

#### 4.1

# Continuity (8)

#### 4.1.1 Continuity: GATE CSE 1996 | Question: 3





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

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

gate1996 calculus differentiation continuity

Answer key 🖗

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
- C. differentiable but not continuous
- gate1998 calculus continuity differentiation
- 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.
- C. Both P and Q are true.

- D. Both P and Q are false.
- B. P is false and Q is true.

B. continuous but not differentiable

D. neither continuous nor differentiable

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?



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

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

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

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

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 norma

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  $x = \frac{5}{3}$

# 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. 
$$\int_0^1 \frac{\sin x}{1-\cos x} dx$$
 C. 
$$\int_0^\infty \frac{x}{1+x^2} dx$$

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

$$\int_{-3}^{3} \int_{-2}^{2} \int_{-1}^{1} (4x^{2}y - z^{3}) dz dy dx$$

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. 
$$\left(\frac{7\pi}{768}\right)$$

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

go2025-mockgate-6 calculus definite-integral

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

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

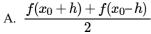
Answer key 🖟

#### 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



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

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

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

gate1996 calculus differentiation norma

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

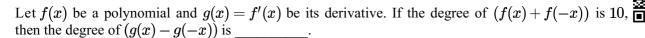
 $heta \in \left[ rac{\pi}{6}, rac{\pi}{3} 
ight] \; ext{ and } f'( heta)$ denote the derivative of f with respect to  $\theta$ . Which of the following statements is/are TRUE?

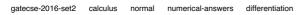
- I. There exists  $\theta \in (\frac{\pi}{6}, \frac{\pi}{3})$  such that  $f'(\theta) = 0$  II. There exists  $\theta \in (\frac{\pi}{6}, \frac{\pi}{3})$  such that  $f'(\theta) \neq 0$
- A. I only
- B. II only
- C. Both I and II
- D. Neither I nor II

gatecse-2014-set1 calculus differentiation

Answer key 🖗

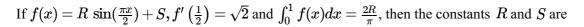
#### 4.5.4 Differentiation: GATE CSE 2016 Set 2 | Question: 02





Answer key 🖗

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





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 🖗

# 4.7.1 Integration: GATE CSE 1993 | Question: 02.6

The value of the double integral  $\int_0^1 \int_0^{\frac{1}{x}} \frac{x}{1+y^2} dx dy$  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  $0 \le x \le 6$ .

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

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
- C. S < T and 2S > T

- B. S = TD.  $2S \le T$

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 normal

- C. -i
- D. i

Answer key 🖗

gatecse-2011 calculus integration

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



$$\int_{0}^{\pi} x^{2} \cos x \, dx$$

A.  $-2\pi$ 

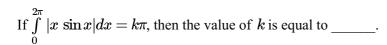
B.  $\pi$ 

D.  $2\pi$ 

gatecse-2014-set3 calculus limits integration normal

Answer key 🖗

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



gatecse-2014-set3 calculus integration limits numerical-answers

Answer key 🖗

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

Compute the value of:



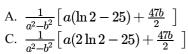
$$\int\limits_{\frac{1}{\pi}}^{\frac{2}{\pi}}\frac{\cos(1/x)}{x^2}dx$$

gatecse-2015-set1 calculus integration normal numerical-answers

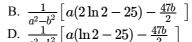
Answer key 🖗

## 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



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



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  $\int_0^{2\pi} (x-\pi)^2 (\sin x) dx$ 



B. 0

C. 1

D.  $\pi$ 

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,

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

A. 
$$\frac{\sqrt{3}}{2} + i\frac{1}{2}$$
  
C.  $\frac{1}{2} + i\frac{\sqrt{3}}{2}$ 

B. 
$$\frac{\sqrt{3}}{2} - i\frac{1}{2}$$
  
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



$$\lim_{x\to 0}\frac{x(e^x-1)+2(\cos x-1)}{x(1-\cos x)} \text{ is } \underline{\hspace{1cm}}$$

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



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

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  $\lim_{n\to\infty} \left(1-\frac{1}{n}\right)^{2n}$ ?

Α. (

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



$$\lim_{x o \infty} x^{rac{1}{x}}$$
 is

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.  $\infty$ 

gatecse-2015-set3 calculus limits normal

Answer key 🖗

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



$$\lim_{x\to 4}\frac{\sin(x-4)}{x-4}=\underline{\hspace{1cm}}$$

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
- C. 108/7

- B. 53/12
- 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

Answer key 🖗

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

Evaluate the following limit:



$$\lim_{x o 0}rac{\lnig(ig(x^2+1ig)\cos xig)}{x^2}=$$

gate-ds-ai-2024 numerical-answers 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.  $\frac{1}{\sqrt{2}}$ 

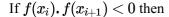
gateda-sample-paper-2024 limits

Answer key 🖗

4.9

#### Maxima Minima (13)

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





- 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

maxima-minima



- A. No solution
- C. Exactly two solutions

gate1995 calculus normal

- B. Exactly one solution
- D. An infinite number of solutions

# 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 normal maxima-minima

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

Answer key 🖗

# 4.9.6 Maxima Minima: GATE CSE 2012 | Question: 9



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

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

- B. One, at  $\frac{3\pi}{2}$ 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  $-1 \le x \le 1$ . 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



II. 
$$x^2 - \sin x$$

III. 
$$\sqrt{x^3+1}$$

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

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

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

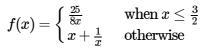
gate-ds-ai-2024 calculus maxima-minima

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  $x \in (0,2]$ ?



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  $2\pi$ ) defined by



$$f(x) = \left\{ egin{aligned} 0, -p < x < 0 \ x, 0 < x < p \end{aligned} 
ight. \ is \ rac{\pi}{4} + \sum \left[ rac{1}{\pi n^2} (\cos n\pi - 1) \cos nx - rac{1}{n} \cos n\pi \sin nx 
ight]$$

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

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

A. 
$$\frac{\pi^2}{4}$$

B. 
$$\frac{\pi^2}{6}$$

C.  $\frac{\pi^2}{8}$ 



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
- (2,3) 2 3 223 2 2 3
- C. one local maximum but no local minimum
- B. one local minimum but no local maximum
- D. one local minimum and one local maximum

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Answer key 🖗

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



Given  $\vec{v} = x \cos^2 y \hat{i} + x^2 e^z \hat{j} + z \sin^2 y \hat{k}$  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  $\int_{-\infty}^{1} \int_{s} \vec{V} \cdot \hat{n} dS$  is \_\_\_\_\_.



#### 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. 
$$C_1 e^x + C_2 e^{2x}$$

C. 
$$C_1e^{-x} + C_2e^{-2x}$$

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B.  $C_1e^{-x} + C_2e^{3x}$ 

D. 
$$C_1e^{-2x} + C_2e^{-x}$$

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

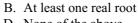
A. All complex roots

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  $\omega^2$ , then the roots of the following equation are

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

A. 
$$-1, 1+2\omega, 1+2\omega^2$$

C. 
$$-1, 1-2\omega, 1-2\omega^2$$

gate1995 calculus normal polynomials

Answer key 🖗

(x -	_ +/	+ 0 $-$ 0	

B. 
$$1, 1 - 2\omega, 1 - 2\omega^2$$

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

# **Answer Keys**

4.0.1	1.2	4.1.1	N/A
4.1.5	Α	4.1.6	С
4.2.2	N/A	4.3.1	0
4.5.1	D	4.5.2	-2
4.5.6	D	4.6.1	В
4.7.4	D	4.7.5	D
4.7.9	Α	4.7.10	0.288 : 0.289
4.8.2	1	4.8.3	Α
4.8.7	1	4.8.8	С
4.8.12	0.5	4.8.13	С
4.9.4	В	4.9.5	В
4.9.9	B;D	4.9.10	Α
4.10.1	С	4.10.2	Α
4.11.2	С		

4.1.2	В
4.1.7	19 : 19
4.3.2	В
4.5.3	С
4.7.1	N/A
4.7.6	Α
4.7.11	В
4.8.4	В
4.8.9	С
4.9.1	Α
4.9.6	D
4.9.11	В
4.10.3	N/A

4.1.3	Α
4.1.8	С
4.3.3	Α
4.5.4	9
4.7.2	N/A
4.7.7	4
4.7.12	Α
4.8.5	С
4.8.10	0.25 : 0.25
4.9.2	В
4.9.7	С
4.9.12	В
4.10.4	С

4.1.4	Α
4.2.1	Q-Q
4.4.1	Α
4.5.5	С
4.7.3	Α
4.7.8	-1
4.8.1	1
4.8.6	С
4.8.11	-0.5
4.9.3	1
4.9.8	Α
4.9.13	В
4.11.1	В