B1-CLAT3-18MAB101T-Calculus and Linear Algebra

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* Required

PART-B(35*2=70 marks)Answer all the questions

choose the correct answer

*

The value of $\lim_{n\to\infty} \frac{n^2}{n+1}$ is

A)0 B)∞ C)1 D)$\frac{1}{2}$

- ○ A
- ◉ B
- ○ C
- ○ D

*

The definite integral $\int_0^1 x^{m-1}(1-x)^n dx$ represents

A) $\beta(m+1,n)$ B) $\beta(m,n)$ C) $\beta(m,n+1)$ D) $\beta(m,n-1)$

- ○ A
- ○ B
- ◉ C
- ○ D

*

Radius of curvature of $f(x) = x^2 + 5x$ at the point (1,6) is

A) $125\sqrt{2}$ B) $\frac{5\sqrt{2}}{2}$ C) $25\sqrt{2}$ D) $\frac{5}{\sqrt{2}}$

- ◉ A
- ○ B
- ○ C
- ○ D

*

The value of $\beta(2,3)$ is

A) $\frac{1}{6}$ B) $\frac{1}{3}$ C) $\frac{1}{12}$ D) $\frac{1}{24}$

- ○ A
- ○ B
- ◉ C
- ○ D

*

The value of $\lim_{n\to\infty} \frac{1}{n\sqrt{n}}$ is

A) 0 B) ∞ C) 1 D) $\frac{1}{2}$

- ◉ A
- ○ B
- ○ C
- ○ D

*

If $y_1 = 1$ and $y_2 = -3$ at $x = 1$ on the curve $y = \frac{\log x}{x}$ then the radius of curvature is

A) $\sqrt{2}$ B) $\frac{2}{\sqrt{3}}$ C) $\frac{2\sqrt{2}}{3}$ D) $\frac{3}{\sqrt{2}}$

- [ ] A
- [ ] B
- [x] C
- [ ] D

*

The (n+1)th term of the series $\frac{1}{2\sqrt{2}} + \frac{1}{3\sqrt{3}} + \frac{1}{4\sqrt{4}} + \cdots + \infty$ is

A) $\frac{1}{n\sqrt{n}}$ B) $\frac{1}{n\sqrt{n+1}}$ C) $\frac{1}{(n+1)\sqrt{n}}$ D) $\frac{1}{(n+1)\sqrt{(n+1)}}$

- [ ] A
- [ ] B
- [ ] C
- [x] D

*

If $\lim_{n\to\infty}\left|\frac{u_n}{v_n}\right| = \frac{1}{2}$ and v_n=$\frac{1}{n}$ then the series $\sum u_n$ is

A) convergent B) absolutely convergent C) Divergent D) not absolutely convergent

- ( ) A
- ( ) B
- (•) C
- ( ) D

*

The value of $\Gamma(1/4).\Gamma(1-1/4)$ is

A)$\sqrt{2}$ B)$\pi\sqrt{2}$ C)$\frac{\pi}{\sqrt{2}}$ D)$2\sqrt{2}$

- ( ) A
- (•) B
- ( ) C
- ( ) D

*

Radius of curvature of the curve xy=4 at the point (2,2) is

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

- A
- B
- C
- D (selected)

*

If the series $\sum v_n = \frac{1}{n^3}$ then it is

A) convergent B) divergent C) conditionally convergent D) conditionally divergent

- A
- B (selected)
- C
- D

*

In Limit comparison test if $u_n = \frac{n+1}{2n^2+2}$ then v_n can as be chosen as

A) $\frac{1}{n}$ B) $\frac{n}{2n+1}$ C) $\frac{n}{n+1}$ D) $\frac{1}{n^2}$

- (•) A
- ( ) B
- ( ) C
- ( ) D

*

The envelope of the family of lines $y = mx + \sqrt{(1+m^2)}$, m being the parameter is

A) $x^2 + y^2 = 1$ B) $x^2 + y^2 = 0$ C) $x^2 + y^2 = 4$ D) $x^2 - y^2 = 0$

- ( ) A
- (•) B
- ( ) C
- ( ) D

*

The series $\sum \frac{x^n}{n^n}$ is

A) conditionally convergent B) divergent C) convergent D) Absolutely convergent

- (selected) A
- B
- C
- D

*

Curvature of the curve y = Cosh (x/c) at the point (0, 1) is

A) 1/c B) 1 C) $\sqrt{c}$ D)$1/\,c^2$

- A
- B
- C
- (selected) D

*

Radius of the curvature of the Parabola $y^2 = 4x$ at (1,2) is

A) 2 B)$4\sqrt{2}$ C)$2\sqrt{2}$ D)$\frac{1}{\sqrt{2}}$

- A
- B
- C
- D

*

If $\lim_{n\to\infty} u_n^{1/n} < 1$ then the series $\sum u_n$ is

A) absolutely convergent B) convergent C) divergent D) Conditionally convergent

- A
- B
- C
- D

*

The parametric equations $x = a\cos\theta$, $y = b\sin\theta$ represent the curve

A) Ellipse B. Cycloid C. Hyperbola D. Parabola

- (•) A
- ( ) B
- ( ) C
- ( ) D

*

If $\sum u_n = \sum \frac{1}{\sqrt{n^2+1}}$ then $\lim_{n\to\infty} \frac{u_n}{v_n} =$

A)0 B)1 C)$\frac{1}{2}$ D)∞

- ( ) A
- (•) B
- ( ) C
- ( ) D

*

The (n+1)th term of the series $\frac{1}{2}+\frac{1}{3^2}+\frac{1}{4^3}+\cdots..+\infty$ is

A)$\frac{1}{n}$B) $\frac{n}{n+1}$C) $\frac{1}{(n+1)^n}$D)$\frac{1}{(n+2)^{n+1}}$

- ○ A
- ○ B
- ○ C
- ◉ D

*

The envelope for the quadratic family of curves $Am^2 + Bm + C = 0$ (where m is the parameter) is

A) $B^2 = AC$ B) $C^2 = 4AB$ C) $B^2 = 4AC$ D) B= AC.

- ○ A
- ○ B
- ◉ C
- ○ D

*

The n[th] term of the series $\frac{x}{1.2}+\frac{x^2}{3.4}+\frac{x^3}{5.6}+\cdots$ *to* ∞ *is*

A) $\frac{x^n}{(n+1)2n}$ B) $\frac{x^n}{(2n+1)2n}$ C) $\frac{x^n}{(2n+3)2n}$ D) $\frac{x^n}{(2n-1)2n}$

- ○ A
- ○ B
- ○ C
- ◉ D

*

If f(n) is a positive monotonic decreasing function and if $\int_1^\infty f(x)dx$ is infinite then the series $\sum f(n)$ is

A) absolutely convergent B) convergent C) divergent D) Conditionally convergent

- ○ A
- ○ B
- ◉ C
- ○ D

*

For the curve y = f(x), if $y' = \infty$, then the direction of the tangent is

A) Parallel to X-axis B) Parallel to Y-Axis C) Inclined at 30 ° D)Inclined at 45 °.

- A
- B
- C
- D

*

. The radius of curvature formula $\left[\frac{\left\{1+\left(\frac{dx}{dy}\right)2\right\}^{\frac{3}{2}}}{x''}\right]$ is suitable when the derivative y' is equal to

A)0 B)1 C)-1 D) ∞

- A
- B
- C
- D

*

In Raabe's test if $\lim_{n\to\infty} n\left[\frac{u_n}{u_{n+1}} - 1\right] = l$ then the series is ----------if $l < 1$.

A)convergent B) absolutely convergent C) divergent D) Conditionally convergent

- ( ) A
- ( ) B
- (•) C
- ( ) D

*

The x-coordinate of the centre of curvature is

A) $x + \frac{y_1(1+y_1{}^2)}{y_2}$ B) $x - \frac{y_1(1+y_1{}^2)}{y_2}$ C) $x - \frac{(1+y_1{}^2)}{y_2}$ D) $x + \frac{(1+y_1{}^2)}{y_2}$

- (•) A
- ( ) B
- ( ) C
- ( ) D

*

The equation $(x - \bar{x})^2 + (y - \bar{y})^2 = \rho^2$ represents (where $(\bar{x}, \bar{y})$ coordinates of centre of curvature)

A) Circle of curvature B) Envelope C) Evolute D) Curvature

- (selected) A
- B
- C
- D

*

If $f(x) = \frac{1}{x^2+1}$ then f(x) is ------------function.

A) a monotonically Increasing B) a monotonically decreasing C)an oscillating

D) a convex

- A
- (selected) B
- C
- D

*

If $\lim_{n\to\infty}\left|\frac{u_{n+1}}{u_n}\right| = 0$ then the series $\sum|u_n|$ is

A) absolutely convergent B) convergent C) divergent D) Conditionally convergent

- ○ A
- ○ B
- ◉ C
- ○ D

*

The value of $\beta\left(\frac{5}{2},\frac{3}{2}\right)$ is

A) $\frac{\pi}{4}$ B) $\frac{\pi}{16}$ C) $\frac{\pi}{8}$ D) $\frac{\pi}{32}$

- ○ A
- ◉ B
- ○ C
- ○ D

*

Radius of curvature of the Parabola $y = x^2$ at (2, 4) is

A) $\frac{17\sqrt{17}}{4}$ B) $\frac{17\sqrt{17}}{2}$ C) $\frac{5\sqrt{5}}{2}$ D) $\frac{5\sqrt{5}}{4}$

- ○ A
- ◉ B
- ○ C
- ○ D

*

The parametric equations $x = at^2$, $y = 2at$ represent the curve

A) Ellipse B) Cycloid C) Hyperbola D) Parabola

- ○ A
- ○ B
- ○ C
- ◉ D

*

If $u_n = \frac{n^n}{n!}x^n$ then $\lim_{n\to\infty} \frac{u_{n+1}}{u_n} =$

A) e B) e. x C) $\frac{e}{x}$ D) $\frac{1}{e}$

- ○ A
- ○ B
- ○ C
- ○ D

*

The n^{th} term of the sequence $\frac{1}{4}, \frac{2}{9}, \frac{3}{16}, \ldots$ is

A) $\frac{1}{n}$ B) $\frac{n}{2n+1}$ C) $\frac{n}{n+1}$ D) $\frac{n}{(n+1)^2}$

- ○ A
- ○ B
- ○ C
- ◉ D

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