B1-CLAT2-18MAB101T-Calculus and Linear Algebra

pp0783@srmist.edu.in Switch account

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* Required

PART-A (20*1=20Marks) -ANSWER ALL THE QUESTIONS

CHOOSE THE CORRECT ANSWER

*

A stationary point of $f(x,y) = 2x + 2y - x^2 - y^2$ is

(A) (1,1)

(B) (1,0)

(C) (0,1)

(D) (-1,0)

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

D

*

The complementary function of $(D^2 + 2D + 5)y = 0$, $(D = \frac{d}{dx})$ is

(A) $e^x(A\cos 2x + B\sin 2x)$

(B) $e^{-x}(A\cos x + B\sin x)$

(C) $e^{-x}(A\cos 2x + B\sin 2x)$

(D) $e^x(A\cos x + B\sin x)$

A

B

C

D

*

If 2 and 3 are the roots of the auxiliary equation of the given differential equation $(D^2 + 5D + 6)y = 0$, $(D = \frac{d}{dx})$ then the general solution is

(A) $C_1e^{2x} + \frac{C_2}{e^{3x}}$

(B) $\frac{C_1}{e^{2x}} + C_2e^{3x}$

(C) $C_1e^{3z} + C_2e^{2z}$

(D) $C_1e^{2x} + C_2e^{3x}$

A

B

C

D

*

If u and v are functionally dependent of two independent variables x and y then $\frac{\partial(u,v)}{\partial(x,y)} =$

(A) 0

(B) $(-1)^n \frac{\partial(x,y)}{\partial(u,v)}$

(C) $\frac{\partial(x,y)}{\partial(u,v)}$

(D) 1

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

*

The particular integral of the differential equation $(D^2 + 4D + 5)y = 2, \ (D = \frac{d}{dx})$ is

(A) 2

(B) $\frac{2}{5}$

(C) $\frac{1}{2}$

(D) 1

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

*

If $f(x, y) = x^2 y + \sin y + e^x$, then $\frac{\partial f}{\partial x}(1, \pi)$ is

(A) $2\pi - e$

(B) 2π

(C) $2\pi + e$

(D) 0

- ○ A
- ○ B
- ◉ C
- ○ D

*

If $u = x^2 - y^2$, then $\frac{\partial^2 u}{\partial x \partial y} =$

(A) 0

(B) 1

(C) 2

(D) 3

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

*

The nature of the stationary point (-1,0) for the function $f(x, y)$, if $f_{xx} = 4x$, $f_{xy} = 0$, and $f_{yy} = -4$ is

(A) minimum

(B) maximum

(C) saddle point

(D) no conclusion

- [ ] A

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

*

The order and degree of the differential equation $[1 + (\frac{dy}{dx})^2]^3 = c^2(\frac{d^2y}{dx^2})^2$ is

(A) 2, 3

(B) 2, 2

(C) 3, 2

(D) 1, 1

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

*

Identify the correct form of the Taylor's series expansion for the function $f(x, y)$ in the neighbourhood of (a, b) is

(A) $f(a,b)+(x-a)\frac{\partial f}{\partial x}+(y-b)\frac{\partial f}{\partial x}+\frac{1}{2!}\{(x-a)^2\frac{\partial^2 f}{\partial x^2}+2(x-a)(y-b)\frac{\partial^2 f}{\partial x\partial y}+(y-b)^2\frac{\partial^2 f}{\partial x^2}\}+\cdots$

(B) $f(a,b)+(x+a)\frac{\partial f}{\partial x}+(y+b)\frac{\partial f}{\partial x}+\frac{1}{2!}\{(x+a)^2\frac{\partial^2 f}{\partial x^2}+2(x+a)(y+b)\frac{\partial^2 f}{\partial x\partial y}+(y+b)^2\frac{\partial^2 f}{\partial x^2}\}+\cdots$

(C) $(x-a)\frac{\partial f}{\partial x}+(y-b)\frac{\partial f}{\partial x}+\frac{1}{2!}\{(x-a)^2\frac{\partial^2 f}{\partial x^2}+2(x-a)(y-b)\frac{\partial^2 f}{\partial x\partial y}+(y-b)^2\frac{\partial^2 f}{\partial x^2}\}+\cdots$

(D) $f(a,b)-(x-a)\frac{\partial f}{\partial x}+(y-b)\frac{\partial f}{\partial x}+\frac{1}{2!}\{(x-a)^2\frac{\partial^2 f}{\partial x^2}+2(x-a)(y-b)\frac{\partial^2 f}{\partial x\partial y}+(y-b)^2\frac{\partial^2 f}{\partial x^2}\}-\cdots$

- [x] A
- [ ] B

C

D

*

If $w = x + y, \ x = t, \ y = e^t$ then $\frac{dw}{dt}$ at $t = 0$ is

(A) 0

(B) 1

(C) 2

(D) 3

A

B

C

D

*

If $r = \frac{\partial^2 f}{\partial x^2}, \ s = \frac{\partial^2 f}{\partial x \partial y}$, and $t = \frac{\partial^2 f}{\partial y^2}$, then the condition for the saddle point is

(A) $rt - s^2 > 0$

(B) $rt - s^2 = 0$

(C) $rt - s^2 < 0$

(D) $rs - t^2 < 0$

A

B

- [x] C
- [ ] D

*

Reduce the equation $[x^2D^2 + xD + 1]y = 4\cos(logx)$ into linear equation with constant coefficient $(D = \frac{d}{dx}, \theta = \frac{d}{dz})$ is

(A) $(\theta^2 + 1)y = 4\cos z,$

(B) $(\theta^2 + \theta + 1)y = 4\cos z,$

(C) $(\theta^2 + 2\theta + 1)y = 4\cos z,$

(D) $(\theta^2 + 2\theta + 1)y = 4z\cos z,$

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

*

The formula for finding particular integral for the case xe^{ax}, $\frac{1}{f(D)}xe^{ax} =$

(A) $\frac{1}{f(D+a)}xe^{ax}$

(B) $\frac{1}{f(D-a)}xe^{ax}$

(C) $e^{ax}\frac{1}{f(D+a)}x$

(D) $e^{ax}\frac{1}{f(D-a)}x$

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

*

If $f(x, y) = xy$, then $\frac{dy}{dx} =$

(A) $-\frac{x}{y}$

(B) $\frac{x}{y}$

(C) $\frac{y}{x}$

(D) $-\frac{y}{x}$

- ○ A
- ○ B
- ○ C
- ◉ D

*

The particular integral of $(D^2+4)y = e^{2x}$, $(D = \frac{d}{dx})$ is

(A) xe^{2x}

(B) $\frac{x}{3}e^{2x}$

(C) $\frac{e^{2x}}{8}$

(D) $-\frac{xe^{2x}}{4}$

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

*

$A\cos x + B\sin x$ is the general solution of

(A) $(D^2+1)y = 0$

(B) $(D^2-1)y = 0$

(C) $(D^2+m^2)y = 0$

(D) $(D^2+m)y = 0$

- [x] A

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

*

The solution of the differential equation $\frac{d^2y}{dx^2}+y=0$ satisfying the initial condition $y(0)=1,\ y(\frac{\pi}{2})=2$ is

(A) $y = 2\cos x + \sin x$

(B) $y = \cos x + 2\sin x$

(C) $y = \cos x + \sin x$

(D) $y = 2\cos x + 2\sin x$

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

*

To transform $x\frac{d^2y}{dx^2}+\frac{dy}{dx}=\frac{1}{x}$ into a linear differential equation with constant coefficients, the required substitution is

(A) $x = \sin t$

(B) $x = t^2 + 1$

(C) $x = logt$

(D) $x = e^t$

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

*

. If $u = x - y,\ v = x + y$ then $\frac{\partial(u,v)}{\partial(x,y)} =$

(A) 0

(B) 1

(C) 2

(D) 3

- ○ A
- ○ B
- ◉ C
- ○ D

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