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SIVS-N-290-B-22

B.Sc. IV Semester (CBCS) Degree Examination

MATHEMATICS

Differential Equations

Paper : BMDSC 4T

(New)

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates:

Answer all the Sections.

SECTION-A

I. Answer any TEN questions. **(10×2=20)**

1. Solve $p^2-2p\cosh x+1=0$
2. Solve $(D^3-8)y=0$
3. Solve $(D^2-6D+9)y=0$
4. Define Cauchy-Eulers equations.
5. Find Auxillary equation of $y_2+9y=\operatorname{Sec}3x$
6. Find the part of the Complementary function of $x^2\frac{d^2y}{dx^2}+3x\frac{dy}{dx}+y=x+\frac{1}{x}$
7. Verify the condition of integrability of $(y+z)dx+(z+x)dy+(x+y)dz=0$
8. Solve $\frac{dx}{z^2y}=\frac{dy}{z^2x}=\frac{dz}{xy^2}$
9. Solve $\frac{dx}{yz}=\frac{dy}{zx}=\frac{dz}{xy}$
10. Form the Partial differential equation by eliminating arbitrary constants a & b of $z=(x-a)^2+(y-b)^2$
11. Solve $p\tan x+q\tan y=\tan z$
12. Solve $p^2+q^2=1$

SECTION-B

II. Answer any **THREE** questions. (3×5=15)

1. Solve $\left(D^2 - 3D + 2\right)y = x^2 e^{3x}$

2. Solve $\left(D^2 - 5D + 6\right)y = Sin 3x$

3. Solve $\frac{d^3y}{dx^3} + 8y = x^4 + 2x + 1$

4. Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = e^{2x} Sin x$

SECTION-C

III. Answer any **THREE** questions. (3×5=15)

1. Solve $x^2\frac{d^2y}{dx^2} - 3x\frac{dy}{dx} + 4y = 2x^2$

2. Solve $x^2\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} - 20y = (x+1)^2$

3. Solve by the method of variation of parameters. $y_2 + y = Sec x$

4. Solve by the method of variation of parameters $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = x^2 e^x$

SECTION-D

IV. Answer any **THREE** questions. (3×5=15)

1. Verify the condition of Integrability and solve $3x^2dx + 3y^2dy - (x^3 + y^3 + e^{2z})dz = 0$

2. Solve $\frac{dx}{mz - ny} = \frac{dy}{nx - lz} = \frac{dz}{ly - mx}$

3. Solve $\frac{dx}{y + z} = \frac{dy}{z + x} = \frac{dz}{x + y}$

4. Solve $\frac{dx}{x(y - z)} = \frac{dy}{y(z - x)} = \frac{dz}{z(x - y)}$

SECTION-E

V. Answer any **THREE** questions. (3×5=15)

1. Form the partial differential equation from $xyz = f\left(x^2+y^2+z^2\right)$ by eliminating arbitrary function.

2. Solve $z(x+y)p + z(x-y)q = x^2 + y^2$

3. Solve $\left(\frac{y-z}{yz}\right)p + \frac{(z-x)}{zx}q = \frac{x-y}{xy}$

4. Solve by Charpit's method $q = px + p^2$
