



## Science And Humanities Department (Academic Year :2022-23)

### Vision:

To Visualize the creation of skilled, proficient IT professionals to meet current challenges.

### Mission:

- To encourage young minds for training & entrepreneurship.
- To convey standard education with a rapidly changing environment with ethical values.
- To provide an environment where students can continuously learn, apply & communicate knowledge.

**Subject Name:-Applied Mathematics**

**Date:-**

**Assignment No:-01**

**Topic Name:-**

**Course outcomes: - Solve board –based technology problems using the principles Of basic mathematics**

- 1) a.  $F(x) = \sin x$ , Show that  $F(3x) = 3f(x) - 4f^3(x)$   
b.  $F(x) = \frac{1}{1-x}$  find  $f[f(x)]$
- 2) a.  $F(x) = \frac{1}{1-x}$  show that  $f\{f[f(x)]\} = x$   
b. State whether the function  $f(x) = \frac{a^x + a^{-x}}{2}$  is even or odd function
- 3)  $F(x) = 3x^4 + x^2 = 5 - 3\cos x + 2\sin^2 x$  then show that  $f(x) + f(-x) = 2f(x)$
- 4) If  $f(x) = \log \frac{1+x}{1-x}$  then prove that  $f\left(\frac{2x}{1+x^2}\right) = 2f(x)$
- 5) If  $Y = f(x) = \frac{2x-3}{3x-2}$  then prove that  $x = f(y)$

**Last date of Submission:-**

**Name of course coordinator:- Mrs Vrushali Patil**



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**Subject Name:-Applied Mathematics**

**Date:-**

**Assignment No:-02**

**Topic Name:-**

**Course outcomes :- Solve board –based technology problems using the principles Of basic mathematics**

1. Find  $\frac{dy}{dx}$ , If  $y = \frac{\sin x}{1 + \cos x}$
2. Differentiate  $\frac{e^x - 1}{e^x + 1}$  with respect to 'x'
3. If  $\log(x + \sqrt{x^2 + a^2})$ , Find  $\frac{dy}{dx}$ .
4. If  $\log(\sqrt{x^2 + y^2}) = \tan^{-1} \frac{y}{x}$  Find  $\frac{dy}{dx}$
5. Differentiate with respect to 'x'  $\sin^{-1}(\frac{2x}{1+x^2})$
6. Differentiate with respect to 'x'  $\sec^{-1}(\frac{1}{4x^3-3x})$
7. Differentiate with respect to 'x'  $\tan^{-1}(\frac{\sin x}{1+\cos x})$
8. Differentiate with respect to 'x'  $\tan^{-1}(\frac{5x}{1-6x^2})$
9.  $x^2 + y^2 = 4xy$  Find  $\frac{dy}{dx}$  at (2, -1)
10. Find  $\frac{dy}{dx}$  If  $y = x^x + \sin^x$

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**Subject Name:-Applied Mathematics**

**Date:-**

**Assignment No:-03**

**Topic Name:-**

**Course outcomes :- Solve board –based technology problems using the principles Of basic mathematics**

1. Find the radius of the curve  $xy=c$  at point  $(c,c)$
2. Find maximum and minima of the equation  $\tan x - 2x$
3. Find maximum and minima of the equation  $x^3 - 18x^2 + 96x$
4. Find the equation of tangent and normal to the curve  $y=x(2-x)$  at point  $(2,0)$
5. Find the point on the curve  $y=7x-3x^2$  where the inclination of the tangent is  $45^\circ$ .
6. A telegraph wire hangs in the form of a curve  $y = a \log \left[ \sec \left( \frac{x}{a} \right) \right]$ . Where  $a$  is a constant. Show that, radius of curvature at any point is  $a \cdot \sec \left( \frac{x}{a} \right)$
7. Find the equation of tangent to the curve  $y= 9x^2-12x+7$  which is parallel to x axis.

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**Subject Name:-Applied Mathematics**

**Date:-**

**Assignment No:-04**

**Topic Name:-**

**Course outcomes :- Solve board –based technology problems using the principles Of basic mathematics**

1. Evaluate  $\int \frac{1}{x^2+3x+2} dx$

2. Evaluate  $\int \frac{1}{x[9+(\log x)^2]} dx$

3. Evaluate  $\int \frac{1}{(x+3)(x+2)} dx$

4. Evaluate  $\int x \cdot e^x dx$

5. Evaluate  $\int \sin^3 x \cdot \cos x dx$

x

6. Evaluate  $\int \frac{e^x (x+1)}{\cos^2(x \cdot e^x)}$

7. Evaluate  $\int \frac{dx}{5-4\cos x}$

8. Evaluate  $\int e^e + x^e + e^x dx$

9. Evaluate  $\int x \cdot e^x dx$

10. Evaluate  $\int \frac{4x+3}{x^2+5x+9} dx$

11. Evaluate  $\int \sin^3 x dx$

12. Evaluate  $\int \frac{x}{(x^2-1)(x^2+2)} dx$

13. Evaluate  $\int \frac{(\sin^{-1}) x^3}{\sqrt{1-x^2}} dx$

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**Subject Name:-Applied Mathematics**

**Date:-**

**Assignment No:-05**

**Topic Name:-**

**Course outcomes :- Solve board –based technology problems using the principles Of basic mathematics**

1. Evaluate  $\int_0^2 \frac{5x+2}{x^2+4} dx$

2. Evaluate  $\int_0^{\frac{\pi}{2}} \frac{1}{1+\sqrt[n]{\cot x}} dx$

3. Evaluate  $\int_0^{\frac{\pi}{4}} \log(1+\tan x)$

4. Evaluate.  $\int_1^3 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5}+\sqrt[3]{9-x}} dx$

5. Find the area of the region bounded by the curve  $y=4x^2$ , x-axis and the lines  $x=1$  and  $x=2$

6. Find the area of circle  $x^2+y^2=16$  using Integration.

7. Find the area bounded between the parabolas  $y^2=9x$  and  $x^2=9y$

8. Find the area between the parabola  $y=x^2+3$  and  $y=x+3$

9. Find the area between the parabola  $y=4x-x^2$  and x-axis.

10. By using method of integration find the area of circle  $x^2+y^2=a^2$

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**Subject Name:-Applied Mathematics**

**Date:-**

**Assignment No:-06**

**Topic Name:-**

**Course outcomes :- Solve board –based technology problems using the principles Of basic mathematics**

1. Find the order and degree of the differential equation  $\sqrt[3]{\frac{dy}{dx}} + y = \sqrt[4]{\frac{d^2y}{dx^2}}$
2. From the differential equation whose solution is ,  $y = A\cos 3t + B\sin 3t$
3. Verify that  $y = \log x$  is a solution of differential equation  $x \frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$
4. Solve the differential equation  $\frac{dy}{dx} = e^{3x-2y} + x^2 e^{-2y}$
5. Solve  $\sec^2 x \cdot \tan y dx + \sec^2 y \cdot \tan x = 0$  if  $y = \frac{\pi}{4}$  when  $x = \frac{\pi}{4}$
6. Solve the differential equation  $\frac{dy}{dx} = (4x + y + 1)^2$
7. Solve the differential equation  $\frac{dy}{dx} = \cos(x+y)$
8. Solve  $(x^3 + y^3) \frac{dy}{dx} = x^2 y$
9. Solve  $\frac{dy}{dx} + y \cot x = \operatorname{cosec} x$ .
10. Solve the differential equation  $(x+1) \frac{dy}{dx} - y = e^x (1+x)^2$

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**Subject Name:-Applied Mathematics**

**Date:-**

**Assignment No:-07**

**Topic Name:-**

**Course outcomes :- Solve board –based technology problems using the principles Of basic mathematics**

i) Solve the equation by Gauss - Seidal method. (two iterations only)

$$10x + y + 2z = 13, \quad 3x + 10y + z = 14, \quad 2x + 3y + 10z = 15$$

ii) Solve the following system of equation by using Jacobi-Iteration method. (two iterations)

$$5x + 2y + z = 12, \quad x + 4y + 2z = 15, \quad x + 2y + 5z = 20$$

2) Solve the following system of equations by using Gauss elimination method.

$$x + 2y + 3z = 14, \quad 3x + y + 2z = 11, \quad 2x + 3y + z = 11$$

3) Using Newton – Raphson method find the approximate root of the equation (use four iterations)

$$x^2 + x - 5 = 0$$

4) Solve the following :

Find the root of the equation  $\cos x - x e^x = 0$  using the regular-falsi method. (carry out two iterations)

5) Solve the following system of equations by using Gauss Elimination method.

$$2x + 3y + z = 13, \quad x - y - 2z = -1, \quad 3x + y + 4z = 15.$$

5) Solve the following system of equations by using Gauss Seidal method.

$$20x + y - 2z = 17 ; \quad 3x + 20y - z = -18 ; \quad 2x - 3y + 20z = 25.$$

6) Using Newton-Raphson method to find the approximate root of the equation  $x \log_{10} x = 1.2$ . (carry out three iterations)

7) Solve the equation by Gauss - Seidal method. (two iterations only)

$$10x + y + 2z = 13, \quad 3x + 10y + z = 14, \quad 2x + 3y + 10z = 15$$

8) Solve the following system of equation by using Jacobi-Iteration method. (two iterations)

$$5x + 2y + z = 12, \quad x + 4y + 2z = 15, \quad x + 2y + 5z = 20$$

9) Solve the following system of equations by using Gauss elimination method.

$$x + 2y + 3z = 14, \quad 3x + y + 2z = 2x + 3y + z = 11$$



$$5x + 2y + z = 12,$$

$$x + 4y + 2z = 15,$$

$$x + 2y + 5z = 20$$

0

4. Solve the differential equation  $\frac{dy}{dx} = e^{3x-2y} + x^2 e^{-2y}$

5. Solve  $\sec^2 x \cdot \tan y dx + \sec^2 y \cdot \tan x = 0$  if  $y = \frac{\pi}{4}$  when  $x = \frac{\pi}{4}$

6. Solve the differential equation  $\frac{dy}{dx} = (4x + y + 1)^2$

7. Solve the differential equation  $\frac{dy}{dx} = \cos(x+y)$

8. Solve  $(x^3 + y^3) \frac{dy}{dx} = x^2 y$

9. Solve  $\frac{dy}{dx} + y \cot x = \operatorname{cosec} x$ .

10. Solve the differential equation  $(x+1) \frac{dy}{dx} - y = e^x (1+x)^2$

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