ASSIGNMENT 1

.

Subject Code : **MC-406** Course Title : **Partial Differential Equations**

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Syllabus

Unit -1 First order partial differential equation (PDEs): Formation of PDEs, linear and quasi-linear first order PDEs, Lagrange, method, integral surface passing through a given curve, non-linear first order PDEs, Charpit's method, Jacobi's method for non-linear PDEs.

Instructions

Write your name and roll number on the first page of your assignment. The assignment should be legibly handwritten and on both sides of the paper. I will follow a zero toleration policy towards copying in any form. The assignment must be submitted as a single pdf file before the due date without fail. For any further query feel free to contact me. Timely submission of the assignment will be appreciated. There will be no credit for late submissions.

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1. Form a partial differential equation by eliminating arbitrary constant(s):

   (a) a, b and c from $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} = 1$ and

   (b) a and b from $z = (x^2 + a)(y^2 + b)$.

2. Form a partial differential equation by eliminating arbitrary function(s):

   (a) f from $x + y + z = f(x^2 + y^2 + z^2)$ and

   (b) f, and g from $y = f(x - ct) + g(x + ct)$.

3. Solve the following partial differential equations

   (a) $y^2 p - xyq = x(z - 2y)$,

   (b) $xzp + yzq = xy$,

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

4. Find the integral surface of the linear partial differential equation

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

which contains the straight line $x + y = 0$, $z = 1$.

5. Use Charpit's method to find three complete integrals of $pq = px + qy$.

6. Find the complete integral of

(a) $(p+q)(px+qy) = 1$,

(b) $(y-x)(qy-px) = (p-q)^2$ and

(c) $pz = 1 + q^2$.

7. Use Jacobi's method to find complete integrals of $p_1^3 + p_2^2 + p_3 = 1$.

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