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Designation: Professor & Head

Department: Mathematics

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Assignment-3

Subject: Mathematics-II

(BT-202)

(Common to All Branches)

Topic: Partial Differential Equations

1. Form the partial differential equation by eliminating the arbitrary function (s) from the relation:

(i) $z = f(x+iy)+g(x-iy)$

(ii) $f\left(x^2+y^2+z^2,\ z^2-2xy\right)=0$

2. Solve (Linear Partial Differential Equations of First order-Lagranges Equation)

(i) $y^2zp+x^2zq=y^2x$

(ii) $xp+yq=3z$

(iii) $\left(z^2-2yz-y^2\right)p+(xy+zx)q=xy-zx$

(iv) $x(y-z)p\ +\ y(z-x)q=z(x-y)$

(v) $(x^2-yz)p\ +\ (y^2-zx)q=\left(z^2-xy\right)$

(vi) $\left(y^2+z^2-x^2\right)p-2xyq+2zx=0$

3. Solve (Non Linear Partial Differential Equation of First order)

(i) $x^2p^{\,2}+y^2q^{\,2}=z^2$ (ii) $z^2\left(p^2z^2+q^2\right)=1$

(iii) $p^2-q^2=x-y$ ((iv) $z^2\left(p^2+q^2\right)=x^2+y^2$

4. Solve by Charpit's method

(i) $(p^2+q^2)y = qz$ (ii) $2(z+px+yq) = yp^2$

(iii) $pxy + pq + qy = yz$ (iv) $2xz - px^2 - 2qxy + pq = 0$

5. Solve (Linear Partial Differential Equation with Constant coefficient):

(i) $(D^2 - 4DD' + 4D'^2)z = e^{2x+y}$

(ii) $(D^3 - 7DD'^2 - 6D'^3)z = e^{3x+y} + \sin(x+2y)$

(iii) $(D^2 + DD' - 6D'^2)z = y\cos x$

(iv) $(D^2 - DD - 2D'^2)z = (y-1)e^x$

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