M.Sc. (Mathematics)-I (Second Semester)
Mid-Semester Examination 2017-18
Department of Mathematics, SOPS, Doon University Dehradun
Core Course, Partial Differential Equations (MAC-453)

Time: 02 Hour   Total Marks: 30

Note: (i) Attempt ALL the questions. (ii) Do neat and clean work.

Section A

Attempt ALL: (3x2=6)

1. Find the complete integral of the equation $p^2 + q^2 - 2pqx - 2qy + 2xy = 0$
2. Find the family orthogonal to $\emptyset[z((x^2 + y^2)^2, x^2 - y^2] = 0$
3. Find the complete integral of the pde $z^2 p^2 y + 6zpxy + 2zqx^2 + 4x^2 y = 0$

Section B

Attempt ALL: (3x4=12)

1. Prove that the system of PDE $f(x, y, z, p, q) = 0$ & $g(x, y, z, p, q) = 0$ are compatible to each-other
2. Solve $(z^2 - 2yz - y^2)p + (xy + zx)q = xy - zx$, if the solution of the given equation represents a sphere, what will be the coordinates of its center.
3. Prove that the complete integral of $z = px + qy + [pq/(pq - p - q)]$ represents all planes such that the algebraic sum of the intercepts on three coordinate axes is unity.

Section C

Attempt ALL: (3x4=12)

1. Solve $(t + y + z)\frac{\partial t}{\partial x} + (t + z + x)\frac{\partial t}{\partial y} + (t + x + y)\frac{\partial t}{\partial z} = (x + y + z)$.
2. Find the integral surface of the differential equation $2y(z - 3)p + (2x - z)q = y(2x - 3)$ which passes through the circle z=0, and $x^2 + y^2 = 2x$,
3. Find the complete integral of $pqz = p^2(xq + p^2) + q^2(yp + q^2)$