Assignment

B.A(Prog.) II Year Annual Mode
Discipline (Mathematics)
Geometry, Differential Equations and Algebra
(Code-B-155)

M.M. : 100

Attempt any **two** *questions in all.*
All questions carry equal marks.

Q.1. (*a*) Identify and sketch the curve: $16x^2 + 9y^2 - 64x - 54y + 1 = 0$

Show the position of centre, vertices and foci, stating their distances from the origin.

(b) Find the equation of the sphere which passes through the point (3, 4, 5) and the feet of perpendiculars from this point on the co-ordinate planes. Find centre and radius of sphere.

(c) Describe the reflection property of an ellipse together with a figure.

Q.2. (*a*) If $y_1(x) = \sin 3x$ and $y_2(x) = \cos 3x$ are two solution of $\frac{d^2y}{dx^2} + 9y = 0$,

show that $y_1(x)$ and $y_2(x)$ are linearly independent solution.

(b) Solve the differential equation

$$\left(1+x^2\right)\frac{dy}{dx} + y = \tan^{-1} x$$

(c) Solve the equation

$$\frac{d^2y}{dx^2} + y = \sec^2 x$$

Q.3. (*a*) Find a partial differential equation by eliminating the arbitrary constant *a*, *b*, *c* from the equation

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$$

(b) Solve the equation

$$x(x^2 + 3y)\, p - y\,(3x^2 + y^2)\, q = 2z\,(y^2 - x^2)$$

(c) Find a complete integral of $p = (z + qy)^2$

Q.4. (*a*) If G is the set of all positive rational number forms as abelian group under the composition defined by $a * b = \frac{ab}{2}$, then (G, $*$) is an abelian group.

(b) If G be a group and H be a nonempty subset of G. Then show that H is a subgroup of G iff $ab^{-1} \in H \;\; \forall \; a, b \in H$.

(c) Find the order of permutation $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 6 & 2 & 5 & 3 & 4 & 1 \end{pmatrix}$