

Savitribai Phule Pune University
Hutatama Rajguru Mahavidyalaya, Rajgurunagar
F.Y.B.Sc.

MT-121: Analytical Geometry
(2019 Pattern) (Semester-II) (Paper-I) (12111)

Time: 2 Hours

Max. Marks: 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.

- Q1) Attempt any five of the following: [5]**
- a) Find the new co-ordinates of the point (3,4), when the origin is shifted to the point (1,3).
 - b) Find the centre of the conic
$$x^2 + 4xy + y^2 - 2x + 2y - 6 = 0.$$
 - c) If the direction ratios of the line are 6,-2,3 then find its direction cosines.
 - d) Find centre and radius of sphere
$$x^2 + y^2 + z^2 - 4x + 6y + 10z + 2 = 0.$$
 - e) Find angle between the planes
$$2x - y + 2z + 1 = 0 \text{ and } 3x + 2y + 6z - 5 = 0.$$
 - f) Write equation XY plane.
 - g) Obtain the equation of line joining the points (-2,1,3) and (3,1,-2).
- Q2) A) Attempt any one of the following [5]**
- a) Derive the relation between old and new co-ordinates.
 - b) Derive equation of plane in normal form.
- B) Attempt any one of the following [5]**
- a) Find centre of the conic $2x^2 - 2xy + 3y^2 + 6x - 4y - 1 = 0$. Also write the equation of the conic when origin is shifted at the centre.
 - b) Find the angle between two lines whose direction cosines are connected by the relations $2l - m + 2n = 0$, $mn + nl + lm = 0$.
- Q3) A) Attempt any one of the following [5]**
- a) Show that every equation of first degree in x,y,z represents a plane.
 - b) Find the distance from the point (1,-2,3) to the point where the line $\frac{x-2}{3} = \frac{y+1}{-2} = \frac{z}{1}$ meets the plane $x - 2y + z = 20$.
- B) Attempt any one of the following [5]**
- a) Find the equation of plane passing through A(2,2,-1), B(3,4,2), C(7,0,6).
 - b) Find the equation of the line of intersection of the planes
$$4x + 4y - 5z = 12, 8x + 12y - 13z = 32$$
 in the symmetrical form.
- Q4) A) Attempt any one of the following [5]**

- a) Show that the angle between the line $\frac{x-x_1}{a_1} = \frac{y-y_1}{b_1} = \frac{z-z_1}{c_1}$

And the plane $a_2x + b_2y + c_2z + d = 0$ is

$$\sin \theta = \frac{a_1a_2 + b_1b_2 + c_1c_2}{\sqrt{a_1^2 + b_1^2 + c_1^2}\sqrt{a_2^2 + b_2^2 + c_2^2}}$$

- b) Find the condition under which the plane $lx + my + nz = p$ is a tangrnt to the standard sphere.

B) Attempt any one of the following [5]

- a) Find the equation of the planes bisecting the angles between the planes $3x + 4y + 12z + 1 = 0$ and $x + 2y + 2z - 3 = 0$. Distinguish between them.
- b) Find the equation of the sphere passing through the circle of intersection of $x^2 + y^2 + z^2 + 6x - 4y - 6z - 14 = 0$ and the plane $x + y - z = 0$ and passing through the point $(1,1,-1)$.