F.Y.B.Sc. SEM – II (CBCS 2018 COURSE) : SUMMER - 2019

SUBJECT : MATHEMATICS : ANALYTICAL GEOMETRY

Day : Tuesday
Date : 07/05/2019

Time : 11.00 A.M TO 02.00 PM
Max. Marks : 60

S-2019-0793

N.B. :

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.

Q.1 Attempt **ANY TWO** of the following: **(12)**

a) Let OX, OY be the original system of rectangular axes. If these axes rotated through an angle θ without changing the origin so that new system of rectangular axes is OX', OY' then prove that
$x = x'\cos\theta - y'\sin\theta$ *and*
$y = x'\sin\theta + y'\cos\theta$.

b) The equation of conic is $3x^2 + 2xy + 3y^2 - 4x + 2y + 1 = 0$,
i) Find it's centre
ii) State it's nature
iii) Reduced the equation to standard form .

c) Find the equation of the plane passing through the points (1, 2, 2), (2, 1, 2) and (-3, 0, 1).

Q.2 Attempt **ANY TWO** of the following: **(12)**

a) The α, β, γ are angles made by a line with the positive directions of the co-ordinate axes, then prove that $\cos^2\alpha + \cos^2\beta + \cos^2\gamma = 1$.

b) Show that the two lines
$\frac{x-1}{-1} = \frac{y-8}{7} = \frac{z-2}{2}$ *and* $\frac{x+1}{1} = \frac{y-2}{-1} = \frac{z+4}{1}$
are coplanar and find the equation of the plane containing them.

c) Find the shortest distance between the lines
$\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$ *and* $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$

Q.3 Attempt **ANY TWO** of the following: **(12)**

a) Prove that the general equation of first degree in x, y, z given by $ax + by + cz + d = o$, where a, b, c, d are constants (not all zero) represent a plane.

b) Show that the two spheres
$x^2 + y^2 + z^2 - 2x - 6y - 15 = 0$ *and* $5x^2 + 5y^2 + 5z^2 - 10x + 26y + 42z + 107 = 0$
touches each other and find their point of contact.

c) Find the equation of the tangent plane to the sphere
$x^2 + y^2 + z^2 + 4x - 5y - 3z - 3 = 0$ at the point (1, 2, -1) on it.

P.T.O.

Q.4 Attempt **ANY THREE** of the following: **(12)**

a) Find the equation of the cone whose vertex is (1, 1, 2) and guiding curve is the ellipse $\frac{x^2}{4}+\frac{y^2}{2}=1,\ z=0.$

b) Find the equation of right circular cylinder of radius 2 whose axis is the line $\frac{x}{1}=\frac{y}{-2}=\frac{z}{2}$.

c) Shift the origin to a suitable point so that the equation $x^2-6x-4y-1=0$ will be in the form $x^2=4by.$ State the value of b.

d) Find the angle between the lines

$x+y+2z-3=0=2x+y+z+1$ and $\frac{x-1}{2}=\frac{y}{1}=\frac{z-2}{-1}$.

Q.5 Attempt **ANY FOUR** of the following: **(12)**

a) Find the transformed form of the equation $2x^2+3xy-4y^2+x+3=0$ when origin is shifted to the point (1, -2).

b) Find direction cosines of a line whose direction ratios are 6, -2, 3.

c) Find the equation of the plane passing through the point (2, 1, -3) and parallel to the plane $x+2y+3z=8.$

d) Find the equation of line joining the points (-2, 1, 3) and (3, 1, -2).

e) Find the centre and radius of the sphere $x^2+y^2+z^2-4x+6y+10z+2=0.$

f) Define : **i)** Cone
ii) Right circular cylinder.

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