F.Y.B.SC. SEM – II (CBCS - 2016 Course) : SUMMER - 2019

SUBJECT : MATHEMATICS : ANALYTICAL GEOMETRY

Day : Wednesday
Date : 24/04/2019

Time : 03.00 P.M. To 06.00 P.M
Max. Marks : 60

S-2019-0822

N.B.:

1) All questions are **COMPULSORY**.
2) Figures to the right indicate **FULL** marks.
3) Use of non-programmable **CALCULATOR** is allowed.

Q.1 A) Choose the correct alternative of the following: **[06]**

i) Direction ratios are associated with _____.
a) plane **b)** sphere **c)** line **d)** none of these

ii) Direction ratios of normal to the plane $x - y + 2z - 3 = 0$ are _____.
a) $-1, 1, -2$ **b)** $1, -1, 2$ **c)** $1, 0, 0$ **d)** none of these

iii) Equation of smallest sphere passing through two given points is found by _____.
a) center radius form of sphere **c)** general form of sphere
b) diameter form of sphere **d)** none of these

iv) Two non-parallel planes together represents _____.
a) plane in space **c)** line in space
b) sphere is space **d)** none of these

v) Direction cosines of x-axis are _____.
a) $0, 0, 1$ **b)** $0, 1, 0$ **c)** $1, 0, 0$ **d)** None of these

vi) The new equation of the locus given by $x^2 + 6x + 2y + 1 = 0$ when the origin is changed to $(-3, 4)$ is _____.
a) $X^2 + 2Y = 0$ **c)** $X^2 + 6Y = 0$
b) $X^2 - 2Y = 0$ **d)** $X^2 + 6X + 2Y = 0$

B) Attempt the following: **[06]**

i) Find the equation of a line passing through two points)2, 3, 7) and $(-1, 5, -2)$.

ii) What is mean by skew lines?

iii) Find the center and radius of the sphere $2x^2 + 2y^2 + 2z^2 - 4z = 1$.

iv) Find the equation of a plane having x, y, z intercepts 2, 3, 1 respectively.

v) Find the center of the conic $x^2 - 4xy - 2y^2 + 10x + 4y = 0$.

vi) Define the term 'cylinder'.

P.T.O.

Q.2 Attempt **ANY THREE** of the following: **[12]**

a) Find the transformed form of equation $3x^2 + 2xy + 3y^2 - 18x - 22y + 50x = 0$ under shifting of origin to point (2, 3) followed by rotation of the axes through 45^0.

b) Find whether plane $2x - 2y + z + 16 = 0$ is a tangent plane to sphere $x^2 + y^2 + z^2 - 2x - 4y + 2z - 3 = 0$, if so find the point of contact.

c) Find distance of (1, 0, 1) from the plane $x + y - z = 0$. Also find co-ordinates of the foot of perpendicular.

d) Find the equation of the plane through the points (2, 2, 1) and (9, 3, 6) and perpendicular to the plane $2x + 6y + 6z - 11 = 0$.

Q.3 Attempt **ANY FOUR** of the following: **[12]**

a) Find equation of plane passing through (1, 1, 2) and is perpendicular to planes $x - y - z = 1$ and $x + 3z = 4$.

b) Find the shortest distance between the skew lines given by: $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$ and $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$

c) Find the equation of the sphere passing through the circle $x^2 + y^2 + z^2 + 2x - 2y - 2z - 1 = 0$, $2x - 2y + z - 1 = 0$ and passing through the point $(3, -1, 1)$.

d) Find the general equation of quadratic cone which passes through the axes of co-ordinates.

e) Show that following spheres touch each other and find point of touching: $x^2 + y^2 + z^2 - 4x - 2y - 4z + 5 = 0$, $x^2 + y^2 - 6x - 6y + 17 = 0$.

Q.4 Attempt **ANY TWO** of the following: **[12]**

a) Discuss nature of the conic $5x^2 + 6xy + 5y^2 + 12x + 4y - 4 = 0$, reduce it to standard form and find the lengths of axes.

b) State and derive the normal form of equation of a plane.

c) Show that general equation of second degree in x, y represents a conic.

Q.5 Attempt **ANY TWO** of the following: **[12]**

a) Define direction cosines of a line. Derive formula for acute angle between two lines in terms of their direction cosines.

b) Find the symmetric form of equation of a line: $x + y + z + 1 = 0$, $4x + y - 2z + 2 = 0$.

c) Find the equation of the sphere passing through the four points (2, 4, −1), (0, −4, 3), (−2, 0, 1) and (6, 0, 9)

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