

F.Y.B.SC. SEM – II (2014 COURSE) : SUMMER - 2018

SUBJECT : MATHEMATICS : ANALYTICAL GEOMETRY (M-21)

Day : **wednesday**
Date : **25/04/2018**

S-2018-0701

Time : **03.00 PM TO 05.00 PM**
Max. Marks : 40

N.B.

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

Q.1 Attempt any **TWO** of the following: **(10)**

- a) Find the centre of conic $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$.
- b) Transform the equation $x^2 - 5xy + 13y^2 - 3x + 21y = 0$ when the origin is changed to $(-1, -1)$ and then the axes are turned through an angle $\tan^{-1}\left(\frac{1}{5}\right)$
- c) Find the centre and lengths of the axes of conic $x^2 - 5xy + 13y^2 - 3x + 21y = 0$

Q.2 Attempt any **TWO** of the following: **(10)**

- a) Prove that the general equation of first degree in x, y, z given by $ax + by + cz + d = 0$, where a, b, c, d are constants, represents a plane.
- b) Find in symmetrical form the equations of the line of intersection of the planes $x + y + z + 1 = 0$ and $4x + y - 2z + 2 = 0$ and find its direction cosines.
- c) Find the equations of two tangent planes to the sphere $x^2 + y^2 + z^2 - 4x + 2y - 6z + 5 = 0$, which are parallel to the plane $2x + 2y - z = 0$.

Q.3 Attempt any **TWO** of the following: **(10)**

- a) Find the equation of the right circular cone with vertex at $V(\alpha, \beta, \gamma)$, semi-vertical angle θ and whose axis has direction ratios a, b, c .
- b) Show that the equation $x^2 - 2y^2 + 4z^2 + 6yz - 2zx + 4xy + 6x - 30y - 14z = 0$, represents a quadratic cone and find its vertex.
- c) Find the equation of the right circular cylinder of radius 3 whose axis passes through $(2, -1, 3)$ and has direction cosines proportional to $1, 2, -2$.

P.T.O.

Q.4

Attempt any **FIVE** of the following:

(10)

- a) The origin is changed to the point $(h, 2)$. Find the value of h so that transformed equation of locus given by $x^2 + 4x + 3y - 5 = 0$ will not contain a first degree term in x .
- b) Find the new equation of $2x - y + 3 = 0$, when the axes are turned through an angle of 45° .
- c) Find the equation of the plane passing through the point $(1, 1, 4)$ and having direction ratios $3, -6, 2$ to the normal to the plane.
- d) Find the centre and radius of the sphere
 $12x^2 + 12y^2 + 12z^2 - 4x - 8y + 16z - 101 = 0$.
- e) Find the value of k if the line $\frac{x-2}{-1} = \frac{y+3}{2} = \frac{z+4}{k}$ is parallel to the plane
 $2x + 3y - 4z + 7 = 0$
- f) Examine whether the line $\frac{x}{2} = \frac{y}{-1} = \frac{z}{3}$ is a generator of the cone
 $4x^2 - y^2 + 2z^2 + 2xy - 3yz + 12x - 11y + 6z = 0$.
- g) Find the equation of sphere whose centre is at $(1, -2, 3)$ and passing through the origin.

* * *