

F.Y.B.SC. SEM – II (2014 Course) : WINTER - 2018
SUBJECT : MATHEMATICS : ANALYTICAL GEOMETRY (M-21)

Day : Tuesday
Date : 23/10/2018

W-2018-0794

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 $7x^2 - 8xy + y^2 + 14x - 8y - 2 = 0$, when the origin is shifted to the point $(-1, 0)$ and then axes are turned through an angle $\tan^{-1}\left(-\frac{1}{2}\right)$.
- c) Find the centre and lengths of axes of conic $x^2 - 3xy + y^2 + 10x - 10y + 21 = 0$.

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

- a) Find the equation of the sphere with intercepts a, b, c on the axes of coordinates and passing through the origin.
- b) Find the equation of the plane through the points $(0, 1, 1), (1, 1, 2)$ and $(-1, 2, -2)$.
- c) Find the shortest distance between the lines given by $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$ and $\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$

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

- a) Find the equation of a right circular cone with vertex at $V(\alpha, \beta, \gamma)$, semi-vertical angle θ and whose axis has direction ratios is a, b, c .
- b) Find the equation of the right circular cylinder of radius 2 and having as axis is the line $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{2}$.
- c) The plane $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$ meets the co-ordinate axes in points A, B and C. Prove that the equation of the cone generated by the lines drawn from the origin to meet the circle ABC is $yz\left(\frac{b}{c} + \frac{c}{b}\right) + zx\left(\frac{c}{a} + \frac{a}{c}\right) + xy\left(\frac{a}{b} + \frac{b}{a}\right) = 0$

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 perpendicular distance of a point $(1, 1, 4)$ from the plane $3x - 6y + 2z + 11 = 0$.
- d) Find the equations of the line passing through the point $(2, -3, 4)$ and having direction ratios $3, 2, 1$.
- e) Find the centre and radius of the sphere $12x^2 + 12y^2 + 12z^2 - 4x - 8y + 16z - 101 = 0$.
- f) Find the equations of normal to the sphere $x^2 + y^2 + z^2 - 6x - 4y + 10z = 0$ at the origin.
- g) Examine whether the line $\frac{x}{3} = \frac{y}{-1} = \frac{z}{2}$ is a generator of the cone $x^2 + 2y^2 + z^2 - 2yz + zx - 3xy = 0$

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