PARUL UNIVERSITY
FACULTY OF APPLIED SCIENCE
B.Sc., Summer-2017-18 Examination

Semester: 3   Date: 22/05/2018
Subject Code: 11106201   Time: 10:30am to 1:00pm
Subject Name: Solid Geometry   Total Marks: 60

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1. A) Do as directed: (Each of 04 marks)   **(08)**

   (a) Show that the points (0,7,10), (-1,6,6) and (-4,9,6) are vertices of isosceles right-angle triangle.

   (b) Find the equation of the plane through the points (1,1,1) (1,-1,1) (-7,-3,-5).

Q.1. B) Answer the following questions (Any two)

   (a) Answer the following   **(04)**

   1. Find the shortest distance between lines $\dfrac{x-3}{2}=\dfrac{y+15}{-7}=\dfrac{z-9}{5}$ and $\dfrac{x+1}{2}=\dfrac{y-1}{1}=\dfrac{z-9}{-3}$.

   2. Find the condition for the line $\dfrac{x-\alpha}{l}=\dfrac{y-\beta}{m}=\dfrac{z-\gamma}{n}$ intersect the curve $xy=c^2$.

   (b) Find the equation of the sphere which touches the sphere $x^2+y^2+z^2-x+3y+2z-3=0,$ **(04)**

   at the point (1,1,-1) and passes through the origin.

   (c) Find the equation of the plane through the points (1,0,-1), (3,2,2) and parallel to the line   **(04)**

   $x-1=\dfrac{y-1}{-2}=\dfrac{z-2}{3}.$

Q.2. A) Answer the following questions.

   (a) Do as directed (Each of 02 marks)   **(04)**

   1. Find the value of b , such that $OP \perp OQ$ where O is origin, P(2,3,4) and Q(1,b,1)?

   2. Obtain the equation of plane passing through the intersection of the planes

   $x+2y+3z+4=0, 4x+3y+2z+1=0$ and the origin.

   (b) Find the direction cosines of two lines which are determined by the relations   **(04)**

   $l+m-n=0; \quad mn+6ln-12lm=0$

Q.2. B) Answer the following questions (Any two)

   (a) Multiple choice questions   (Each of 01 marks)   **(03)**

   1. Which of the following triplet gives the direction cosine of line?

      (a) 2,2,1   (b) 2,-2,1   (c) 2,2,-1   (d) $\dfrac{2}{3},\dfrac{2}{3},\dfrac{1}{3}$

   2. Which of the following represent cylinder in 3- dimensional space?

      (a) $x^2+y^2=4$ (b) $x^2+y^2+z^2=4, z=0$ (c) $x^2+y^2+z^2=4$ (d) None

   3. The equation of z-axis is

      (a) z=0   (b) z=0 x=0   (c) y=0,z=0   (d) x=0,y=0

   (b) Find the equation of sphere whose centre is on the line segment joining the points   **(03)**

$A(x_1, y_1, z_1)$ and $B(x_2, y_2, z_2)$.

(c) Put in symmetrical form, the equation of the line $3x - y + z + 1 = 0, 5x + y + 3z = 0$. **(03)**

Q.3. A) Answer the following (Each of 04 marks) **(08)**

(a) Find the point where the line joining (2,-3,1), (3,-4,-5) cuts the plane 2x+y+z=7.

(b) Show that the lines $\dfrac{x+5}{3} = \dfrac{y+4}{1} = \dfrac{z-7}{-2}$; $3x + 2y + z - 2 = 0.x - 3y + 2z - 3 = 0$ are

coplanar and the find the equation of plane in which they lie.

Q.3. B) Answer the following questions (Any two)

(a) Do as directed: (Each of 02 marks) **(04)**

   1. Find the equation of line through the points (3,1,2) and (1,2,1).

   2. Find the area of triangle whose vertices are the points (1,2,3) ,(-2,1,-4) (3,4,-2).

(b) Find the equation of cone with vertex (5,4,3) and $y^2 = 4x, z = 0$. as base. **(04)**

(c) Find the ratio in which the sphere $x^2 + y^2 + z^2 = 350$ divides the line joining the points **(04)**

   (3,-1,2) and (9,-3,6).

Q.4. A) Answer the following questions.

(a) Multiple choice questions (Show all calculations) (Each of 2 Marks) **(04)**

   1.Point of contact of the spheres $x^2 + y^2 + z^2 + 2x - 4y - 4z - 7 = 0$,

   $x^2 + y^2 + z^2 + 2x - 4y - 16z + 65 = 0$

    (a) (1,2,6)   (b) (1,2,-6)   (c) (1,-2,6) (d) (-1,2,6)

   2. Nature of intersection of planes $2x - 5y + z = 3, x + y + 4z = 5$ and $x + 3y + 6z = 1$

    (a) intersects in line   (b) intersect in point   (c) intersect in prism   (d) none

(b) Find the equation of sphere through the points (0,0,0), (0,1,-1), (-1,2,0) and (1,2,3). **(04)**

Q.4. B) Answer the following questions (Any two)

(a) Multiple choice questions. (Each of 01 marks) **(03)**

   1. The angle between planes $2x - 3y + 2z = 0, 2x + 2y + z = 5$ is

    (a) $\dfrac{\pi}{3}$ (b) $\dfrac{\pi}{6}$ (c) $\dfrac{\pi}{2}$ (d) $\dfrac{\pi}{4}$

   2. The intercepts of the plane $4x + 2y + 3z = 12$ on the co-ordinate axes are given by:

    (a) 2, -3, 4   (b) 3, 6, 4   (c) 6, -4, 3   (d) 3, -3, 1.5

   3. Guiding curve of enveloping cylinder is

    (a) circle   (b) sphere   (c) any curve   (d) ellipse

(b) Find the equation of the enveloping cylinder of the sphere $x^2 + y^2 + z^2 = 25$, whose **(03)**

generators are parallel to the line $\dfrac{x}{1} = \dfrac{y}{2} = \dfrac{z}{3}$.

(c) Find the equation of the line which passes through the point (2,-1,1) and intersects the lines **(03)**

   2x+y-4=0=y+2z;   x+3z=4=2, 2x+5z=8.