**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 619**

**Time :** 08:54:00 **MATHEMATICS**

**Marks :** 527

11.THREE DIMENSIONAL GEOMETRY

**Single Correct Answer Type**

| 1. | Let and , then the point of intersection of the lines and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 2. | The distance between the line: and the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 3. | The projection of point on the plane is , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 4. | The intercepts made on the axes by the plane which bisects the line joining the points (1,2, 3) and at right angles are | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 5. | The plane will contain the line , if | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 6. | The vector equation of the plane passing through the origin and the line of intersection of the planes and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 7. | The line intersects the curve if is equal to | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 8. | and are two lines whose vector equations are  , where and are scalars and is the acute angle between and . If the angle ‘’ is independent of , then the value of ‘’ is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 9. | Distance of the point from the line is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | None of these | | |
| 10. | The coordinates of the foot of the perpendicular drawn from the origin to the line joining the points and will be | | | | | | | |
|  | a) |  | b) | (1, 2, 2) | c) | (4, 5, 3) | d) | None of these |
| 11. | For the line , which one of the following is incorrect? | | | | | | | |
|  | a) | It lies in the plane | | | | | | | |
|  | b) | It is same as line | | | | | | | |
|  | c) | It passes through (2, 3, 5) | | | | | | | |
|  | d) | It is parallel to the plane | | | | | | | |
| 12. | The equation of a plane which passes through the point of intersection of lines , and and at greatest distance from point (0, 0, 0) is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 13. | Let be the line and let be the line . Let be the plane which contains the line and is parallel to . The distance of the plane from the origin is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None |
| 14. | The lines and will intersect if | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 15. | The projection of the line on the plane is the line of intersection of this plane with the plane | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 16. | A plane makes intercepts and whose measurements are and on the and axes. The area of triangle is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 17. | Given and are the position vectors of the points and . Then the distance of the point from the plane passing through and perpendicular to is | | | | | | | |
|  | a) | 5 | b) | 10 | c) | 15 | d) | 20 |
| 18. | If the distance of the point from the plane where α>0, is 5, then the foot of the perpendicular from to the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 19. | Shortest distance between the lines and is equal to | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 20. | A line with positive direction cosines passes through the point and makes equal angles with the coordinate axes. The line meets the plane at point . The length of the line segment equals | | | | | | | |
|  | a) | 1 | b) |  | c) |  | d) | 2 |
| 21. | A tetrahedron has vertices and , then angle between faces and will be: | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 22. | Let the equations of a line and a plane be and , respectively, the | | | | | | | |
|  | a) | The line is parallel to the plane | | | | | | | |
|  | b) | The line is perpendicular to the plane | | | | | | | |
|  | c) | The line lies in the plane | | | | | | | |
|  | d) | None of these | | | | | | | |
| 23. | The length of the perpendicular from the origin to the plane passing through the point and containing the line is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 24. | The number of planes that are equidistant from four non-coplanar points is | | | | | | | |
|  | a) | 3 | b) | 4 | c) | 7 | d) | 9 |
| 25. | The intercept made by the plane on the -axis is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 26. | What is the nature of the intersection of the set of planes and ? | | | | | | | |
|  | a) | They meet at a point | | | | | | | |
|  | b) | They form a triangular prism | | | | | | | |
|  | c) | They pass through a line | | | | | | | |
|  | d) | They are at equal distance from the origin | | | | | | | |
| 27. | Which of the following are equations for the plane passing through the points and ? | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) |  | | | | | | | |
| 28. | The line through and to the line and is | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) |  | | | | | | | |
| 29. | Equation of the plane passing through the points (2, 2, 1) and (9, 3, 6) and to the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of the above |
| 30. | The intersection of the spheres and is the same as the intersection of one of the spheres and the plane | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 31. | The length of the perpendicular drawn from (1, 2, 3) to the line is | | | | | | | |
|  | a) | 4 | b) | 5 | c) | 6 | d) | 7 |
| 32. | If angle between the line and the plane is such that , the value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 33. | Let be the line of intersection of the planes and . If makes an angle with the positive -axis, then equals | | | | | | | |
|  | a) |  | b) | 1 | c) |  | d) |  |
| 34. | For what value(s) of , will the two points and lie on opposite sides of the plane | | | | | | | |
|  | a) | or | b) | only | c) |  | d) |  |
| 35. | The reflection of the point in the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 36. | The point of intersection of the lines and is | | | | | | | |
|  | a) |  | b) | (2, 10, 4) | c) |  | d) |  |
| 37. | What is the equation of the plane which passes through the -axis and is perpendicular to the line | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 38. | The line is the hypotenuse of an isosceles right angled triangle whose opposite vertex is (). Then which of the following is not the side of the triangle? | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) | None of these | | | | | | | |
| 39. | The distance of point from the line through which makes equal angles with the axes is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 40. | From the point , let perpendicular and be drawn to and planes, respectively. Then the equation of the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 41. | If the lines  interested, then the value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 42. | In a three-dimensional space, the equation represnts | | | | | | | |
|  | a) | Points | b) | Planes | c) | Curves | d) | Pair of straight lines |
| 43. | The direction ratios of a normal to the plane through (1, 0,0) and (0, 1, 0), which makes an angle of with the plane are | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 44. | The value of for which straight line is parallel to the plane is | | | | | | | |
|  | a) |  | b) | 8 | c) |  | d) | 11 |
| 45. | A plane passes through a fixed point . The locus of the foot of the perpendicular to it from the origin is a sphere of radius | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 46. | Line will not meet the plane , if | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 47. | Let and be points on two skew lines and and the shortest distance between the skew lines is 1, where and are unit vectors forming adjacent sides of a parallelogram enclosing an area of units. If an angle between and the line of shortest distance is , then | | | | | | | |
|  | a) |  | b) | 2 | c) | 1 | d) |  |
| 48. | Consider triangle in the - plane, where and. The new position of , when triangle is rotated about side by can be | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 49. | Let and be three points, then equation of a plane parallel to the plane which is at distance 2 is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 50. | Value of such that the line is to normal to the plane is | | | | | | | |
|  | a) |  | b) |  | c) | 4 | d) | None of these |
| 51. | The shortest distance between the lines and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 52. | If a line makes an angle of with the positive direction of each of -axis and -axis, then the angle that the line makes with the positive direction of the -axis is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 53. | The length of projection of the line segment joining the points and on the plane , is equal to | | | | | | | |
|  | a) | 2 | b) |  | c) |  | d) |  |
| 54. | Distance of point from the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 55. | The three planes and | | | | | | | |
|  | a) | Meet in a point | | | b) | Have a line in common | | |
|  | c) | Form a triangular prism | | | d) | None of these | | |
| 56. | Equation of the plane containing the straight lineand perpendicular to the  plane containing the straight lines | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 57. | The value ofsuch that lies in the plane is | | | | | | | |
|  | a) | 7 | b) |  | c) | No real value | d) | 4 |
| 58. | If lines and , and third line passing through (1, 1, 1) form a triangle of area units, then point of intersection of third line with second line will be | | | | | | | |
|  | a) | (1,2, 3) | b) | (2, 4, 6) | c) |  | d) | None of these |
| 59. | The point on the line at a distance of 6 from the point is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 60. | A sphere of constnat radius passes through the origin and meets the axes in and . The locus of a centroid of the tetrahedron is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | None of these | | |
| 61. | The radius of the circle in which the sphere is cut by the plane is | | | | | | | |
|  | a) | 2 | b) | 3 | c) | 4 | d) | 1 |
| 62. | The image of the point in the plane is | | | | | | | |
|  | a) |  | b) | (15,11, 4) | c) |  | d) |  |
| 63. | If the foot of the perpendicular from the origin to a plane is , the equation of the plane is | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) |  | | | | | | | |
| 64. | The equation of the plane passing through the lines and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 65. | Find the equation of a straight line in the plane which is parallel to and passes through the foot of the perpendicular drawn from point  to (where ) | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 66. | A plane passes through and is perpendicular to two planes and then the distance of the plane from the point is | | | | | | | |
|  | a) | 0 | b) | 1 | c) |  | d) |  |
| 67. | A straight line on the -plane bisects the angle between and . What are the direction cosines of ? | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 68. | A unit vector parallel to the intersection of the plane and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 69. | If the plane cuts the axes of coordinates at points and , then find the area of then triangle | | | | | | | |
|  | a) | 18 sq unit | b) | 36 sq unit | c) | sq unit | d) | sq unit |
| 70. | The ratio in which the line segment joining the points whose position vectors are and is divided by the plane whose equation is , is | | | | | | | |
|  | a) | 13:12 internally | b) | 12:25 externally | c) | 13:25 internally | d) | 37:25 internally |
| 71. | A plane passing through (1, 1, 1) cuts positive direction of co-ordinate axes at and , then the volume of tetrahedron satisfies | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 72. | The direction cosines of a line satisfy the relations and . The value of , for which the two lines are perpendicular to each other, is | | | | | | | |
|  | a) | 1 | b) | 2 | c) | 1/2 | d) | None of these |
| 73. | The plane is rotated through a right angle about its line of intersection with the plane . The equation of the plane in its new position is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 74. | A line makes an angle with each of the - and -axes. If the angle , which it makes with -axis, is such that , then equals | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 75. | The equation of the plane which passes through the line of intersection of planes and is parallel to the line of intersection of planes and, is | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) | None of these | | | | | | | |
| 76. | In a three dimensional co-ordinate system, and are images of a point in the -, - and - planes, respectively. If is the centroid of triangle , then area of triangle is ( is the origin) | | | | | | | |
|  | a) | 0 | b) |  | c) |  | d) | None of these |
| 77. | The lines which intercept the skew lines and the -axis lie on the surface | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 78. | Equation of a line in the plane which is perpendicular to the line whose equation is and which passes through the point of intersection of and is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 79. | The Cartesian equation of the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 80. | The coordinates of the point on the line which is nearest to the origin is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 81. | The lines: and are coplanar if: | | | | | | | |
|  | a) | or | b) | or | c) | or | d) | or |
| 82. | If and are three planes and  are three non-coplanar vectors, then three lines and are | | | | | | | |
|  | a) | Parallel lines | b) | Coplanar lines | c) | Coincident lines | d) | Concurrent lines |
| 83. | The pair of lines whose direction cosines are given by the equations and , are | | | | | | | |
|  | a) | Parallel | b) | Perpendicular | c) | Inclined at | d) | None of these |
| 84. | The centre of the circle given by: and is | | | | | | | |
|  | a) | (0, 1,2) | b) | (1, 3, 4) | c) |  | d) | None of these |
| 85. | Two systems of rectangular axes have the same origin. If a plane cuts them at distance and from the origin, then: | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) |  | | | | | | | |
| 86. | The equation of the plane through the intersection of the planes and and passing through the origin is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 87. | The equation of the plane through the line of intersection of the planes and and parallel to the line and is | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) | None of these | | | | | | | |
| 88. | A variable planeat a unit distance from origin cuts the coordinate axes  Centriodsatisfies the equationThe value of k is | | | | | | | |
|  | a) | 9 | b) | 3 | c) |  | d) |  |
| 89. | The plane, which passes through the point (3, 2, 0) and the line is: | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 90. | The point of intersection of the line passing through (0,0, 1) and intersecting the lines and with plane is | | | | | | | |
|  | a) |  | b) | (1, 1, 0) | c) |  | d) |  |
| 91. | The shortest distance from the plane to the sphere is | | | | | | | |
|  | a) | 39 | b) | 26 | c) |  | d) | 13 |
| 92. | The angle between line of the intersection of the plane and, is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 93. | The ratio in which the plane divides the line joining the points and is | | | | | | | |
|  | a) | 1:5 | b) | 1:10 | c) | 3:5 | d) | 3:10 |

**Multiple Correct Answers Type**

| 94. | Let be the perpendicular from the point to the - plane. If makes an angle with the positive direction of the -axis and makes an angle with the positive direction of -axis, where is the origin and and are acute angles, then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 95. | The equation of the line and written in the symmetrical form is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 96. | Consider a set of points in the space which is at a distance of 2 units from the line between the planes and | | | | | | | |
|  | a) | The volume of the bounded figure by points and the planes is cube units | | | | | | | |
|  | b) | The area of the curved surface formed by the set of points is sq. units | | | | | | | |
|  | c) | The volume of the bounded figure by the set of points and the planes is cubic units | | | | | | | |
|  | d) | The area of the curved surface formed by the set of points is sq. units | | | | | | | |
| 97. | A rod of length 2 units whose one end is and other end touches the plane , then | | | | | | | |
|  | a) | The rod sweeps the figure whose volume is cubic units | | | | | | | |
|  | b) | The area of the region which the rod traces on the plane is | | | | | | | |
|  | c) | The length of projection of the rod on the plane is units | | | | | | | |
|  | d) | The centre of the region which the rod traces on the plane is | | | | | | | |
| 98. | Consider the planes and . The plane bisects the angle between the given planes which | | | | | | | |
|  | a) | Contains the origin | b) | Is acute | c) | Is obtuse | d) | None of these |
| 99. | If are the angles which a line makes with the coordinate axes, then | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 100. | If is a tetrahedron such that , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 101. | The equations of the plane which passes through (0, 0, 0) and which is equally inclined to the planes and is/are | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 102. | If the lines and intersect, then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 103. | If the volume of tetrahedron is 1 cubic units, where and , then the locus of point is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 104. | The equation of the plane which is equally inclined to the lines and and passing through the origin is/are | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 105. | The extremities of a diameter of a sphere lie on positive ad positive -axes at distance 2 and 4 from the origin, respectively, then | | | | | | | |
|  | a) | Sphere passes through the origin | | | b) | Centre of the sphere is (0, 1, 2) | | |
|  | c) | Radius of the sphere is | | | d) | Equation of a diameter is | | |
| 106. | The lines and | | | | | | | |
|  | a) | Do not intersect | b) | Intersect | c) | Intersect at | d) | Intersect at |
| 107. | Let denote the equation of a plane to which the vector is normal and which contains the line whose equation is and denote the equation of the plane containing the line and a point with position vector . Which of the following holds good? | | | | | | | |
|  | a) | The equation of is | | | | | | | |
|  | b) | The equation of is | | | | | | | |
|  | c) | The acute angle between and is | | | | | | | |
|  | d) | The angle between the plane and the line is | | | | | | | |
| 108. | Let be the equation of a plane passing through the line of intersection of the planes and and perpendicular to the plane . Then the points which lie on the plane is/are | | | | | | | |
|  | a) | (0, 9, 17) | b) | (1/7, 2, 1/9) | c) |  | d) | (1/2, 1, 1/3) |
| 109. | The - plane is rotated about its line of intersection with line - plane by , then the equation of the new plane is/are | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 110. | A line with direction cosines proportional to and meets lines and . The coordinates of each of the point of the intersection are given by | | | | | | | |
|  | a) |  | b) | (1, 2, 3) | c) | (0, 5/3, 5/2) | d) |  |
| 111. | The equation of a line passing through the point parallel to the plane and perpendicular to the line is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 112. | Which of the following lines lie on the plane ? | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) | None of these | | | | | | | |
| 113. | If the planes and intersect in a line, then the value of is | | | | | | | |
|  | a) | 1 | b) | 1/2 | c) | 2 | d) | 0 |
| 114. | and are two points in the space such that , the value of can be | | | | | | | |
|  | a) |  | b) |  | c) | 2 | d) | 4 |

|  |  |  |  |
| --- | --- | --- | --- |
| **Assertion - Reasoning Type** | | | |
| This section contain(s) 0 questions numbered 115 to 114. Each question containsstatement 1(Assertion) and statement 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **only one** is correct. | | | |
|  | a) | Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1 | |
|  | b) | Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1 | |
|  | c) | Statement 1 is True, Statement 2 is False | |
|  | d) | Statement 1 is False, Statement 2 is True | |

|  |  |  |  |
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| 115 |  | | |
|  | **Statement 1:** | | A plane passes through the point . If distance of this plane from origin is maximum, then its equation is |
|  | **Statement 2:** | | If the plane passing through the point is at maximum distance from origin, then normal to the plane is vector |

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| 116 |  | | |
|  | **Statement 1:** | | Let and be two points. Then point lies exterior to the sphere with as its diameter |
|  | **Statement 2:** | | If and are any two points and is a point in space such that , then point lies exteriuor to the sphere with as its diameter |

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| 117 |  | | |
|  | **Statement 1:** | | Equation of the polar to the sphere with respect to the point (1,2, 3) is |
|  | **Statement 2:** | | The point (1,2,3) lies outside the sphere |

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| 118 |  | | |
|  | **Statement 1:** | | The points and and the vertices of a rhombus |
|  | **Statement 2:** | | and |

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| 119 |  | | |
|  | **Statement 1:** | | There exists a unique sphere which passes through the three non-collinear points and which has the least radius |
|  | **Statement 2:** | | The centre of such a sphere lies on the plane determined by the given three points |

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| 120 |  | | |
|  | **Statement 1:** | | Lines and do not intersect |
|  | **Statement 2:** | | Skew lines never intersect |

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| 121 |  | | |
|  | **Statement 1:** | | If centroid and circumcentre of a triangle are known its othocentre can be found |
|  | **Statement 2:** | | Centroid, orthocentre and circumcentre of a triangle are collinear |

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| 122 |  | | |
|  | **Statement 1:** | | Let be the angle between the line and the plane . Then |
|  | **Statement 2:** | | The angle between a straight line and a plane is the complement of the angle between the line and the normal to the plane |

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| 123 |  | | |
|  | **Statement 1:** | | Two spheres radii and cut orthogonally, then radius of the common circle is |
|  | **Statement 2:** | | If two spheres  and  cut  Orthogonally, then |

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| 124 | Consider the lines | | |
|  | **Statement 1:** | | The distance of the point (1,1,1) from the plane passing through the point and whose normal is perpendicular to both the lines and is |
|  | **Statement 2:** | | The unit vector perpendicular to both the lines and is |

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| 125 |  | | |
|  | **Statement 1:** | | The lines and are coplanar and equation of the plane containing them is |
|  | **Statement 2:** | | The line is perpendicular to the plane and parallel to the plane |

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| 126 |  | | |
|  | **Statement 1:** | | Lines and intersect |
|  | **Statement 2:** | | If , then lines and do not intersect |

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| 127 |  | | |
|  | **Statement 1:** | | The shortest distance between the lines and is zero |
|  | **Statement 2:** | | The given lines are perpendicular |

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| 128 |  | | |
|  | **Statement 1:** | | There exists two points on the line which are at a distance of 2 units from point |
|  | **Statement 2:** | | Perpendicular distance of point from the line is 1 unit |

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| 129 |  | | |
|  | **Statement 1:** | | The spheres and touch each other, if |
|  | **Statement 2:** | | Two spheres with centres and and radii touch each other if |

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| 130 |  | | |
|  | **Statement 1:** | | The plane contains the line and and is perpendicular to |
|  | **Statement 2:** | | The plane meets the line at the point (1,1,1) |

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| 131 | The equation of two straight lines are and | | |
|  | **Statement 1:** | | The given lines are coplanar |
|  | **Statement 2:** | | The equation and are consistent |

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| 132 |  | | |
|  | **Statement 1:** | | The shortest distance between the skew lines and is 9 |
|  | **Statement 2:** | | Two lines are skew lines if there exists no plane passing through them |

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| 133 | Consider the planes | | |
|  | **Statement 1:** | | The parametric equations of the line of intersection of the given planes are |
|  | **Statement 2:** | | The vectors is parallel to the line of intersection of the given planes. |

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| 134 |  | | |
|  | **Statement 1:** | | Line lies in the plane |
|  | **Statement 2:** | | If line lies in the plane(where is scalar), then |

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| 135 |  | | |
|  | **Statement 1:** | | The point is the mirror image of the point in the plane |
|  | **Statement 2:** | | The plane bisects the line segment joining and |

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| **Matrix-Match Type** | | | | | | | | | |
| This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**. | | | | | | | | | |

| 136. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Image of the point (3, 5, 7) in the plane is | | (p) | |  | |
|  | **(B)** | The point of intersection of the line and the plane is | | (q) | |  | |
|  | **(C)** | The foot of the perpendicular from the point (1, 1, 2) to the plane is | | (r) | |  | |
|  | **(D)** | The intersection point of the lines and is | | (s) | |  | |
|  | **CODES :** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | q | r | s | p |  |  |
|  | **b)** | r | s | p | q |  |  |
|  | **c)** | s | p | q | r |  |  |
|  | **d)** | p | q | r | s |  |  |

| 137. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Lines and are | | (p) | | Intersecting | |
|  | **(B)** | Lines and are | | (q) | | Perpendicular | |
|  | **(C)** | Lines and are | | (r) | | Parallel | |
|  | **(D)** | Lines and are | | (s) | | Skew | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | r | p,q | p | q,s |  |  |
|  | **b)** | q,s | r | p,q | p |  |  |
|  | **c)** | p,q | p | q,s | r |  |  |
|  | **d)** | p | q,s | r | p,q |  |  |

| 138. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | The distance between the line and plane | | (p) | |  | |
|  | **(B)** | Distance between parallel planes and is | | (q) | | 13/7 | |
|  | **(C)** | The distance of a point from the plane is | | (r) | |  | |
|  | **(D)** | The distance of the point from the plane measured parallel to line | | (s) | | 7 | |
|  | **CODES :** | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | p | q | s | r |  |  |
|  | **b)** | q | s | r | p |  |  |
|  | **c)** | s | r | p | q |  |  |
|  | **d)** | r | p | q | s |  |  |

| 139. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | A vector perpendicular to the line and | | (p) | |  | |
|  | **(B)** | A vector parallel to the planes and | | (q) | |  | |
|  | **(C)** | A vector along which the distance between the lines and is the shortest | | (r) | |  | |
|  | **(D)** | A vector normal to the plane  + | | (s) | |  | |
|  | **CODES :** | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | s | q | p | r |  |  |
|  | **b)** | q | p | r | s |  |  |
|  | **c)** | p | r | s | q |  |  |
|  | **d)** | r | s | q | p |  |  |

| 140. |  | | | | | | | | |

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|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | The coordinates of a point on the line at a distance 3 from the point is/are | | (p) | |  | |
|  | **(B)** | The plane containing the lines and parallel to has the point | | (q) | |  | |
|  | **(C)** | A line passes through two points and . The coordinates of a point on this line nearer to the origin and at a distance of 14 units from is/are | | (r) | | (2,5, 7) | |
|  | **(D)** | The coordinates of the foot of the perpendicular from the point on the line is/are | | (s) | | (14, 1, 5) | |
|  | **CODES :** | | | | | | | |

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|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | s | r | q | p |  |  |
|  | **b)** | r | q | p | s |  |  |
|  | **c)** | q | p | s | r |  |  |
|  | **d)** | p | s | r | q |  |  |

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| **Linked Comprehension Type**  This section contain(s) 13 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **only one** is correct.  **Paragraph for Question Nos. 141 to -141** | | | | | | | | |
| Let any two points in a plane be A(-2, 2, 3) and B13, -3, 13 and L is a line through AOn the basis of above information, answer the following questions | | | | |

| 141. | A point moves in the space such that then the locus of is | | | | | | | |
|  | a) |  | | | | | | | |
|  | b) |  | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) |  | | | | | | | |
| **Paragraph for Question Nos. 142 to - 142** | | | | | | | | |

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| Consider the linesL1: x+13=y+21=z+12,And L2: x-21=y+22=z-33 | | | | |

| 142. | The unit vector perpendicular to both and is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 143 to - 143** | | | | | | | | |

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| --- | --- | --- | --- | --- |
| Suppose direction cosines of two lines are given by ul+vm+wn=0 and al2+bm2+cn2=0, where u, v, w, a, b, c are arbitrary constant and l, m, n are direction cosines of the lines.On the basis of above information, answer the following questions | | | | |

| 143. | For , both lines satisfies the relation | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | All of the above |
| **Paragraph for Question Nos. 144 to - 144** | | | | | | | | |

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| Given four points A2,1, 0, B(1, 0, 1), C(3, 0, 1) and D0,0, 2. Point D lies on a line L orthogonal to the plane determined by the A, B and C | | | | |

| 144. | The equation of the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 145 to - 145** | | | | | | | | |

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| --- | --- | --- | --- | --- |
| A ray of light comes along the line L=0 and strikes the plane mirror kept along the plane P=0 at B. A(2, 1, 6) is a point on the line L=0 whose image about P=0 is A'. It is given that L=0 is x-23=y-14=z-65 and P=0 is x+y-2z=3 | | | | |

| 145. | The coordinates of are | | | | | | | |
|  | a) | (6, 5, 2) | b) |  | c) |  | d) | None of these |
| **Paragraph for Question Nos. 146 to - 146** | | | | | | | | |

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| --- | --- | --- | --- | --- |
| Consider three planes 2x+py+6z=8, x+2y+qz=5 and x+y+3z=4 | | | | |

| 146. | Three planes intersect at a point if | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 147 to - 147** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Consider a plane x+y-z=1 and point A(1, 2, -3). A line L has the equation x=1+3r, y=2-r and z=3+4r | | | | |

| 147. | The coordinate of a point of line such that is parallel to the plane is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |

**Integer Answer Type**

| 148. | Let be the areas of the triangular faces of a tetrahedron, and be the corresponding altitude of the tetrahedron. If volume of tetrahedron is 1/6 cubic units, then find the minimum value of (in cubic units) | | | | | | | |
| 149. | Let be any point on the plane , then find the least value of | | | | | | | |
| 150. | Find the distance of the -axis from the image of the point in the plane | | | | | | | |
| 151. | The position vectors of the four angular points of a tetrahedron are (0, 0, 0), (0, 0, 2), (0, 4, 0) and (6, 0, 0), respectively. A point inside the tetrahedron is at the same distance ‘’ from the four plane faces of the tetrahedron. Find the value of | | | | | | | |
| 152. | Let the equation of the plane containing line and paralllle to the line of intersecting of the planes and be . Then find the value of | | | | | | | |
| 153. | The plane denoted by is rotated through a right angle its line of intersection with the plane . If the plane in its new position be denoted by , and the distance of this plane from the origin is , then find the value of (where represents greatest integer less than or equal to ) | | | | | | | |
| 154. | The distance of the point from the line measured parallel to the plane is , then find the value of | | | | | | | |
| 155. | If the length of the projection of the line segment with points and to the plane is , then find the value of where represent greatest integer function | | | | | | | |
| 156. | If the angle between the plane and the line is , then find the value of | | | | | | | |
| 157. | Find the number of spheres of radius touching the coordinate axes | | | | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 619**

**Time :** 08:54:00 **MATHEMATICS**

**Marks :** 527

11.THREE DIMENSIONAL GEOMETRY

|  |
| --- |
| **: ANSWER KEY :** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1) b 2) a 3) b 4) a**  **5) c 6) b 7) c 8) a**  **9) c 10) d 11) c 12) b**  **13) a 14) b 15) a 16) c**  **17) a 18) a 19) c 20) c**  **21) d 22) a 23) c 24) c**  **25) a 26) c 27) d 28) b**  **29) b 30) d 31) d 32) b**  **33) d 34) a 35) b 36) a**  **37) a 38) c 39) b 40) b**  **41) b 42) b 43) b 44) a**  **45) a 46) c 47) b 48) c**  **49) a 50) a 51) d 52) c**  **53) d 54) c 55) b 56) c**  **57) a 58) b 59) b 60) b**  **61) b 62) d 63) c 64) d**  **65) a 66) d 67) a 68) c**  **69) c 70) b 71) b 72) b**  **73) a 74) c 75) a 76) a**  **77) c 78) b 79) c 80) a**  **81) b 82) d 83) c 84) b**  **85) c 86) a 87) c 88) a**  **89) a 90) a 91) d 92) d**  **93) d 1) b,c,d 2) b,c,d 3) b,c 4) a,c,d**  **5) a,b 6) a,c,d 7) a,b,c 8) a,c**  **9) a,d 10) b,c 11) a,b 12) a,b,c**  **13) b,c 14) a,c 15) a,d 16) a,d**  **17) a,b 18) a,b 19) a,c 20) a,b**  **21) b,d 1) a 2) a 3) b 4) c**  **5) b 6) b 7) b 8) a**  **9) a 10) a 11) b 12) b**  **13) b 14) c 15) a 16) c**  **17) a 18) b 19) d 20) b**  **21) a 1) a 2) b 3) d 4) a**  **5) c 1) a 2) b 3) d 4) b**  **5) b 6) b 7) d 1) 8 2) 7 3) 1 4) 6**  **5) 6 6) 7 7) 9 8) 3**  **9) 2 10) 8** | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 619**

**Time :** 08:54:00 **MATHEMATICS**

**Marks :** 527

11.THREE DIMENSIONAL GEOMETRY

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| **: HINTS AND SOLUTIONS :** |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | **(b)**  Let  Similarly, other line , where and are scalars  Now  (equating the coefficients of and  i.e., | | | | | | | |
| 2 | **(a)**  It is obvious that the given line and plane are parallel  Given point on the line is  is a point on the plane  Then distance of from the plane = projection of on vector | | | | | | | |
| 3 | **(b)**  We have and | | | | | | | |
| 4 | **(a)**  Direction ratios of the line joining points and are which are direction ratios of the normal to the plane  Then, equation of plane is  Also this plane passes through the midpoint of  Equation of plane is  Then, intercepts are and 9 | | | | | | | |
| 5 | **(c)**  We must have and | | | | | | | |
| 6 | **(b)**  The equation of a plane through the line of intersection of the planes andis  or (i)  This passes through the origin, therefore  Putting the value of in (i). we get the equation of the required plane as | | | | | | | |
| 7 | **(c)**  We have for the point, where the line intersects the curve  Therefore,  and  and  Putting these values in , we get | | | | | | | |
| 8 | **(a)**  Both the lines pass through origin. Line is parallel to the vector  and is parallel to the vector  For to be independent of , we get  and | | | | | | | |
| 9 | **(c)**  Let be the foot of altitude drawn from  to the line ,  and | | | | | | | |
| 10 | **(d)**  Let be the perpendicular and be the foot of the perpendicular which divides in the ratio , then    The direction ratios of are and and direction ratios of are and  Since , we get  Hence, on putting the value of in (i), we get required foot of the perpendicular, i.e., | | | | | | | |
| 11 | **(c)**  (1, 2, 3) satisfies the plane and also  Since the lines and both satisfy (0, 0, 0) and (1, 2, 3), both are same. Given line is obviously parallel to the plane | | | | | | | |
| 12 | **(b)**  Let a point of the first line also lies on the second line  Then  Hence, the point of intersection of the two lines (4, 3, 5)  Equation of plane perpendicular to , where is (0, 0, 0) and passing through is | | | | | | | |
| 13 | **(a)**  Equation of the plane containing  Where  Plane is or  Hence, | | | | | | | |
| 14 | **(b)**  The lines and pass through and , respectively, and are parallel to the vectors and , respectively. Therefore, they intersect if and are coplanar and so | | | | | | | |
| 15 | **(a)**  Equation of the plane through is  (i)  Which is parallel to the given line and perpendicular to the given plane  (ii)  and (iii)  From Eqs. (ii) and (iii), we get  From Eq., | | | | | | | |
| 16 | **(c)**  Plane meets axes at and  Then area of , | | | | | | | |
| 17 | **(a)**  Equation of the plane passing through and perpendicular to is  Hence the required distance from | | | | | | | |
| 18 | **(a)**  Distance of point from plane=5  α =10  Foot perpendicular  Thus, the foot of the perpendicular is | | | | | | | |
| 19 | **(c)**  Since the given lines are parallel    From the figure, we get  Shortest distance | | | | | | | |
| 20 | **(c)**    Any point on the line is  lies on the plane  Coordinate | | | | | | | |
| 21 | **(d)**  Vector perpendicular to the face is  Vector perpendicular to face is  Since the angle between the face = angle between their normal, therefore | | | | | | | |
| 22 | **(a)**  Also, point does not lie on the plane  Therefore, the line is parallel to the plane | | | | | | | |
| 23 | **(c)**  The given plane passes through and is parallel to the vectors and . So it is normal to . Hence, its equation is  Or  The length of the perpendicular from the origin to this plane is | | | | | | | |
| 24 | **(c)**  Let the point be and  The number of planes which have three points on one side and the fourth point on the other side is 4. The number of planes which have two points on each side of the plane is 3  Number of planes is 7 | | | | | | | |
| 25 | **(a)**  intercept is say  Plane passes through it | | | | | | | |
| 26 | **(c)** | | | | | | | |
| 27 | **(d)**  are in the same plane | | | | | | | |
| 28 | **(b)**  The required line passes through the point and is perpendicular to the lines and ; therefore it is parallel to the vector  Hence, the equation of the required line is | | | | | | | |
| 29 | **(b)**  Any plane through (2, 2, 1) is  (i)  It passes through (9, 3, 6) if (ii)  Also (i) is perpendicular to , we have  (iii)  or (from (ii) and (iii))  Therefore, the required plane is or | | | | | | | |
| 30 | **(d)**  The given sphere are  (i)  and (ii)  Subtracting (ii) from (i), we get | | | | | | | |
| 31 | **(d)**  Let be the point () and be the length of the perpendicular from on the given line  Coordinates of point are  Now is perpendicular to the given line or vector  Then, point is (3, 5, 9) | | | | | | | |
| 32 | **(b)**  The line is and the plane is  If be the angle between the line and the plane, then is the angle between the line and normal to the plane | | | | | | | |
| 33 | **(d)**  Since line of intersection is perpendicular to both the planes, direction ratios of the line of intersection  Hence, | | | | | | | |
| 34 | **(a)**  We must have  or | | | | | | | |
| 35 | **(b)**  Given plane is (i)    Let the image of in the plane be  Equation of is ( is normal to the plane) (ii)  Solving (i) and (ii), we get  But | | | | | | | |
| 36 | **(a)**  Given lines are  (say)  and (say)  and  On solving, we get | | | | | | | |
| 37 | **(a)**  The plane is perpendicular to the line  Hence, the direction ratios of the normal of the plane are , and 0 (i)  Now, the required plane passes through the -axis. Hence the point (0, 0, 0) lies on the plane  From Eqs. (i) and (ii), we get equation of the plane as | | | | | | | |
| 38 | **(c)**  Given one vertex and line  General point on above line  Direction ratios of line are  Direction ratios of line are <>  Since angle between nad is  Squaring and solving, we have  Hence equation of lines are and | | | | | | | |
| 39 | **(b)**  Here,  DC’s of are    Projection of on  and | | | | | | | |
| 40 | **(b)**  Coordinates of and are and , respectively. Therefore, the equation of the plane passing through (0, 0, 0), and is | | | | | | | |
| 41 | **(b)**  As the lines intersect they must have a point in common. | | | | | | | |
| 42 | **(b)**  Which represents planes | | | | | | | |
| 43 | **(b)**  Any plane through (1, 0, 0) is (i)  It passes through (0, 1, 0)  (ii)  (i) makes an angle of with , therefore  Squaring, we get  (using (ii))  Hence, | | | | | | | |
| 44 | **(a)**  Vector is perpendicular to | | | | | | | |
| 45 | **(a)**  Let the foot of the perpendicular from the origin on the given plane be . Since the plane passes through  Hence, the locus of is  Which is a sphere of radius | | | | | | | |
| 46 | **(c)**  We must have (because the line and the plane must be parallel) and (as point on the line should not lie on the plane) | | | | | | | |
| 47 | **(b)** | | | | | | | |
| 48 | **(c)**    Equation of a line is  Now  is . Now  (i)  and (ii)  Now  (iii)  From (i) and (ii), we get  From (iii), putting . Putting this value of and in (i), we get | | | | | | | |
| 49 | **(a)**  direction ratios of are  Direction ratios of are  Therefore, direction ratios of normal to plane are  As a result, equation of the plane is  Let the equation of the required plane is , then  Hence, equation of the required plane is | | | | | | | |
| 50 | **(a)**  Since line is parallel to the plane vector, is perpendicular to the normal to the plane | | | | | | | |
| 51 | **(d)**  Given lines are and  Required shortest distance | | | | | | | |
| 52 | **(c)**  Here  Let the line make an angle ‘’ with -axis | | | | | | | |
| 53 | **(d)**  Let  Direction ratios of segment are  Length of projection | | | | | | | |
| 54 | **(c)**  Let be the foot of altitude drawn from ‘’ to the plane  Also  Thus, required distance | | | | | | | |
| 55 | **(b)**  Plane passing through the line of intersection if planes and is , or  Clearly, for , we get the plane  Hence, the given three planes have common line of intersection | | | | | | | |
| 56 | **(c)**  Equation of plane containing the line  …(i)  *….*(ii)  Another equation of the plane containing the other two lines is  ….(iii)  Also,  on solving we get  Eq. (iii) becomes  …(iv)  Since, the plane (i) is perpendicular to the plane (ii)  …(v)  On solving Eqs. (ii) and (v), we get  From Eq. (i)  **Alternate**  Let  ⟹ Direction ratio of normal to the required plane (passing through origin ) is  ⟹ Equation of required plane is | | | | | | | |
| 57 | **(a)**  Since, line lies in a plane, it means point lies in a plane. | | | | | | | |
| 58 | **(b)**    Let any point on second line be  So is (2, 4, 6) | | | | | | | |
| 59 | **(b)**  Direction cosines of the given line are  Hence, the equation of line can be point in the form  Therefore, any point on the line is , where  Points are and | | | | | | | |
| 60 | **(b)**  Let the equation of the sphere be . This meets the axes at and  Let be the coordinares of the centroid of the tetrahedron . Then  Now, radius of the sphere  Hence, the locus of is | | | | | | | |
| 61 | **(b)**  Centre of the sphere is and its radius  , perpendicular distance of from plane, is    Now  Hence, radius of the circle | | | | | | | |
| 62 | **(d)**  Let be the image of the point  Midpoint of lies on . Then,  (i)  Also is perpendicular to the plane. Then,  (ii)  Solving (i) and (ii), we get  Therefore, image is  For image, | | | | | | | |
| 63 | **(c)**  Direction ratios of are  Therefore, equation of the plane is  i.e., | | | | | | | |
| 64 | **(d)**  Here, the required plane is  Also and  Solving, we have  Therefore, the required equation of plane is | | | | | | | |
| 65 | **(a)**  Foot of the perpendicular drawn from point on the plane is  Therefore, equation of the line parallel to in the plane is given by | | | | | | | |
| 66 | **(d)**  Let the equation of plane be,  Which is perpendicular to  The equation of plane is, | | | | | | | |
| 67 | **(a)**  The given line makes angles of and with the -- and -axes, respectively,  Direction cosines of the given line are  and , or and 0 | | | | | | | |
| 68 | **(c)**  (where and are normal to the planes) | | | | | | | |
| 69 | **(c)**  Plane meets axes at and  Then area of is  sq units | | | | | | | |
| 70 | **(b)**  Let be the point and it divides the line segment in the ratio . Then,  It satisfies . So,  or  or or or | | | | | | | |
| 71 | **(b)**  Let the equation of the plane be  Volume of tetrahedron  Now (G.M.H.M.) | | | | | | | |
| 72 | **(b)**  Eliminating , we get    (product of roots and )  Where and are the roots of this equation, further eliminating , we get  Since the lines with direction cosines and are perpendicular, we have | | | | | | | |
| 73 | **(a)**  The equation of the plane through the line of intersection of the plane and is  (i)  Which is perpendicular to  Hence the place is | | | | | | | |
| 74 | **(c)**  Here (i)  By the question, (ii)  (iii)  Adding (i) and (iii), we get | | | | | | | |
| 75 | **(a)**  (i)  Where is a parameter  So, is normal to plane (i). Now, any plane parallel to the line of intersection of the planes  and is of form . Hence we must have  On putting this value in Eq. (i), we have the equation of the required plane as | | | | | | | |
| 76 | **(a)**  Point is Points are and, respectively  Centroid of triangle is  are collinear area of triangle is zero | | | | | | | |
| 77 | **(c)**  Equating of the planes through and are respectively,  (i)  and (ii)  It meets at -axis, i.e.,  From (i) and (ii), | | | | | | | |
| 78 | **(b)**  Let direction ratios of the line be , then  and i.e,  Therefore, direction ratios of the line are  Any point on the given line is , it lies on the given plane if  Therefore, the point of intersection of the line and the plane is (1,3, 5)  Therefore, equation of the required line is | | | | | | | |
| 79 | **(c)**  Given plane is  Which is a plane passing through and parallel to the vectors and  Therefore, it is perpendicular to the vector  Hence, equation of plane is or | | | | | | | |
| 80 | **(a)**  Let the point be , then the vector will lie on the line  and  Now point is nearest to the origin  The point is | | | | | | | |
| 81 | **(b)**  The lines (i)  and (ii)  are coplanar if  or  or | | | | | | | |
| 82 | **(d)**  and are lines of intersection of the three planes and . As and are non-coplanar, planes and will intersect at unique point. So the given liens will pass through a fixed point | | | | | | | |
| 83 | **(c)**  (i)  (ii)  Substituting the value of from Eq. (i) in Eq. (ii), we get  and  From Eq. (i), we get  and  and  If be the angle between the lines, then | | | | | | | |
| 84 | **(b)**  The equation of the line through the centre and normal to the given plane is  (i)  This meets the plane for which  Putting in (i), we get  Hence, centre is (1, 3, 4) | | | | | | | |
| 85 | **(c)**  The planes are and  Since the perpendicular distance of the origin on the planes is same, therefore | | | | | | | |
| 86 | **(a)**  Any plane through the given planes is  It passes through (). Therefore,  Therefore, the required plane is or | | | | | | | |
| 87 | **(c)**  The equation of a plane through the line of intersection of the planes  and is  or (i)  This is parallel to -axis, i.e., . Therefore,  Putting the value of in (i), the required plane is or | | | | | | | |
| 88 | **(a)**  cuts the coordinate axes at  Since, distance from origin  From Eqs. (i) and (ii), | | | | | | | |
| 89 | **(a)**  The required plane is  (Operating ) | | | | | | | |
| 90 | **(a)**  Equation of line (i)  (ii)  (0, 0, 1) lies on it  For point of intersection, and solve (i) and (ii) | | | | | | | |
| 91 | **(d)**  The given sphere is  Its centre is and radius  Therefore, distance of centre from the plane    Hence, the shortest distance is 13 | | | | | | | |
| 92 | **(d)**  Line of intersection of and will be parallel to , i.e.,  If the required angle is , then | | | | | | | |
| 93 | **(d)**  Let the plane divide the line joining the pointsand in the ratio at point  Therefore, point is  This lies on the given plane  Solving, we get | | | | | | | |
| 94 | **(b,c,d)**  If be , then from the figure  and  and    and  (neglecting negative sign as are acute)  Also, | | | | | | | |
| 95 | **(b,c,d)**  Therefore, the line is along the vector  Let . Then and  Therefore, is any point on the line  Hence, and are the points on the line | | | | | | | |
| 96 | **(b,c)**  Distance between the planes is  Also the figure formed is cylinder, whose radius is units  Hence, the volume of the cylinder is  Also the curved surface area is | | | | | | | |
| 97 | **(a,c,d)**    The rod sweeps out the figure which is a cone  The distance of point from the plane is unit  The slant height of the cone is 2 units  Then the radius of the base of the cone is  Hence, the volume of the cone is cubic units  Area of the circle on the plane which the of traces is  Also, the centre of the circle is . Then , or | | | | | | | |
| 98 | **(a,b)**  (i)  (ii)  Bisectors are  The plane which bisects the angle between the planes that contains the origin  (iii)  Further,  Hence, the origin lies in acute angle | | | | | | | |
| 99 | **(a,c,d)**  …(i)  Or  Also, from Eq. (i),  Or | | | | | | | |
| 100 | **(a,b,c)**  Let then    or  Hence,  Similarly, and | | | | | | | |
| 101 | **(a,c)**  The required plane is parallel to the bisector of the given planes  Bisectors are  or and . Hence, the planes are and | | | | | | | |
| 102 | **(a,d)**  The given lines intersect if | | | | | | | |
| 103 | **(b,c)**  Volume of tetrahedron is cubic units  or | | | | | | | |
| 104 | **(a,b)**  The plane is equally inclined to the lines. Hence, it is perpendicular to the angle bisector of the vectors and  Vector along the angle bisectors of the vectors are  , or  and  Hence, the equation of the planes are or | | | | | | | |
| 105 | **(a,b,c)**  Extremities of a diameter of the sphere are given as (0, 2, 0) and (0, 0, 4)  Centre is (0, 1, 2) and radius  Equation of the sphere is  Or  Which passes through the origin  So, option (a), (b), (c) are correct  Now, represents a diameter, if the centre (0, 1,2) lies on it  There exists a value of for which  and  Which is not possible  Hence, option (d) is not correct | | | | | | | |
| 106 | **(b,c)**  For the given lines  So, the given lies intersect  Any point on the first line is and any point on the second line is  Since, the lines intersect, at the point of intersection  Hence, the point of intersection is (4, 0, ) | | | | | | | |
| 107 | **(a,c)**  Plane contains the line , hence contains the point and is normal to vector  Hence equation of plane is  or  Plane contains the line and point  Hence equation of plane is  or  If is the acute angle between and , then  As is contained in | | | | | | | |
| 108 | **(a,d)**  The equation of the plane passing through the intersection of the planes and is  (i)  Or  Plane (i) is perpendicular to . Therefore, | | | | | | | |
| 109 | **(a,d)**  The equation of a plane passing through the line of intersection of the - and - planes is  This plane makes an angle with the - plane | | | | | | | |
| 110 | **(a,b)**  Let the coordinates of the point(s) be and  Therefore, the equation of the line passing through and whose direction ratios are and is  (i)  Line (i) intersect the line,  (ii)  Therefore, these are coplanar  Or  Also, by using procedure with the second equation, we get the condition | | | | | | | |
| 111 | **(a,b)**    Required line is parallel to  The equation of line is | | | | | | | |
| 112 | **(a,c)**  For line , point (1, 0, 5) lies on the plane. Also, the vector along the line is perpendicular to the normal to the plane. For line , point lies on the plane and vector is perpendicular to the normal . Line passes through the origin, which is not on the given plane | | | | | | | |
| 113 | **(a,b)**  and intersect in a line if . So, | | | | | | | |
| 114 | **(b,d)**  or 4 | | | | | | | |
| 115 | **(a)**  The direction cosines of segment are and  This means will be normal; to the plane and the equation of the plane is | | | | | | | |
| 116 | **(a)**  . Therefore, is exterior to the sphere. Statement 2 is also true (standard result) | | | | | | | |
| 117 | **(b)**  Equation of the polar to the sphere with respect to the point (1,2, 3) is    Let  Point (1, 2, 3) lies outside the sphere : for polar point may be inside or outside of sphere | | | | | | | |
| 118 | **(c)**  Thus, statement II is false  Now,  Hence, and | | | | | | | |
| 119 | **(b)**  Obviously the answer is (b) | | | | | | | |
| 120 | **(b)**  Given lines are parallel as both are directed along the same vector ; so they do not intersect. Also Statement 2 is correct by definition of skew lines, but skew lines are those with are neither parallel nor intersecting. Hence, both the statements are true, but Statement 2 is not the correct explanation for Statement 1 | | | | | | | |
| 121 | **(b)**  Since, orthocentre, nine point centre, centroid and circumcentre are collinear and centroid divides orthocenter and circumcentre in the ratio 2 : 1 (internally)  And  Orthocentre is | | | | | | | |
| 122 | **(a)**  Therefore, Statement 1 is true and Statement 2 is also true by definition | | | | | | | |
| 123 | **(a)**  Let the equation of the common circle be  …(i)  Its radius is evidently and we are to evaluate it. Now, let the equations of the two given spheres through this circle be  …(ii)  And …(iii)  (Here an extra term has been introduced in each equation, so that it may represent a sphere)  From Eq. (ii), the radius of the sphere  (given)  And similarly from Eq. (iii) the radius of the sphere  (given)  Also, as the sphere (ii) and (iii) cut each other orthogonally, so we have  Or  Or  Or | | | | | | | |
| 124 | **(a)**  **Statement II** Lines and are parallel to the vectors and respectively. The unit vector perpendicular to both and is using it the plane is  Statement I is whose distance from (1,1,1) is | | | | | | | |
| 125 | **(b)**  The equation of the plane containing them is  **Statement II** Here,  and | | | | | | | |
| 126 | **(b)**  For the given lines, let and. Therefore,  Hence, the lines are coplanar. Also vectors and along which the lines are not collinear. Hence, the lines intersect. When , vectors and are collinear; therefore, lines and are parallel and do not intersect. But this statement is not the correct explanation for Statement 1 | | | | | | | |
| 127 | **(b)**  Direction ratios of the given lines are and . Hence, the lines are perpendicular as  Also lines are coplanar as  But Statement 2 is not enough reason for the shortest distance to be zero, as two skew lines can also be perpendicular | | | | | | | |
| 128 | **(c)**  Any point on the line is  Also, is perpendicular to the line, where is  Point is  Hence, | | | | | | | |
| 129 | **(a)**  Here,  And  For touch  On squaring both sides, then  Again, on squaring both sides, then | | | | | | | |
| 130 | **(c)**  Equation of plane is  For , we get  which is perpendicular to  as | | | | | | | |
| 131 | **(a)**  Any point on the first line is  Any point on the second line is  If two lines are coplanar, then and are consistent | | | | | | | |
| 132 | **(b)**  Let be the DC’s of the line of the common perpendicular (or SD) to the two given lines. Then, we have  And  On solving these, we get  Or  DC’s of SD are  Also , is a point on first line and is a point on second line, then  And two lines are said to be skew lines or non-intersecting lines if they do not lie in the same plane | | | | | | | |
| 133 | **(d)**  Given planes are  For we get  Direction ratios of given planes are  Let be the direction ratios of the line of intersection of the given planes. Then,  The DR’s of line of intersection of planes is <14, 2, 15> and line is  Hence, statement I is false,  But statement II is true | | | | | | | |
| 134 | **(b)**  Statement 2 is true as when the line lies in the plane, vector along which the line is directed is perpendicular to the normal of the plane, but it does not explain Statement 1 as for , the line may be parallel to the plane. However, Statement 1 is correct as any point on the line lies on the plane for | | | | | | | |
| 135 | **(a)**  The image of the point (3, 1, 6) with respect to the plane is  Which show that Statement I is true.  We observe that the line segment joining the points has direction ratios which is preoperational to the direction ratios of the normal to the plane. Hence, Statement II is true  Thus, the Statement I and II are true and Statement II is correct explanation of Statement I. | | | | | | | |
| 136 | **(a)**  If the required image is , then or  Any point on the line is , which lies on plane . Therefore        Therefore, the point is  If is required foot of the perpendicular, then or  Any point on the line is , which satisfies the line or    The required point is | | | | | | | |
| 137 | **(b)**  Line is along the vector and line is along the vector . Here  Also  The direction ratios of the line are . Hence, the given two lines are parallel  The given lines are and , or and .  The lines are perpendicular as  Also  Hence, the lines are intersecting  The given lines are and    Hence, the lines are coplanar and hence intersecting (as the lines are not parallel) | | | | | | | |
| 138 | **(d)**  The given line and plane are and, respectively. Since line and plane are parallel  Hence, the required distance = distance of point from the plane , which is  The distance between two parallel planes andis    The perpendicular distance of the point from the plane or is      The equation of the line is    The equation of line passing through an dparallle to is  (say)    The coordinates of any point on line which lie on plane  Point  Required distance | | | | | | | |
| 139 | **(a)**  Line or , which is along the vector . Vector is perpendicular to the line  Normals to the planes and are and . Then the vector along the line of intersection of planes is  The shortest distance between the lines and occurs along the vector  Normal to the plane is | | | | | | | |
| 140 | **(c)**  **a**. The given line is , or  or (say)  Any point on the line is of the form  The distance between and is 3 units (given). Therefore  The point is  **b**. The equation of the plane containing the lines and parallel to  Point lies on this plane  **c**. The line passing through points and is or (say)  Any point on this line is of the form , whose distance from point is 14 units. Therefore,  Therefore, the required points are (14, 1, 5) and . The point nearer to the origin is (14, 1, 5)  **d**. Any point on line is . Therefore the direction ratios of are and    But  Therefore, foot of the perpendicular is | | | | | | | |
| 141 | **(a)**  Let be any point on the locus, then | | | | | | | |
| 142 | **(b)**  The equation of given lines in vector from may be written as  And  The vector perpendicular to both and is  Required unit vector | | | | | | | |
| 143 | **(d)**  The DC’s of the lines are given by  And  On eliminating between them, we get  …(i)  Put in Eq. (i), then  Similarly,  And …(ii) | | | | | | | |
| 144 | **(b)**    The vector normal to the plane is  The equation of the line through (0, 0,2) and parallel to is  The perpendicular distance of from plane is | | | | | | | |
| 145 | **(b)**  Let be the image of about mirror . Then, | | | | | | | |
| 146 | **(b)**  The given system of equations is  By Cramer’s rule, if , i.e., and , the system has a unique solution  If or , then if , the system has infinite solutions and if any one of and, the system has no solution  Now  Thus, if for all , the system has infinite solutions  If and, then the system has no solution  Hence the system has (i) no solution if and , (ii) a unique solution if and and (iii) infinite solutions if and | | | | | | | |
| 147 | **(d)**  The line  Any point say (on the line )  Hence,  is parallel to  or  is | | | | | | | |
| 148 | **(8)**  Volume (V)  Similarly and  So  Now using A.M.-H.M. inequality in , we get  Hence the minimum value of | | | | | | | |
| 149 | **(7)**  Clearly minimum value of | | | | | | | |
| 150 | **(1)**  If image of point is the plane is , then  Hence the image is (0, 1, 5)  Obviously distance of image of the point from -axis is 1 | | | | | | | |
| 151 | **(6)**  The given points are and  Here three faces of tetrahedron are plane  Since point is equidistance from and planes, its coiordinates are  Equation of plane is  (from intercept form)  is also at distance from plane  (as ) | | | | | | | |
| 152 | **(6)**  A plane containing the line of intersection of the given planes is  i.e.,  vector normal to it  (i)  Now the vector along the line of intersection of the planes  and is given by  As is parallel to the plane (i), therefore  Hence the required plane is  Hence | | | | | | | |
| 153 | **(7)**  (i)  (ii)  Equation of plane passing through their line of intersection is  Or (iii)  Plane (iii) to (i), so  From (iii), equation of plane is (iv)  Distance of (iv) from | | | | | | | |
| 154 | **(9)**  Line through point and parallel to the given line is  Any point on this line is  Direction ratios of are  Now is parallel to the given plane  line is perpendicular to the normal to the plane | | | | | | | |
| 155 | **(3)**  Let  Direction ratios of are  Let be the angle between the line and normal to plane, then  Length of projection | | | | | | | |
| 156 | **(2)**  Vector normal to the plane is and vector along the line is  Now  Hence | | | | | | | |
| 157 | **(8)**  Obviously one in each octant | | | | | | | |