MTH 123 (VECTORS, COORDINATE GEOMETRY AND STATISTICS). 2019/2020 SESSION
ASSIGNMENT QUESTIONS

1. What are vector quantities?
2. Differentiate between a scalar and vector quantity.
3. A quantity that has magnitude only is referred to as …
4. That quantity with magnitude as well as direction is known as …
5. List 4 examples of vectors …
6. List 4 examples of scalars…
7. A vector where initial and terminal points coincide is called …
8. Two or more vectors having the same initial position are called… vectors
9. Two or more vectors that are parallel to the same line irrespective of their magnitudes and direction are called … vectors
10. Two or more vectors having the same magnitude and direction regardless of the positions of their initial points are said to be ….. vectors
11. Let $\overrightarrow{AB}$ be a vector. Then $\overrightarrow{BA}$ is … vector $\overrightarrow{AB}$
12. Represent $\overrightarrow{AB} - \overrightarrow{CB} + \overrightarrow{CD} - \overrightarrow{ED}$ with a diagram and give the resultant
13. Find the sum of the vector $\overrightarrow{AC}$ +CL – ML

    If A = 3i + 6j + 12k, B=4i + 6j + 13k, C = 3i-7j + 8k, use the information to answer question 14 to 17.
14. Find the modulus of vector A.
15. Evaluate 3A – 2C
16. Find /2A – C/
17. Find the unit vector of the resultant of B-C
18. Let A=17i + 25j; B = 4i + 5j, C = 3i + 5j. Find the scalars λ and β if C is the resultant of λA and βB
19. Find the value of λ if the modulus of the vector A = λi +4j is 5.
20. Find the unit vector parallel to V=-2i + 3j – 6k.
21. Let $\vec{A}$ and $\vec{B}$ be vectors and θ the angle between the two vector. The mathematical expression for the dot product of the two vectors is given as $\vec{A} . \vec{B}$ =…
22. In dot product, $\vec{A} . \vec{B} \neq \vec{B}.\vec{A}$. True or false?
23. In dot product (i) i.i = j.j = k.k = … (ii) i.j = j. k = k. I = …
24. The dot product of vectors $\vec{A}$ and $\vec{B}$ is a … quantity
25. If $\vec{A} . \vec{B}$ = 0 and $\vec{A}$ and $\vec{B}$ are not null vectors, vectors $\vec{A}$ and $\vec{B}$ are said to be … vectors.
26. Find the dot product of vectors A=3i + 2j + k and B = 2i + j + 2k
27. Find the angle between A = 2i + 3j + k and B = 2i – 3j + 4k
28. Determine the value of λ if vector 2i – 3j + 4k and 2i + λk + k are perpendicular..
29. Find the resolved part of the vector A = 6i – 3j + 9k in the direction B = 2i + 2j – k.
30. Find the values of b if the resultant of 2i + (2b + 2) j + 3k and 2i + (3b + 1) j + 3k is orthogonal to the resultant of – 2i + (b+1)j – k and – i + (2b – 1) j + 2k.
31. Let $\vec{A}$ and $\vec{B}$ be vectors and θ the angle between the two vectors. The mathematical expression for the cross product of the two vectors is given as $\vec{A}$ x $\vec{B}$ =…
32. Cross product is also known as … product.
33. In cross product, $\vec{A}$ x $\vec{B} = \vec{B}$ x $\vec{A}$. True of false?

34. In cross product (i) ixi=jxj=kxk=... (ii) ixj = ... (iii) jxk=... (iv) kxi=... (v) jxi = ...
(vi) kxj=... (vii) ixk=...

35. The cross product of vectors $\bar{A}$ and $\bar{B}$ is a ... quantity

36. $\bar{A}$ and B are non-zero vectors. A x B = 0, then vectors A and B are ... vectors.

37. Find the cross product of the vectors 2i – 3j and i + 4j.

38. If A = 2i – 3j –k; B= i + 4j – 2k. find (A+B) x (A-B)

39. Find the area of a triangle formed by the vertices p(1,5,-2), Q(0,0,0) and R (3,5,1).

40. Find the area of the parallelogram determined by the vectors u=j+2k and v=i-2j.

41. Find the value of λ if the vectors i+λj+3k and – 2i+j-4k are parallel.

42. Find the area of the parallelogram whose adjacent sides are determined by the vectors i-j + 3k and 2i – 7j+k.

43. Let u, v and w be vectors. If u. (vxw) = 0, then the three vectors are ...

44. Find the triple product of the vectors u=21+3j-7k, v=i+2j+8k and 2=2i+2j+2k.

45. Find the values of λ if the triple scalar product of the vectors x=2i +3j – 17k, y = i+2j+4λk and z = λl + 2j + 2k is 32.

46. Determine the value of λ if u (-1, λ, 11), v(1, 2, 3) and w(-3, 1, 5) are coplanar.

47. If A = (k, 1) and B= (4,3). Evaluate the values of k that make the angle between vectors A and B equals. $\Pi/6$ (30⁰).

48. Let ABCD be a square, AC is a diagonal. If the coordinates of A and C are (-3,8) and (7,-2) respectively, find the coordinates of B and D.

49. Determine the polar coordinate of the points whose Cartesian coordinate is p (5,3).

50. What is the Cartesian coordinates of the point in a plane with polar coordinate A $\left(4, \Pi/4\right)$"

51. Compute the distance between the points p(2, 4) and Q (7,3)

52. Calculate the shortest distance between the two points $\left(3, \Pi/4\right)$ and $\left(5, \Pi/6\right)$

53. Find the shortest path between the point (4, -3) and the origin.

54. Find the shortest distance between (a, b) and (-a, -b)

55. Find coordinates of the midpoint joining the points (1,1) and (4,5)

56. Find the midpoint of the line joining the point (5,1) to the point (3,-1).

57. Calculate the length of the shortest distance between $\left(4, \Pi/6\right)$ and the point (4,6).

58. Find the distance between (2,4) and (7,4)

59. $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$ is a formula for calculating the coordinates of the ... of a given ..

60. Find the gradient of a line with points (3,-1) and (5,1).

61. Form the equation of a circle with centre (a,b) and radius r.

62. Find the equation of a circle with AB as diameter where A and B are points (-3,-4) and (7,20).

63. Find the centre and radius of the equation $4x^2 + 4y^2 – 4x – 12y+ = 0$.

64. The centre of a circle is $\left(10, \Pi/3\right)$. Find its equation.

65. Find the equation of a circle with radium 5 units that passes through the origin.

66. Determine the equation of the circle with centre (0,-25) and radius 4.

67. Determine the centre and radius of the circle $x^2 + y^2 – 5x = 0$

68. Find the points of intersection of the circles $x^2 + (y+1)^2 = 2$ and $(x+1)^2 + (y+1)^2 = 4$

69. Find the points of intersection of the circle $x^2 + y^2 = 25$ and $x^2 + y^2 - 2x + 14y + 25 = 0$

70. Find the equation of the circle that passes through the points (1,5), (5,3) and (3,-1).

71. Determine the equation of the circle having (0,0), (3,1) and (5,5) as some points on its circumference.

72. Determine the equation of the tangent to the circle $x^2 + y^2 - 10y = 0$ at the point (3,9).

73. Find the length of the tangent from the point (5,6) to the circle $x^2 + y^2 + 2x + 4y - 21 = 0$

74. Find p if the length of the tangent from the point (8,2) to the circle $x^2 + y^2 + 2x + 3y + p = 0$ *is* 11.

75. Show that the point (4,-3) lie on the circle $x^2 + y^2 + 2x + 14y - 25 = 0$

76. If $x^2 + y^2 + 2x + 4gx + 2fy + c = 0$ is equation of a circle, find the coordinate of the centre of the circle.

77. Suppose points $p(x_q, y_p)$ *and* $Q(x_p, y_p)$, find the straight line distance between the two points.

78. A point p (0,4) is a point along the $x-axis$. True or false

79. A (-4, -2), B(-4,6) and C (2, -2) are points on a Cartesian plane. Lines AB and AC are two adjacent sides of the rectangle formed from the points. Determine the coordinates of the point N, where AN is the diagonal of the rectangle.

80. Show on a diagram the position of the point $\left(3, -5\Pi/4\right)$

81. The scientific methods of collecting, organizing, summarizing, presenting, analyzing and drawing conclusion from data is known as ...

82. A tentative proposition that can be subjected to statistical analysis and testing is called?

The frequency table presents the scores obtained by 30 students in a class.

Scores	Frequency
7	4
8	3
9	2
10	4
11	2
12	6
13	4
14	3
15	2

Use the table to answer questions 83-85

83. What is the mode of the distribution?

84. What is the median of the distribution

85. If a student is selected at random, what is the probability that he scored at least 10?

86. In a normal distribution, mean, median and mode are ...

720 students are in mathematics, physics, chemistry and computer science departments. This information is represented on a pie chat below.
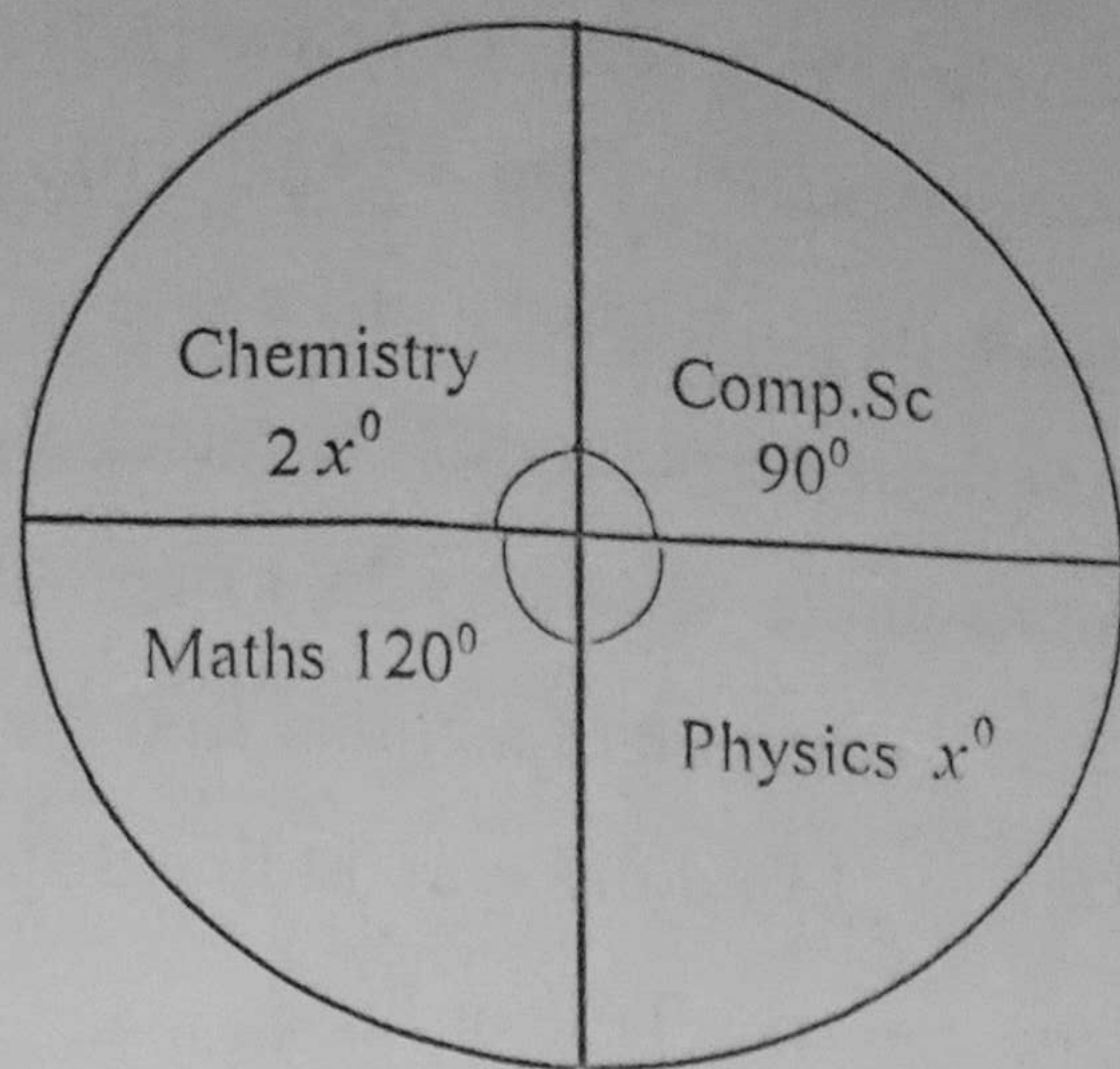
Use the information on the diagram above to answer question 87-90.

87. How many students are in chemistry department?

88. Calculate the angle of the sector represented by physics department.

89. If a student is selected at random, what is the probability that he is either a mathematics or a computer science student?

90. What percentage of the total students is mathematics students?

91. The difference between the lower and the upper class boundaries is called ...?

92. Cumulative frequency curve is also known as ...

93. Give two examples of measure of location.

94. List two example of measure of variability

95. Find x, if the mean of the scores 4, 4, 6, 8, 10, x, 12, 17 is 9.

The grouped frequency distribution of 50 students is given below

Class internal	Frequency
34-40	3
41-47	4
48-54	3
55-61	14
62-68	8
69-75	8
76-72	5
83-89	5

Use the information on the table to answer question 96 and 97

96. Calculate the median

97. Calculate the mode.

98. Two dice are thrown together. What is the probability that the face that appears in even?

99. An employer wishes to fill two positions from a group of 13 employees, 5 male and 8 female. If he selects without knowing the identity of the employee. What is the probability that one is a male and the other a female?

100. A manufacturing plant turns out a continuous stream of products throughout the year. Under normal conditions, 5 percent of the items turned out by the process are defective. One morning 10 items were selected at random from the assembly line. What is the probability that exactly 3 of these items are defective?