TWO MARK QUESTIONS

I. SETS AND FUNCTIONS

1. If A ={4,6.7.8.9}, B = {2,4,6} and C= {1,2,3,4,5,6 } then find

i. A U (B∩C) ii. A \ (C \ B)

2. Draw venn diagram for the following.

i. (A∩B)' ii. A ∩ (BUC)   iii. A U (B∩C)   iv. A'∩B' v. A\ (B∩C)

3. Which of the following relations are function from A = { 1,4,9,16 } to B = { -1,2,-3,-4,5,6 } ?.

 f_1 = {(1,-1), (4, 2), (9,-3), (16,-4)}

f_2 = {(1, 2), (4, 5), (9, -4), (16, 5)}

f_3 = {(1,-4), (1,-1), (9,-3), (16,2)}

Find its domain and range.

4. Let A = {1,2,3,4,5} , B = N   and   f : A→B be defined by   f(x) = x^2 .Find the range of **f.** Identify the function.

5. For the given function F = {(1, 3), (2, 5), (4, 7), (5, 9), (3, 11)} . Write the domain and range.

6. If R = {(a, -2), (-5, b), (8, c), (d, -1) } represents the identity function. Find the values of **a, b, c,** and **d**.

7. Write the pre-image of 2 and 3 in the function f = {(12, 2), (13, 3), (15, 3), (14, 2), (17,17)}

8. Represent the function   f = {(-1, 2), (-3, 1), (-5, 6), (-4, 3)} – as i) table ii) an arrow diagram

9. If A C B then find A∩B and A \ B (use venn diagram).

10. If A and B are two sets and U is the universal set such that n(U) =700, n(A) = 200,

   n(B) =300, and n(A∩B) =100. Find n (A'∩B')

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2. SEQUENCES AND SERIES

1. Write the first five terms of the sequence $a_n = a_{n-1} / n+2$ $n > 1$ $\forall$ $n \, \varepsilon \, N$

2. Find the smallest positive integer n such that t_n of the arithmetic sequence 20,19¼, 18½, …is negative?.

3. Find the 17th term of the sequence 4, 9, 14, ….

4. Find the common difference and 15th term of the sequence 125, 120, 115, 110 ,….

5. Which term of the arithmetic sequence 24.23¼,22½, 21¾, ….. is 3?.

6. Find the common ratio and general term of the geometric sequence 2/5,6/25, 18/125, …

7. Find the common ratio of the geometric sequence 4,-2,-1,1,-1/2,…

8. Find the 10th term and common ratio of the geometric sequence $1/4$, -1/2, 1,-2,….

9. Which term of the geometric sequence 1,2,4,8,… is 1024?.

10. Find the S_n of the arithmetic series a = 5 , n = 30 ,   l = 121

11. Find the S_n of the geometric series a = 5 , r = 3, n = 12

12. Find the sum   1+3+5+…+25

13. If 1+2+3+…+p = 171 then $1^3 + 2^3 + 3^3 + …+p^3 = $?.

14. Find the sum   1+2+3 + …. + 45

15. Find the sum $1^2 + 2^2 + 3^2 +…. + 25^2$

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3. ALGEBRA

1. Find a quadratic polynomial if the sum and product of zeros of it are -4 and 3 respectively.

2. Find a quadratic polynomial with zeros x = 1/4 and x = --1

3. Find a quadratic polynomial each with the given numbers as the sum and product of its zeros respectively. I). 3, 1   i). 1/3, 1   iii). 1/3, -1/3

4. Find the quotient and remainder when $X^3 + x^2 - 7x - 3$ is divided by x-3.

5. Find the quotient and remainder when $3x^3 - 2x^2 + 7x - 5$ is divided by x+3.

6. Find the quotient and remainder when $x^3 + x^2 - 3x + 5$ is divided by x - 1

7. Prove that x-1 is a factor of $x^3 - 6x^2 + 11x - 6$

8. Find the G.C.D.

 i. $x^4 - 27a^3x$, $(x - 3a)^2$

ii. $m^2 - 3m - 18$, $m^2 + 5m + 6$

9. Find the L.C.M.

   i. $x^3 + y^3$, $x^3 - y^3$, $x^4 + x^2y^2 + y^4$

   ii. $3(a-1)$, $2(a-1)^2$, $a^3 - 1$

   iii. $(x+4)^2 (x-3)^3$, $(x-1)(x+4)(x-3)^2$

   iv. $x^2y + xy^2$, $x^2 + xy$

10. Simplify

   i). $\dfrac{5x+20}{7x+28}$

   ii) $\dfrac{x3 - 5x2}{3x3 + 2x4}$

   iii). $6x^2 + 9x$ / $3x^2 - 12x$ iv). $x^3 - 1$ / $x^2 + x + 1$ v). $x^3 - 27$ / $x^2 - 9$

11. Simplify $x2 + 2x$ / x+2   × 3x+6 / x-2

12. Simplify. $a^3 + b^3$ × $a^2 + b^2$ / $a^2 2ab + b^2$ × a-b

13. Simplify.   x / x+1   ÷ x^2 / $x^2 - 1$

14. Simplify. $x^2 - 36$ / $x^2 - 49$ ÷   x+6 / x+7

15. Simplify. x^3 / x-2 + 8 / 2-x

16. Simplify. (x-3) (x^2 -5x +4) / (x-1) (x^2-2x+3)

17. Find the square root of .

    i.   4x^2+20xy +25y^2 ii. 16x^2-24x+9   iii. 81x^{4}y^{6}z^8 / 64w^{12}s^{14}

18. Find the nature of the roots.

i). x^2+8x+12=0

ii) 2x^2-3x+4=0

iii) . x^2-11x+4=0

iv). 2x^2+5x+5=0

v). 4x^2-28x+49=0

19. Find the sum and product of the following equations..

i) x^2-6x+5=0 ii). 3x^2-5x=0 iii). 8x^2-25=0

20. Form a quadratic equation whose roots are

(1). 3, 4, (2). 7+√3, 7-√3 , (3). 3+√7, 3- √7

21. If α and β are the roots of the equation 3x^2-5x+2=0 then find the values of

 i). α/β +β/α   ii) α - β

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4. MATRICES

1. Construct a 3 ×2 matrix A =[a$_{ij}$] whose elements are given by a$_{ij}$ = │2i-3j│ / **2**

2**.** Construct a 2 ×2 matrix A =[a$_{ij}$] whose elements are given by a$_{ij}$ = I - j / I + j

3. If A = $\begin{matrix} 2 & 3 \\ 4 & 1 \\ 5 & 0 \end{matrix}$ Then find the transpose of A.

4. If A = $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & -5 \\ 3 & -5 & 6 \end{bmatrix}$ then verify that (A^T) ^{T} = A

5 .If A = $\begin{matrix} -1 & 2 & 4 \\ 3 & 6 & -5 \end{matrix}$ then find 3A.

6. Let A = $\begin{bmatrix} 3 & 2 \\ 5 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 8 & -1 \\ 4 & 3 \end{bmatrix}$. Find the matrix C = 2A + B

7. If A = $\begin{bmatrix} 4 & -2 \\ 5 & -9 \end{bmatrix}$ and B = $\begin{bmatrix} 8 & 2 \\ -1 & -3 \end{bmatrix}$ Find 6A – 3B.

8 .Solve for x and y if $\begin{array}{c} 2x + y \\ x - 3y \end{array} = \begin{array}{c} 5 \\ 13 \end{array}$

9. Find the value of x, y and z if $\begin{array}{ccc} x & 5 & 4 \\ 5 & 9 & 1 \end{array} = \begin{array}{ccc} 3 & 5 & z \\ 5 & y & 1 \end{array}$

10. Solve: $\begin{array}{c} y \\ 3x \end{array} = \begin{array}{c} 6 - 2x \\ 31 + 4y \end{array}$

11. If A = $\begin{array}{ccc} 8 & 5 & 2 \\ 1 & -3 & 4 \end{array}$, then find A^T and $(A^T)^T$

12.If A = $\begin{pmatrix} 2 & 3 \\ -9 & 5 \end{pmatrix}$ - $\begin{pmatrix} 1 & 5 \\ 7 & -1 \end{pmatrix}$, then find the additive inverse of A.

13. Find the product of the matrices, if exists,

i) $\begin{array}{ccc} 2 & -1 & 5 \\ & & 4 \end{array}$ ii) $\begin{pmatrix} 3 & -2 \\ 5 & 1 \end{pmatrix} \begin{pmatrix} 4 & 1 \\ 2 & 7 \end{pmatrix}$ iii) $\begin{array}{ccc} 2 & 9 & -3 \\ 4 & -1 & 0 \end{array}$ $\begin{array}{cc} 4 & 2 \\ -6 & 7 \\ -2 & 1 \end{array}$

14. Prove that $\begin{pmatrix} 3 & 5 \\ 1 & 2 \end{pmatrix}$ and $\begin{pmatrix} 2 & -5 \\ -1 & 3 \end{pmatrix}$ are multiplicative inverses to each other.

15. If A = $\begin{array}{cc} 8 & -7 \\ -2 & 4 \\ 0 & 3 \end{array}$ and B = $\begin{array}{ccc} 9 & -3 & 2 \\ 6 & -1 & -5 \end{array}$, then find AB and BA if they exists.

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5. CO-ORDINATE GEOMETRY.

1. Find the midpoint of the line segment joining the points (3,0) and (-1,4)

2. Find the centroid of the triangle whose vertices are A (4,-6) , B (3,-2) and C (5,2)

3. Find the midpoint of the line segment joining the points (1,–1) , (–5,3)

4. Find the centroid of the triangle whose vertices are (1,3) ,(2,7) and (12,-1)

5. The centre of the circle is at (−6,4) If one end of the diameter of the circle is at the origin then find the other end.

6. If the centroid of the triangle is at (1,3) and two of its vertices are (−7,6) and (8,5) then find the third vertex of the triangle.

7. If the area of the $\triangle$ ABC is 68sq.units and the vertices are A (6,7) , B (-4,1) and C (a,-9) taken in order, then find the value of a.

8. Show that the points A (2,3) , B (4,0) and C (6,-3) are collinear.

9. Determine if the following set of points are collinear or not, $(4,3)$,$(1,2)$ and $(-2,1)$

10. Find the value of k for which the given points are collinear $(k,-1),(2,1)$ and $(4,5)$

11. Find the angle of the inclination of the straight line whose slope is $1/\sqrt{3}$

12. Find the slope of the straight line whose angle of inclination is 45°

13. Find the slope of the straight line passing through the points $(3,-2)$ and $(-1,4)$

14. Find the angle of the inclination of the straight line whose slope is $\sqrt{3}$

15. Find the slope of the straight line whose angle of inclination is 30°

16. Find the slope of the straight line passing through the points $(3,-2)$ and $(7,2)$

17. Find the slope of the straight line passing through the points $(2,-4)$ and origin.

18. Find the equation of the straight line whose angle of inclination is 45° and y-intercept is $2/5$.

19. Find the equation of the straight line whose slope is -4 and passing through $(-2,3)$

20. Find the equation of the straight line passing through the points $(-1,1)$, $(2,-4)$

21. Find the equation of the straight line whose x and y intercepts on the axes are given by $2 / 3$ and $3 / 4$.

22. Find the equation of the straight line whose slope is -3 and y-intercept is 4

23. Find the slope and y-intercept of the straight line $4x-2y+1=0$

24. Find the slope and y-intercept of the straight line $10x +15y+6=0$

25. Find the equation of the straight line passing through the point $(1,2)$ and slope is -4

26. Find the equation of the straight line passing through the points $(-2,5)$, $(3,6)$

27. Find the equation of the straight line whose x and y intercepts on the axes are given by2 and 3.

28.. Find the equation of the straight line whose x and y intercepts on the axes are given by $-1/3$ and $3 \ /2$

29. Find the x and y intercepts of the straight line $5x+3y-15=0$

30. Find the equation of the straight line whose x and y intercepts on the axes are given by

$2x-y+16=0$

31. Show that the given straight lines are parallel $3x+2y-12=0$, $6x+4y+8=0$

32. Show that the given straight lines are perpendicular $x+2y+1=0$, $2x-y+5=0$

33. Find the slope of the straight line $3x+4y-6=0$

34. Find the slope of the straight line $4x=5y+3$

35. Show that the given straight lines are parallel $x+2y+1=0$, $3x+6y+2=0$

36. Show that the given straight lines are perpendicular $3x-5y+7=0$, $15x+9y+4=0$

37. If the straight lines $y \ / \ 2 = x - p$ and $ax+5 = 3y$ are parallel, then find a.

38. Find the value of a if the straight lines $5x-2y+9=0$ and $ay+2x-11=0$ are perpendicular to each other.

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6.GEOMETRY

1. In triangle $\triangle$ ABC, $DE \ || \ BC$ and $AD \ / \ DB =2 \ / \ 3$, $AE = 3.7$ cm find EC ..

2. In $\triangle PQR$, given that S is a point on PQ such that $ST \ || \ QR$, and $PS \ / \ SQ = 3 \ / \ 5$.If $PR =5.6$ cm then find PT.

3. In $\triangle$ ABC the angle bisector of angle A meets the side BC at D. If $BD =2.5$ cm, and $AB =5$cm and $AC=4.2$ CM then find DC.

4. In $\triangle$ ABC AE is the external bisector of angle A meeting BC produced at E If $AB =10$ cm,

AC = 6 cm and BC = 12 cm then find CE.

5 In triangle △ ABC, DE || BC and AD = 6 cm, DB = 9 cm and AE = 8 cm then find AC.

6 In triangle △ ABC, DE || BC and AD = 8 cm, AB = 12 cm and AE = 12 cm then find CE

7 In the figure AP = 3 cm , AR = 4.5 cm , AQ = 6 cm and AE = 12 cm then find the length of

AD .
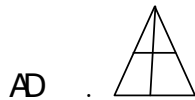
8. In △ ABC , AD is the internal bisector of angle A meeting BC at D. .

i. BD = 2 cm, AB = 5 cm, DC = 3 cm find AC

ii. AB = 5.6 cm, AC = 6 cm, DC = 3 cm find BC.

9. Check whether AD is the bisector of angle A △ ABC in each of the following.

. i. AB = 4 cm, AC = 6 cm, BD = 1.6 cm and CD = 2.4 cm

ii. AB = 6 cm, AC = 8 cm , BD = 1.5 cm and CD = 3 cm

10. In triangle △ PQR , AB || QR, If AB = 3 cm, PB = 2 cm PR = 6 cm find the length of QR.

11. P and Q are points on the side AB and AC respectively, of △ ABC If. AP = 3cm, PB = 6cm, AQ = 5 cm and QC = 10 cm show that BC = 3 PQ

12. The lengths of three sides of a triangle △ ABC are 6 cm , 4 cm , 9 cm. △ ABC ~ △ PQR One of the length of sides of △ PQR is 35 cm. What is greatest perimeter possible for △ PQR

13. In the figure , DE || BC and AD / BD = 3 / 5 calculate the value of

i) .area of △ ADE / area of △ ABC ii. Area of trapezium BCED / area of △ ABC

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7.TRIGONOMETRY

1. Prove that $\sin\theta / \text{cosec}\theta + \cos\theta /\sec\theta = 1$.

2. Prove that $\sqrt{1-\cos\theta} / 1+\cos\theta = \text{cosec }\theta - \cot\theta$

3. Prove that $\sec^2\theta + \text{cosec}^2\theta = \sec^2\theta \cdot \text{cosec}^2\theta$.

4. Prove that $\sin\theta / 1- \cos\theta = \text{cosec }\theta + \cot\theta$

5. Prove that $\sqrt{1- \sin\theta / 1+ \sin\theta} = \sec\theta - \tan\theta$

6. Prove that $\cos\theta / \sec\theta - \tan\theta = 1+ \sin\theta$

7. Prove that $\sqrt{\sec^2\theta + \text{cosec}^2\theta} = \tan\theta + \cot$.

8. Prove that $\sin\theta / \text{cosec }\theta + \cot\theta = 1-\cos\theta$.

9. Prove that $\sec\theta (1- \sin\theta) (\sec\theta + \tan\theta) =$

10. A kite is flying with a string of length 200m.If the thread makes an angle $30^°$ with the ground. Find the distance of the kite from the ground level.(Here that the string is along a straight line)

11. A ladder leaning against a vertical wall , makes an angle of $60^°$ with the ground. The foot of the ladder is 3.5 m away from the wall. Find the length of the ladder.

12. Find the angular elevation (angle of elevation from the ground level) of the sun when the length of the shadow of a 30m long pole is10√3 m.

13. A ramp for unloading a moving truck , has an angle of elevation $30^°$. If the top of the ramp is 0.9m above the ground level, then find the length of the ramp.

14. A girl of height 150cm stands in front of a lamp-post and casts s shadow of length 150√ 3 cm on the ground. Find the angle of the elevation of the top of the lamp-post.

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8. MENSURATION

1. A solid right circular cylinder has radius 7 cm and height 20cm.Find its i). Curved surface area

   ii) total surface area.

2. A solid right circular cylinder has radius 14 cm and height 8cm.Find its i). Curved surface area

   ii) total surface area.

3. Radius and slant height of a solid circular cone are 35cm and37cm. Find the curved surface area and total surface area of the cone

4. Radius and height of a solid circular cone are 7cm and24cm. Find the curved surface area and total surface area of the cone

5. The radii of two right circular cylinders are in the ratio 3:2 and their heights are in the ratio 5:3 Find the ratio of their curved surface areas..

6. If the vertical angle of and the radius of a right circular cone are $60°$ and 15cm respectively. Then find its height and slant height.

7. If the circumference of the base of a right circular cone is 236 cm and its slat height is 12cm, find its curved surface area.

8. Radii of two solid hemispheres are in the ratio 3:5 Find their ratio of their curved surface areas and ratio of their total surface areas.

9. If the curved surface area of a right circular cylinder is 704sq.cm.and height is 8cm, find the volume of the cylinder in litres.

10. Find the volume of a sphere shaped metallic shot put having diameter 8.4 cm.

11. Find the volume of a solid cylinder whose radius is 14 cm and height 30 cm.

12. The radii of two right circular cylinders are in the ratio 2:3. Find the ratio of their volumes if their heights are in the ratio 5:3.

13. The volume of a solid hemisphere is 1152π c.cm Find its curved surface area

14. The total surface area of a solid hemisphere is 675sq.cm. Find its radius.

15. The total surface area of a solid hemisphere is 98.56sq.cm. Find its radius.

16. The outer and the inner radii of a hollow sphere are 12cmand 10cm. Find its volume.

11.STATISTICS

1. Find the range and the coefficient range of 43,24,38,56,22,39,45

2. The largest value in a collection of data is 7.44 .If the range is 2.26 then find the smallest value in the collection.

3. Find the range and the coefficient range of 59,46,30,23,27,40,52,35,29

4 The smallest value in a collection of data is 12 .If the range is 59 then find the largest value in the collection.

5. Find the standard deviation of the first 10 natural numbers..

6. Find the standard deviation of the first 13 natural numbers.

7. If the coefficient of variation of data is 57 and standard deviation is 6.84

8. The standard deviation of 20 observations is $\sqrt{5}$. If each observation is multiplied by 2, and the standard deviation and variance of resulting observations.

9. The coefficient of variations of two series are 58 and 69. Their standard deviations are 31.2 and 15.6. What are their arithmetic means?.

10. A group of 100 candidates have their average height 163.8cm with coefficient of variation 3.2. What is the standard deviation of their heights?.

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12. PROBABILITY

1. A fair die is rolled. Find the probability of getting an even number?.

2 .In tossing a fair coin twice, find the probability of getting atleast one head ?.

3. An integer is chosen from the first twenty natural numbers. What is the probability that is a prime number?.

4. The probability that it will rain on a particular day is 0.76. What is the probability that it will not rain on a day?.

5. Two coins are tossed together. What is the probability of getting atmost one head?.

6. A ticket is drawn from a bag containing 100 tickets. The tickets are numbered from one to hundred. What is the probability of getting a ticket with a number is divisible by 10?.

7. Three dice are thrown simultaneously. Find the probability of getting the same number on all the three dice.

8. If A is an event of a random experiment such that $P(A):P(\bar{A}) = 7:12$,then find P(A).

9. If A and B are mutually exclusive events such that P(A) = 3 / 5 and P(B) = 1 / 5

 Then find P(AUB).

10. If A and B are two events such that P(A) = 1 / 4 , P(B) = 2 / 5 and P(AUB) = 1 / 2

Then find P(∩ B).

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B.T ASST MATHS

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