ARUTHRAA VIDYALAYA MATRICULATION HIGHER SECONDARY SCHOOL, PERAMBALUR -621 220.
SUB TEST VII - (2015-2016)

CLASS : X (A & B) **MARKS: 100**

SUBJECT : MATHEMATICS **TIME : 2.30hrs**

SECTION-I

Note: (i) Answer ALL the 15 questions. **15 X 1 = 15**

(ii) Choose the correct answer from the given four alternatives and Write the option code and the corresponding answer.

1. If { (7, 11), (5, a) } represents a constant function, then the value of 'a' is _____
   (a) 7 (b) 11 (c) 5 (d) 9
2. The common ratio of the G.P. a^{m-n} , a^m, a^{m+n} is_____
   (a) a^m (b) a^{-m} (c) a^n (d) a^{-n}
3. The 8th term of the sequence 1, 1, 2, 3, 5, 8, ……. Is _____
   (a) 25 (b) 24 (c) 23 (d) 21
4. The remainder when $x^2 - 2x + 7$ is divided by $x+4$ is _____
   (a) 28 (b) 29 (c) 30 (d) 31
5. If the system $6x-2y=3$, $kx-y=2$ has a unique solution , then _____
   (a) k=3 (b) k≠3 (c) k=4 (d) k≠4
6. If $\begin{bmatrix} 5 & x & 1 \end{bmatrix} \begin{pmatrix} 2 \\ -1 \\ 3 \end{pmatrix} = \begin{bmatrix} 20 \end{bmatrix}$, then the value of x is _____
   (a) 7 (b) -7 (c) $\frac{1}{7}$ (d) 0
7. The point of intersection of the straight lines $y = 0$ and $x = -4$ is _____
   (a) (0 , -4) (b) (-4 , 0) (c) (0 ,4) (d) (4 , 0)
8. The angle of inclination of a straight line parallel to x-axis is equal to _____
   (a) 0^0 (b) 60^0 (c) 45^0 (d) 90^0
9. $\triangle ABC$ is a right angled triangle where $B = 90^0$ and $BD \perp AC$. If BD = 8 cm, AD = 4 cm, then CD is _____
   (a) 24 cm (b) 16 cm (c) 32 cm (d) 8 cm
10. The perimeter of two similar triangles $\triangle ABC$ and $\triangle DEF$ are 36 cm and 24 cm Respectively . If DE = 10 cm, then AB is _____
    (a) 12 cm (b) 20 cm (c) 15 cm (d) 18 cm
11. $\cos^4 x - \sin^4 x$ = _____
    (a) $2\sin^2 x - 1$ (b) $2\cos^2 x - 1$ (c) $1 + 2\sin^2 x$ (d) $1 - 2\cos^2 x$
12. $9\tan^2\theta - 9\sec^2\theta$ = _____
    (a) 1 (b) 0 (c) 9 (d) –9
13. If the diameter and height of a right circular cone are 12 cm and 8 cm respectively, then the slant height is _____
    (a) 10 cm (b) 20 cm (c) 30 cm (d) 96 cm
14. Mean and standard deviation of a data are 48 and 12 respectively. The coefficient of variation is _____
    (a) 42 (b) 25 (c) 28 (d) 48
15. If $P(A) = 0.25$, $P(B) = 0.50$, $P(A \cap B) = 0.14$ then P(neither A nor B) = _____
    (a) 0.39 (b) 0.25 (c) 0.11 (d) 0.24

SECTION – II

Note: (i) Answer 10 questions. **10X2 =20**

(ii) Question number 30 is COMPULSORY . select ANY 9 questions from the First 14 questions.

16. Let P={ a , b , c } , Q= { g , h , x , y } and R = { a , e , f , s } .Find the R\(P∩Q)

17. A = { -2 , -1 , 1 , 2 } and f = $\{ (x, \frac{1}{x}) : x \in A \}$. Write down the range of f . Is f a function from A to A ?

18. The 10^{th} and 18^{th} terms of an A.P. are 41 and 73 respectively. Find the 27^{th} term .

19. Find a quadratic polynomial with zeros at $x = \frac{1}{4}$ and x = -1 .

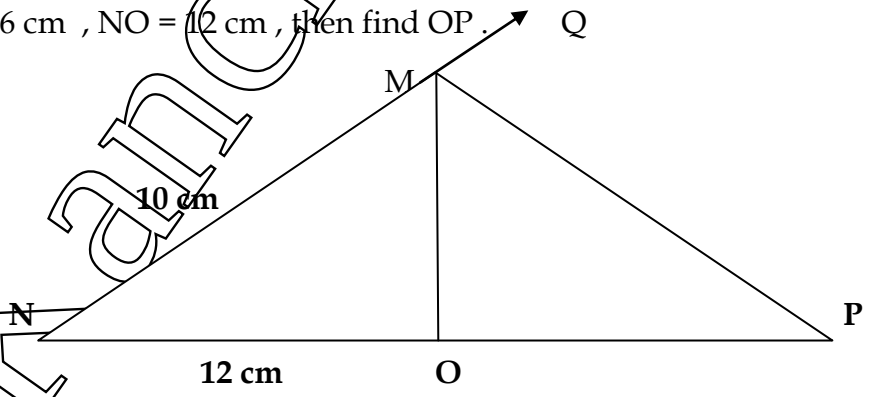
20. Construct a 3X2 matrix A =[a_{ij}] whose elements $a_{ij} = \frac{|2i-3j|}{2}$

21. Find the product of the matrices , $\begin{pmatrix} 3 & -2 \\ 5 & 1 \end{pmatrix} \begin{pmatrix} 4 & 1 \\ 2 & 7 \end{pmatrix}$

22. Show that the straight lines 3x -5y +7=0 and 15x+9y+4=0 are perpendicular .

23. Find the point which divides the line segment joining the points (3 , 5) and (8 , 10) internally in the ratio 2 : 3 .

24. In a △ MNO , MP is the external bisector of ∠M meeting NO produced at P . If MN = 10 cm , MO= 6 cm , NO = 12 cm , then find OP .



25. A ladder leaning against a vertical wall , makes an angle of 60^0 with the ground . The foot of the ladder is 3.5 m away from the wall . Find the length of the ladder .

26. Radius and slant height of a cone are 20 cm and 29 cm respectively . Find its volume .

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

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

29. Two coins are tossed together. What is the probability of getting at most one head .

30. (a) Form the quadratic equation whose roots are $7+\sqrt{3}$ and $7-\sqrt{3}$ (Or)

(b) Prove the identity ($\sin^6\theta + \cos^6\theta$) = $1 - 3\sin^2\theta\cos^2\theta$

SECTION –III

Note : (i) Answer 9 questions. **9X5=45**

(ii) Question number 45 IS COMPULSORY . select ANY 8 questions

From the first 14 questions .

31. Let U = { -2 , -1 , 0 , 1 , 2 , 3 , ……10 } , A= { -2 , 2 , 3 , 4 , 5 } and B = { 1 , 3 , 5 , 8 , 9 }. Verify De Morgan's laws of complementation .

32. A function f: [-7 , 6) ⟶ R is defined as follows

$$f(x) = \begin{cases} X^2+2x+1; & -7 \le x < -5 \\ x + 5 \ ; & -5 \le x \le 2 \\ x - 1 \ ; & 2 < x < 6 \end{cases}$$

(i) 2 f (-4) + 3 f (2) (ii) f (-7) – f (-3) (iii) $\frac{4f(-3)+2f(4)}{f(-6)-3f(1)}$

33. If S_1 , S_2 and S_3 are the sum of first n , 2n , 3n terms of a geometric series respectively , then prove that $S_1 (S_3 - S_2) = (S_2 - S_1)^2$.

34. Find the square root of the polynomial $4x^4 + 8x^3 + 8x^2 + 4x + 1$

35. The speed of a boat in still water is 15 km/hr . it goes 30 km upstream and return downstream to the original point in 4 hrs 30 minutes . Find the speed of the stream .

36. If α and β are roots of the equation $3x^2 - 4x + 1 = 0$, form a quadratic equation whose roots are $\frac{\alpha^2}{\beta}$ and $\frac{\beta^2}{\alpha}$.

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

38. Find the equation of the straight lines passing through the point (2 , 2) and the sum of the intercepts is 9 .

39. Find the area of the quadrilateral vertices are (-3 , 4) , (-5 , -6), (4 , -1),and (1 , 2).

40. Prove that Pythagoras theorem .

41. A flag post stands on the top of a building . From a point on the ground , the angles of elevation of the top and bottom of the flag post are 60^0 and 45^0 respectively . If the height of the flag is 10 m , Find the height of the building ($\sqrt{3} = 1.732$)

42. A circus tent is to be erected in the form of a cone surmounted on a cylinder. The total height of the tent is 49 m. Diameter of the base is 42 m and height of the cylinder is 21 m. Find the cost of canvas needed to make the tent, if the cost of canvas is Rs.12.50/m2 . (Take $\pi = \frac{22}{7}$)

43. Prove that the standard deviation of the first n natural number is $\sigma = \sqrt{\frac{n^2-1}{12}}$

44. Three coins are tossed simultaneously. Using addition theorem on probability , Find the Probability that either exactly two tails or at least one head turn up.

45. (a) Find the sum of first n terms of the series. 7 + 77 + 777 + …… (Or)

(b) Using clay . a student made a right circular cone of height 48cm and base radius 12 cm . Another student reshapes it in the form of a sphere . Find the radius of the sphere

SECTION –IV

Note : Answer BOTH the questions choosing either of the alternatives. 2X10=20

46. (a). Draw a circle of radius 3 cm. From an external point 7 cm away from its centre, construct the pair of tangents to the circle and measure their lengths.

(or)

(b). Construct a cyclic quadrilateral ABCD where AB = 7 cm, $m\angle A = 80^0$, AD = 4.5 cm and BC = 5 cm.

47. (a). Draw the graph of $y = 2x^2$ and hence solve $2x^2 + x - 6 = 0$

(or)

(b). The cost of the milk per liter is 15. Draw the graph for the relation between the quantity and cost . Hence find

(i)The proportionality constant. (ii)the cost of 3 liters of milk