SUBJECT: MATHS   STD - X   MARKS : 100

I) Answer all the questions   14 x 1 = 14
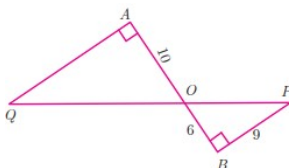
1. If the ordered pairs (a+2,4) and (5,2a+b) are equal then (a,b) is
   (a) (2, -2)   (b) (5,1)   (c) (2,3)   (d) (3, -2)

2. The sum of the exponents of the prime factors in the prime factorization of 1729 is
   (a) 1   (b) 2   (c) 3   (d) 4

3. If the mean and coefficient of variation of a data are 4 and 87.5% then the standard deviation is
   (A) 3.5   (B) 3   (C) 4.5   (D) 2.5

4. The slope of the line which is perpendicular to a line joining the points (0,0) and (–8,8) is
   (A) –1   (B) 1   (C) 13   (D) -8A

5. If {(a, 8), (6, b)} represents an identity function, then the value of a and b are respectively
   (A) (8,6)   (B) (8,8)   (C) (6,8)   (D) (6,6)

6. Variance of first 20 natural numbers is
   (A) 32.25   (B) 44.25   (C) 33.25   (D) 30

7. If (5,7), (3,p) and (6,6) are collinear, then the value of p is
   (A) 3   (B) 6   (C) 9   (D) 12

8. $\tan \Theta \csc^2\Theta - \tan \Theta$ is equal to
   (A) $\sec\Theta$ (B) $\cot^2\Theta$ (C) $\sin \Theta$ (D) $\cot \Theta$

9. If the ratio of the height of a tower and the length of its shadow is $\sqrt{3}:1$, then the angle of elevation of the sun has measure
   (A) 45°   (B) 30°   (C) 90°   (D) 60°

10. The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
   (A) 1:2:3   (B) 2:1:3   (C) 1:3:2   (D) 3:1:2

11. The total surface area of a hemi-sphere is how much times the square of its radius.
   (A) π (B) 4π (C) 3π (D) 2π

12. A tangent is perpendicular to the radius at the
   (A) centre   (B) point of contact   (C) infinity   (D) chord

13. In $\triangle$LMN, $\angle$ L = 60°, $\angle$ M = 50°. If$\triangle$LMN ~$\triangle$PQR then the value of $\angle$R is
   (A) 40°   (B) 70°   (C) 30°   (D) 110°

14. Which of the following should be added to make $x^4 + 64$ a perfect square
   (A) $4x^2$ (B) $16x^2$ (C) $8x^2$ (D) $-8x^2$

II) Answer any 10 questions. Question No.28 is Compulsory.   10 x 2 = 20

15. Let A = {1,2,3} and B = {x | x is a prime number less than 10}. Find A x B and B x A

16. If f (x) = 3x - 2, g (x) = 2x + k and if f o g = g o f, then find the value of k.

17. Find the sum of first six terms of the G.P. 5, 15, 45, …

18. In an A.P. the sum of first n terms is $(5n^2/2) + (3n/2)$. Find 17th Term.

19. Simplify [x(x+1)/x-2] + [x(1-x)/x-2]

20. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$

21. In Fig., QA and PB are perpendiculars to AB. If AO = 10 cm, BO=6 cm and PB=9 cm. Find AQ.

22. D and E are respectively the points on the sides AB and AC of a $\triangle$ABC such that AB = 5.6 cm, AD = 1.4 cm, AC = 7.2 cm and AE = 1.8 cm, show that DE || BC .

23. Find the equation of a line passing through (6,–2) and perpendicular to the line joining the points (6,7) and (2,–3).

24. Find the equation of a line passing through the point (3, -4) and having slope -5/7

25. Prove that $\frac{SinA}{1+CosA} + \frac{SinA}{1-CosA} = 2cosecA$

26. A kite is flying at a height of 75 m above the ground. The string attached to the kite is temporarily tied to a point on the ground. The inclination of the string with the ground is 60°. Find the length of the string, assuming that there is no slack in the string.

27. If the total surface area of a cone of radius 7cm is 704 cm2, then find its slant height.

28. Solve $5x \equiv 4$ (mod 6)

III) Answer any 10 questions. Question No.42 is Compulsory.   10 x 5 = 50

29. Let f : A → B be a function defined by f(x) = (x/2) – 1, where A = {2, 4, 6, 10, 12}, B = {0, 1, 2, 4, 5, 9} represent f by i) set of ordered pairs ii) a table iii) an arrow diagram iv) a graph

30. State and Prove Angle Bisector theorem

31. Find the sum to n terms of the series 0.4 + 0.44 + 0.444 + … to n terms

32. Solve (x/2) – 1= (y/6)+1 = (z/7)+ 2 ; (y/3)+(z/2) =13

33. If α and β are the roots of x²+7x+10 =0 find the values of 1) $\alpha-\beta$ 2) $\frac{\alpha}{\beta}+\frac{\beta}{\alpha}$ 3) $\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}$

34. State and Prove Pythagoras theorem.

35. A cylindrical glass with diameter 20 cm has water to a height of 9 cm. A small cylindrical metal of radius 5 cm and height 4 cm is immersed completely. Calculate the raise of the water in the glass?

36. A capsule is in the shape of a cylinder with two hemisphere stuck to each of its ends. If the length of the entire capsule is 12 mm and the diameter of the capsule is 3 mm, how much medicine it can hold?

37. A man is watching a boat speeding away from the top of a tower. The boat makes an angle of depression of 60° with the man's eye when at a distance of 200 m from the tower. After 10 seconds, the angle of depression becomes 45°. What is the approximate speed of the boat (in km / hr), assuming that it is sailing in still water? ($\sqrt3$ = 1.732)

38. Find the GCD of $6x^3$ - 30x² + 60x - 48 and $3x^3$- 12x² + 21x - 18

39. Two dice are rolled together. Find the probability of getting a doublet or sum of faces as 4.

40. If A = $\begin{matrix} a & b \\ c & d \end{matrix}$ and I = $\begin{matrix} 1 & 0 \\ 0 & 1 \end{matrix}$ Show that A² - (a + d) A = (bc - ad) I_2

41. The marks scored by 10 students in a class test are 25, 29, 30, 33, 35, 37, 38, 40, 44, 48. Find the standard deviation.

42. Find the equation of a line through the given pair of points (2,3) and (7,-1)

IV) Answer all the Questions   2 x 8 = 16

43. a) Draw the two tangents from a point which is 5 cm away from the centre of a circle of diameter 6 cm. Also, measure the lengths of the tangents.

<div align="center">OR</div>

b) Construct a △ABC such that AB = 5.5 cm, ∠ C = 25° and the altitude from C to AB is 4 cm.

44. a) Draw the graph of y = 2x² - 3x - 5 and hence solve 2x² - 4x - 6 = 0

<div align="center">OR</div>

b) Nishanth is the winner in a Marathon race of 12 km distance. He ran at the uniform speed of 12 km/hr and reached the destination in 1 hour. He was followed by Aradhana, Jeyanth, Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3 km/hr and 2 km/hr. And, they covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hours respectively. Draw the speed-time graph and use it to find the time taken to Kaushik with his speed of 2.4 km/hr.