I. Choose The Correct Answer: 15X1=15

1. If { (x, 2), (4, y) } represents a identity function, then (x, y) is
  A) (2, 4)   B) (4, 2)   C) (2, 2)   D) (4, 4)

2. If $k + 2$, $4k – 6$, $3k – 2$ are three consecutive terms of an A.P, then the value of k is
  A) 2   B) 5   C) 4   D) 3

3. If the third term of a G.P, then $\dfrac{a - b}{b - c}$ is equal to
  A) 10   B) 15   C) 2^5 D) 5^2

4. On dividing $\dfrac{x^2-25}{X+3}$ by $\dfrac{x+5}{x^2-9}$ is equal to
  A) (x+5)(x-3)   B) (x+5)(x+3)   C) (x-5)(x-3)   D) (x-5)(x+3)

5. If α, β are the roots of $ax^2+bx+c=0$ a≠0, then the wrong statement is
  A) $\alpha+\beta=b/a$ B) $\alpha\beta=c/a$ C) $\alpha-\beta=\dfrac{b^2-4ac}{a}$ D) $\alpha^2+\beta^2=\dfrac{b^2-2ac}{a^2}$

6. If $\begin{pmatrix} a & 3 \\ 1 & 2 \end{pmatrix} \begin{pmatrix} 2 \\ -1 \end{pmatrix} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$, then the value of a is
  A) 2   B) 4   C) 11   D) 8

7. If a straight line y=2x+k passes through the point (1, 2), then the value of K is equal to
  A) 5   B) -3   C) 4   D) -8

8. The angle of inclination of a straight line parallel to x-axis is equal to
  A) 90° B) 45° C) 60° D) 0°

9. In the figure, if ∠PAB = 120^0 then ∠BPT=
  A) 120^0 B) 30^0 C) 40^0 D) 60^0

10. If two circles touch internally. The distance between their centres is equal to
  A) bigger radius   B) sum of their radii   C) smaller radius   D) difference of their radii

11. $\dfrac{Sin\theta}{1-cos\theta}$ =
  A) cosecθ - cotθ   B) secθ - tanθ   C) cosecθ + cotθ   D) 1

12. In the adjoining figure, sinθ=15/17, then BC
  A) 95m   B) 65m
  C) 85m   D) 75m

13. Radius and height of a right circular cone and that of a right circular cylinder are equal. If the volume of the cylinder is $120cm^2$, then the volume of the cone is equal to
  A) $360cm^3$ B) $1200cm^3$ C) $90cm^3$ D) $360cm^3$

14. For any collection of n items, $\sum(x - \overline{x})$ =
  A) 0   B) $(n – 2) \overline{x}$ C) $n \overline{x}$ D) $(n – 1) \overline{x}$

15. The probabilities of three mutually exclusive events A, B and C are given by 1/3, 1 /4 and 5/12. Then P(A $\cup$ B $\cup$ C) is
  A) 7/12   B) 1   C) 19/12   D) 11/12
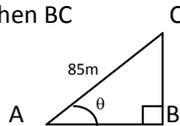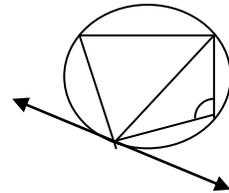
II. Answer any 9 out of 14 (Q.NO:16 to 29) and 30th question is compulsory: 10X2 = 20

16. For A = { x/x is a prime factor of 42 }, B = { x/5< x ≤12,x£N } and C = { 1,4,5,6 }, verify A $\cup$ (B $\cup$ C) = (A $\cup$ B) $\cup$ C.

17. 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 type of function.

18. If a person joins his work in 2010 with an annual salary of Rs.30, 000 and receives an annual increment of Rs.600 every year, in which year, will his annual salary be Rs.39, 000?

19. Find the square root of $x^6 + \dfrac{1}{X^6} - 2$

20. Solve using quadratic formula: $15x^2 – 11x + 2 = 0$

21. If A= $\begin{pmatrix} 1 & -1 & 3 & 2 \\ 5 & -4 & 7 & 4 \\ 6 & 0 & 9 & 8 \end{pmatrix}$, (i) find the order of the matrix (ii) write down the elements a_{24} and a_{32}
  (iii) in which row and column does the element 7 occur?

22. Solve for x and y if $\begin{bmatrix} x^2 \\ Y^2 \end{bmatrix} + 3 \begin{bmatrix} 2x \\ -y \end{bmatrix} = \begin{bmatrix} -9 \\ 4 \end{bmatrix}$

23. Find the slope of the line which passes through the origin and the midpoint of the line segment joining the points (0, -4) and (8, 0).

24. In a ∆ABC, AD is the internal bisector of ∠A, meeting BC at D. If AB= 5.6cm, AC= 6cm, and DC= 3cm find BC.

25. If $x = a \tan \theta + b \tan \theta$ and $y = a \tan \theta + b \sec \theta$, then prove that $x^2 - y^2 = a^2 - b^2$.

26. Find the angular elevation (angle of elevation from the ground level) of the sun when the length of the shadow of a 30 m long pole is $10\sqrt{3}$.

27. The central angle and radius of a sector of a circular disc are 180^0 and 21 cm. If the edges of the sector are joined together to make a hollow cone, then find the radius of the cone.

28. T.S.A of a solid hemisphere is 675π sq.cm. Find the C.S.A of the hemisphere.

29. Find the probability that a leap year selected at random will have only 52 Fridays.

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

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

b) If n = 10, $\bar{x}$ = 12 and $\sum x^2$ = 1530, then calculate the coefficient of variation.

III. Answer any 8 out of 14 (Q.NO:31 to 44) and 45th question is compulsory:　　　　9X5 = 45

31. Given that U= { a,b,c,d,e,f,g,h }, A= { a,b,f,g }, B= { a,b,c }, verify De Morgan's laws of complementation.

32. An advertising agency finds that, of its 170 clients, 115 use television, 110 use radio and 130 use magazines. Also, 85 use television and magazines, 75 use television and radio, 95 use radio and magazines, 70 use all the three. Find i) How many do not use any of the three?　　ii) How many use two types only?
iii) How many use television and magazine but not radio?　iv) How many use television but not magazine?

33. Find the value of k if $1^3 + 2^3 + 3^3 + \ldots + k^3 = 6084$

34. Solve: $\dfrac{2}{x} + \dfrac{2}{3y} = \dfrac{1}{6}$, $\dfrac{3}{x} + \dfrac{2}{y} = 0$

35. Find the L.C.M of $10(9x^2 + 6xy + y^2)$, $12(3x^2 - 5xy - 2y^2)$, $14(6x^4 + 2x^3)$.

36. If α and β are the roots of $5x^2 - px + 1 = 0$ and $\alpha - \beta = 1$, then find p.

37. If $A = \begin{pmatrix} 1 & -1 \\ 2 & 3 \end{pmatrix}$ then show that $A^2 - 4A + 5I_2 = 0$.

38. Find the area of the triangle formed by joining the mid points of the sides of a triangle whose vertices are (0, -1), (2, 1) and (0, 3). Find the ratio of this area to the area of the given triangle.

39. If the vertices of a $\triangle ABC$ are A (2, 1), B (6, -1) and C (4, 11). Find the equation of the straight line along the altitude from the vertex A.

40. A point O in the interior of a rectangle ABCD is joined to each of the vertices A, B, C, and D. Prove that $OA^2 + OC^2 = OB^2 + OD^2$

41. If $\sin\theta$, $\cos\theta$ and $\tan\theta$ are in G.P., then prove that $\cot^6\theta - \cot^2\theta = 1$.

42. The T.S.A. of a circular cylinder is 1540 cm^2. If the height is four times the radius of the base, then find the height of the cylinder.

43. For a collection of data, if $\sum x$ = 35, n = 5, $\sum(x-9)^2$ = 82, then find $\sum x^2$ and $\sum(x - \bar{x})^2$.

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) A container with a rectangular base of length 4.4 m and breath 2 m is used to collect a rain water. The height of the Water level in the container is 4 cm and the water is transferred into a cylindrical vessel with radius 40 cm. what Will be the height of the water level in the cylinder?

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

b) If $a^x = b^y = c^z$ and $b^2 = ac$, then show that 1/x, 1/y, 1/z are in A.P.

IV. Answer any one of the following :　　　　　　　　　　　　　10 X 1 =10

46. a) Draw a circle of radius 4.2 cm, and take any point of the circle. Draw the tangent at that point using the centre.

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

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

V) Answer any one of the following:　　　　　　　　　　　　　10x1 =10

47. a) Draw the graph of $y = 2x^2 + x - 6$ and hence solve $2x^2 + x - 10 = 0$.

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

b) A bank gives 10% S.I on deposits for senior citizens. Draw the graph for the relation between the Sum deposited and the interest earned for one year. Hence find
(i) The interest on the deposit of Rs.650　　　(ii) The amount to be deposited to earn an interest of Rs.45