

Answer Any 10 Questions : (Q.No 28 is compulsory).

15. A relation R is given by the set $\{(x, y)/y = x^2 + 3, x \in \{0, 1, 2, 3, 4, 5\}\}$. Determine domain and range.
16. Let f be a function from \mathbb{R} to \mathbb{R} defined by $f(x) = 3x - 5$. Find the values of a and b given that $(a, 4)$ and $(1, b)$ belongs to f .
17. Find the sum of $1 + 3 + 5 + \dots + 55$.
18. Find x so that $x + 6$, $x + 12$ and $x + 15$ are three consecutive terms of a Geometric progression.
19. Dividing the polynomial $p(x) = x^2 - 5x - 14$ by another polynomial $q(x)$ yields $\frac{x-7}{x+2}$, then find $q(x)$.
20. Determine the quadratic equation, whose sum and product of roots are $-\frac{3}{2}$ and -1 .
21. The line through the points $(-2, 6)$ and $(4, 8)$ is perpendicular to the line through the points $(8, 12)$ and $(x, 24)$. Find the value of x .
22. Find the equation of a line passing through the point $(-4, 3)$ and having slope $-\frac{7}{5}$.
23. Prove that $\frac{\cot A - \cos A}{\cot A + \cos A} = \frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}$.
24. The ratio of the radii of two right circular cones of same height is 1:3. Find the ratio of their curved surface area when the height of each cone is 3 times the radius of the smaller cone.
25. A solid sphere and a solid hemisphere have equal total surface area. Prove that the ratio of their volume is $3\sqrt{3}:4$.
26. The standard deviation of 20 observations is $\sqrt{6}$. If each observations is multiplied by 3, find the standard deviation and variance of the resulting observations.
27. A and B are two candidates seeking admission to IIT. The probability that A getting selected is 0.5 and the probability that both A and B getting selected is 0.3. Prove that the probability of B being selected is at most 0.8.
28. P and Q are points on sides AB and AC respectively of ΔABC . If $AP = 3\text{cm}$, $PB = 6\text{cm}$, $AQ = 5\text{cm}$ and $QC = 10\text{cm}$. Show that $BC = 3PQ$.

Answer Any 10 Questions : (Q.No 42 is compulsory).

29. The function ' t ' which maps temperature in Celsius (C) into temperature Fahrenheit (F) is defined by $t(C) = F$ where $F = \frac{9}{5}C + 32$. Find
 - (i) $t(0)$
 - (ii) The value of C when $t(C) = 212$
 - (iii) The temperature when the Celsius value is equal to the Fahrenheit value.
30. If $f: \mathbb{R} \rightarrow \mathbb{R}$ and $g: \mathbb{R} \rightarrow \mathbb{R}$ are defined by $f(x) = x^5$ and $g(x) = x^4$ then check if f and g are one-one and $f \circ g$ is one-one?
31. (i) Find the least positive value of x such that $67 + x \equiv 1 \pmod{4}$.
(ii) Solve $5x \equiv 4 \pmod{6}$.
32. A man repays a loan of Rs.65,000 by paying Rs.400 in the first month and then increasing the payment by Rs.300 every month. How long will it take for him to clear the loan.
33. Solve : $\frac{1}{2x} + \frac{1}{4y} - \frac{1}{3z} = \frac{1}{4}$; $\frac{1}{x} = \frac{1}{3y}$; $\frac{1}{x} - \frac{1}{5y} + \frac{4}{z} = 2\frac{2}{15}$
34. Find the LCM of the polynomials $a^2 + 4a - 12$, $a^2 - 5a + 6$ whose GCD is $a - 2$.

35. If $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 0 & 3 \\ -1 & 5 \end{pmatrix}$, $C = \begin{pmatrix} -1 & 5 \\ 1 & 3 \end{pmatrix}$, prove that $A(BC) = (AB)C$.
36. The hypotenuse of a right triangle is 6 m more than twice of the shortest side. If the third side is 2 m less than the hypotenuse, find the sides of the triangle.
37. The area of a triangle is 5sq.units. Two of its vertices are (2,1) and (3, - 2). The third vertex is (x, y) where $y = x + 3$. Find the coordinates of the third vertex.
38. As observed from the top of a 60m high light house from the sea level, the angle of depression of two ships are 28° and 45° . If one ship is exactly behind the other on the same side of the lighthouse, find the distance between the two ships. ($\tan 28^\circ = 0.5317$).
39. A shuttle cock used for playing badminton has the shape of a frustum of a cone is mounted on a hemisphere. The diameter of the frustum are 5cm and 2cm. The height of the entire shuttle cock is 7cm. Find its external surface area.
40. A cylindrical bucket 32 cm high and with radius of base 18 cm, is filled with sand completely. This bucket is emptied on the ground and a conical heap of sand is formed. If the height of the conical heap is 24 cm, find the radius and slant height of the heap.
41. The temperature of two cities A and B in a winter season are given below.

Temperature of city A (in degree Celsius)	18	20	22	24	26
Temperature of city B (in degree Celsius)	11	14	15	17	18

Find which city is more consistent in temperature changes?

42. A coin is tossed thrice. Find the probability of getting exactly two heads or at least one tail or two consecutive heads.

PART – D

2x8=16

Answer All The Questions :

43. a) Construct a ΔPQR in which $PQ = 8 \text{ cm}$, $\angle R = 60^\circ$ and the median RG from R to PQ is 5.8 cm. Find the length of the altitude from R to PQ. **(OR)**
- b) Take a point which is 11 cm away from the centre of a radius 4 cm and draw two tangents to the circle from the point.
44. a) Draw the graph of $y = 2x^2$ and hence solve $2x^2 - x - 6 = 0$. **(OR)**
- b) Draw the graph of $y = x^2 + x - 2$ and use it to solve $x^2 + x - 2 = 0$.

ALL THE BEST

Prepared By :

K.MOHAN, M.Sc., B.Ed., M.Phil.,
P.G Assistant in Mathematics,
SRK Garden M.Hr.Sec.School,
Paradarami, Gudiyatham, Vellore (Dt).