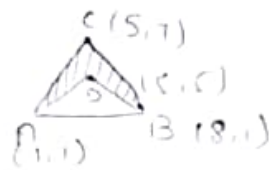


X - MATHEMATICS

2m, 3m COMPULSORY ANALYSIS QUESTIONS

- 1) Let $A = \{0, 1\}$, $B = \{0, 1\}$, $C = \{0, 1\}$. find $A \times B \times C$
- 2) Let $A = \{1, 2, 3\}$ and $B = \{a, b\}$. Write any two functions from A to B in the form of set of ordered pairs.
- 3) Find the G.P in which 2nd term is $\sqrt{6}$ and the 6th term is $9\sqrt{6}$
- 4) A metallic sheet in the form of sector of a circle of radius 21 cm has central angle of 216° . The sector is made into a cone by bringing the bounding radii together. Find the volume of the cone formed.
- 5) Find the diameter as well as radius of a sphere whose surface area is 154 m^2
- 6) Find the volume of a cylinder whose height is 2m and base area is 250 m^2
- 7) The roots of the equation $x^2 + 6x - 4 = 0$ are α, β . Find the quadratic equation whose roots are
 - i) α^2 and β^2
 - ii) $2/\alpha$ and $2/\beta$
 - iii) $\alpha\beta$ and $\beta^2\alpha$
- 8) The volume of the sphere is numerically equal to its surface area. find its diameter.
- 9) The TSA of cone of radius 7cm is 704 cm^2 . Find height.
- 10) Find x if $gf(x)$ and $fg(x)$. Given $f(x) = 3x + 1$ and $g(x) = x + 3$
- 11) The distance s an object travels under the influence of gravity in a time t seconds is given by $s(t) = \frac{1}{2}gt^2 + at + b$ where g is the acceleration due to gravity a, b are constant. Verify whether the functions $s(t)$ is one-one or not.
- 12) Let $A = \{x \in \mathbb{N} : 1 < x < 4\}$. $B = \{x \in \mathbb{W} : 0 \leq x < 2\}$ verify the distributive property of a cartesian product over union and intersection respectively.
- 13) Show that the square of an odd integer is the form $4q + 1$, for some integer q .

- 14) A passenger train takes 1 hr more than an express train to travel a distance of 240 km from Chennai to Virudhachalam. The speed of passenger train is less than that of an express train by 20 km per hour. Find the average speed of both the train.
- 15) Calculate the weight of a hollow brass sphere if the inner diameter is 14 cm and thickness is 1 mm and whose density is 17.3 g/cm^3 .
- 16) Find the sum to n terms of the series $7 + 11 + 17 + \dots$.
- 17) Find the equation of a straight line parallel to $y = 2x + 3$ passing through the point of intersection of the line $4x + 5y = 13$ and $x - 8y + 9 = 0$.
- 18) A capsule is in a shape of a cylinder with the 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 2 mm. How much medicine it can hold?
- 19) If $P(A) = 0.37$, $P(B) = 0.42$, $P(A \cap B) = 0.09$, find $P(A \cup B)$.
- 20) If the area of the triangle formed by the vertices $A(-1, 2)$, $B(k, -2)$ and $(7, 4)$ taken in order is 22 sq units. Find the value of k .
- 21) If -4 is a root of the equation $x^2 + px - 4 = 0$ and if the equation $x^2 + px + q = 0$ has equal roots. Find the values of p and q .
- 22) Find the intercepts made by the line $4x - 9y + 36 = 0$ on the coordinate axis.
- 23) An industrial metallic bucket is in the shape of the frustum of a right circular cone whose top and bottom of diameters are 10 m and 4 m and whose height is 4 m. Find the curved and total surface area of the bucket.
- 24) If the polynomial $25x^4 - 10x^3 + ax^2 + bx + 81$ is a perfect square then find the value of a and b .
- 25) If the straight lines $12y = -(p+3)x + 12$, $12x - 7y = 16$ are perpendicular then find p .
- 26) Let $f = \{(x, y) \mid x, y \in \mathbb{N} \text{ and } y = 2x\}$ be a relation on \mathbb{N} . Find the domain, codomain and range. Is this relation a function?

- 27) The frustum shaped outer portion of the table lamp has to be painted including the top part. Find the total cost of painting the lamp if the cost of painting 1 sq. cm is Rs 2
- 28) What will be the probability that a leap year will have 53 Saturdays?
- 29) The radius of a sphere increases by 25%. Find the percentage increase in its surface area.
- 30) A triangular shaped glass with vertices at A(-5, 4), B(1, 6) and C(7, -4) has to be painted. If one bucket of paint covers 6 square feet how many buckets of paint will be required to paint the whole glass if only one coat of paint is applied.
- 31) In two concentric circles, a chord of length 6 cm of the larger circle becomes a tangent to the smaller circle whose radius is 6 cm. Find the radius of the larger circle.
- 32) A line makes positive intercepts on coordinate axes whose sum is 7 and it passes through (-3, 8). Find its equation.
- 33) Given that $A = \{x/x \text{ is a prime factor of } 42\}$, $B = \{x/0 \leq x < 2, x \in \mathbb{W}\}$, $C = \{1, 4, 5\}$. Verify the distributive property of cartesian product over union.
- 34) The number of volleyball games that must be scheduled in a league with n teams is given by $G(n) = \frac{n^2 - n}{2}$ where each team plays with every other team exactly once. A league schedules 15 games. How many teams are in the league?
- 35) Find the equation of a straight line through the intersection of lines $5x - 6y = 2$, $3x + 2y = 0$ and perpendicular to the line $4x - 7y + 13 = 0$.
- 36) Find the quadratic equation whose roots are $3 + \sqrt{7}$ and $3 - \sqrt{7}$.
- 37) Prove that $\frac{\sec \theta}{\sin \theta} = \frac{\sin \theta}{\cos \theta} = \csc \theta$.
- 38) Find the area of the shaded region.
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- 39) Example 6.3.3
- 40) Two dice are rolled together. Find the probability of

getting a doublet?

- 41) Find LCM $x^3 - 27$, $(x-3)^2$, $x^2 - 9$
- 42) Two ships are sailing in the sea on either side of a lighthouse. The angles of depression of two ships as observed from the top of the lighthouse are 60° and 45° respectively. If the distance between the ships is $200 \left[\frac{\sqrt{3}+1}{\sqrt{3}} \right]$ meters find the height of lighthouse
- 43) State Ceva's theorem
- 44) Find the zeros of the quadratic expression $x^2 + 2x - 143$
- 45) If the 4th and 7th term of a GP are 54 and 1458 respectively. Find the geometric progression
- 46) Find the number of spherical lead shots, each of diameter 6cm that can be made from a solid cuboid of lead having dimensions 24cm \times 22cm \times 12cm
- 47) Find the image of point (3, 8) with respect to the line $x + 3y = 7$ assuming the line to be added plane mirror
- 48) Solve the following quadratic equation by completing the square method $5x^2 + 7/x - 1 = 3x + 2$
- 49) A coin is tossed thrice. What is the probability of getting exactly one head?
- 50) If the roots of $(a-b)x^2 + (b-c)x + (c-a) = 0$ are equal, prove that $2a = b+c$
- 51) The base of a triangle is 4cm longer than its altitude. If the area of a triangle is 48 sq. cm, then find its base and altitude
- 52) Find the volume of iron used to make a hollow cylinder of height 9cm and whose internal and external radii are 3cm and 5cm respectively
- 53) The height of two right circular cones are in the ratio 1:2 and the perimeters of their bases are in the ratio 3:4. Find the ratio of their volume
- 54) If the equation $(1+m^2)x^2 + 2mcx + (c^2 - a^2) = 0$ has equal roots, then prove that $c^2 = a^2(1+m^2)$
- 55) Find the value of x , in $x^2 - 4x - 12$
- 56) A cat is located at the point $(-6, -14)$ in xy plane

A bottle of milk is kept at (5, 11). The cat wish to consume the milk travelling through shortest possible distance Find the equation of the path it needs to take its milk

57) If $P = \frac{x}{x+y}$, $Q = \frac{y}{x+y}$ then find $\frac{1}{P^2 - Q^2}$

All The Best

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