e-Edge Education Centre

2. Polynomials

In this topic Questions are divided in three parts:

1. **Multiple Choices Question (Total Questions-07)**
2. **Numerical Questions (Total Questions-10)**

Multiple Choice Questions (Total Questions-14)

(Q.1) If $P=\frac{x^3+y^3}{(x-y)^2+3xy}$, $Q=\frac{(x+y)^2-3xy}{x^3-y^3}$ and $R=\frac{xy}{x^2-y^2}$ then the value of $(P\div Q)\times R$ is

(A) x + y (B) x y (C) x – y (D) $\frac{x}{y}$.

(Q.2) Simplify: $\frac{(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3}{(a-b)^3+(b-c)^3+(c-a)^3}$.

(A) 3(a + b) (b + c) (c + a) (B) 2(a + b) (b + c) (c + a)
(C) (a + b) (b + c) (c + a) (D) 1

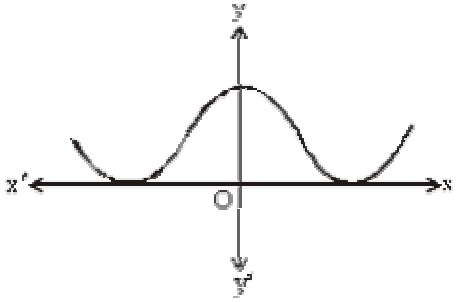
(Q.3) If $f(x)=x^2+5x+p$ and $g(x)=x^2+3x+q$ have a common factor, then $(p-q)^2$ =
(A) 2(5p – 3q) (B) 2(3p-5q) (C) 3p – 5q (D) 5p – 3q.

(Q.4) Express $\frac{(x^3+y^3+z^3-3xyz)}{(x^2+y^2+z^2-xy-yz-zx)}$ in lowest terms.
(A) x + y – z (B) x + y + z (C) x – y + z (D) x – y – z

(Q.5) If α,β,γ are the zeroes of the cubic polynomial $ax^3+bx^2+cx+d=0$, then $\alpha\beta+\beta\gamma+\gamma\alpha$ is equal to

(A) $-\frac{b}{a}$ (B) $\frac{c}{a}$ (C) $-\frac{d}{a}$ (D) None of these.

(Q.6) The graph of y = P(x) is given in fig below. Find the number of zeroes of P(x) .



(A) 4 (B) 3 (C) 2 (D) Can't be determined

(Q.7) Find the sum and product of zeroes of the quadratic polynomials $3x^2 - 3\sqrt{2}x + 1$.

(A) $-\sqrt{2}, \frac{1}{3}$ (B) $\sqrt{2}, -\frac{1}{3}$ (C) $\sqrt{2}, \frac{1}{3}$ **(D) None of these.**

Numerical Questions

(Q.1) If $f(x) = ax^3 + bx^2 + cx + d, a \neq 0$ than what will be the value of sum of Zeros.

(**Q.2**) if $f(x)$ *is divisible by* $q(x)$ *what will be the value of* $r(x)$ $f(x) = g(x)q(x) + r(x)$

(**Q.3**) If α and β are the Zeroes of the quadratic Polynomial $f(x) = x^2 - px + q$, find the Value of $\alpha^2 + \beta^2$

(Q.4) Find a quadratic Polynomial, the sum and product of Zeroes are -3 and 2 respectively.

(Q.5) Find the zeroes of the polynomial $f(x) = x^3 - 5x^2 - 2x + 24$ if given that the product of its 2 zeroes is 12.

(Q.6) (a) Find all the Zeroes of $2x^4 - 3x^3 - 3x^2 + 6x - 2$ if two of its Zeros are $\sqrt{2}$ and $-\sqrt{2}$

(b) Divide $-x^3 + 3x^2 - 3x + 5$ by $-x^2 + x - 1$ and verify the division algorithm

(Q.7) If α and β are the zeroes of the quadratic polynomial $f(x) = 4x^2 + 4x + 4$ such that $\alpha^2 + \beta^2 = 2u$, Find the values of ' u '

(Q.8) If sum of the polynomial is 4 and their product is 4 what will be the equation of quadric polynomials.

(Q.9) If $(x+2)(2x-1)(3x-2) = 0$ Find zeros of Polynomials

(Q.10) Verify that 3, –1, 1/3 are the zeroes of the cubic polynomial

$p(x) = 3x3 – 5x2 – 11x – 3$, and then verify the relationship between the zeroes and the coefficients.

3. Pair of Linear Equations in Two Variables

(Q.1) If $\frac{x}{b} = \frac{y}{a}, bx + ay = a^2 + b^2,$ then the values of x, y

(**Q.2)** A toy train crosses 210 m and 122 m long tunnels in 25 and 17 seconds respectively. Find the length of the train.

(Q.3) The income of P and Q are in the ratio 3: 2 and expenses are in the ratio of 5: 3. If both save Rs 200, what is the income of P? For what value of p does the system of equations 2x – py = 0, 3x + 4y = has nonzero solution?

(**Q.4**) If $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$, Then $a_1x+b_1y+c_1=0 \& a_2x+b_2y+c_2=0$ will represent _____line

(Q.5) The sum of two numbers is 128 and their difference is 16. Find the numbers?

(Q.6) Solve 2x + 3y = 11 and 2x – 4y = -24 and hence find the value of 'm' for which y = mx + 3

(Q.7) for what value of k the following equations are inconsistent?

x – 4y = 6, 3x + ky = 5

(Q.8) For what value of p does the system of equations 4x – py = 0, 5x + 6y = 0 has nonzero solution?

(Q.10) (a) Solve:

$$217x+131y=913 \quad \text{.....(1)}$$
$$131x+217y=827 \quad \text{..(ii)}$$

(b) For what value of *u* the system of Equation

$$3x+5y=0$$
$$ux+10y=0 \text{ has unique solution}$$

(Q.11) A man has only 20 paise and 25 paise coins in his purse. If he has 50 coins in all totaling Rs 11.25 How many coins of each does he have?

(Q.12) A man sold a chair and a table together for Rs 1520 .There is a profit of 25% on the

chair and 10% on table. By selling them together for Rs 1535, he could have made a profit of 10% on the chair and 25% on the table. Find the cost price of each.

(Q.13) A boat goes 30 km upstream and 44km downstream is 10hrs. In 13 hrs it go 40km upstream and 55 km downstream. Determine the speed of the stream and that of boat in still water.

(Q.14) The sum of a two - digit number and the number obtained by reversing the digits is 66. If the digits of the number differ by 2, find the number. How many such numbers are there?

(Q.15) Solve:

$$\frac{1}{2x}-\frac{1}{y}=-1$$

$$\frac{1}{x}+\frac{1}{2y}=8$$

(Q.16) Solve the given Equation by using the method of elimination by the coefficients:

$$\frac{x}{10}+\frac{y}{5}+1=15$$

$$\frac{x}{8}+\frac{y}{6}=15$$

(Q.17) (a) The taxi charges in a city comprise of a fixed charge together with the charge for the distance covered. For a journey for 10km the charge paid is Rs 75 and for a journey of 15km the charge paid Rs 110. What will a person have to pay for traveling a distance of 25km.

(b) In $\Delta ABC,\ \angle C = 3\angle B = 2(\angle A+\angle B)$. Find the three angles.

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Quadratic Equations

(Q.1) Product of two consecutive positive integers is 240. What are the integers?

(Q.2) If the sum of the roots of the quadratic equation $3x^2 + (2k+1)x - (k+5) = 0$ is equal to the product of the roots, then the value of 'k' is

(Q.3) If a and b are the roots of the quadratic equation $x^2 + px + 12 = 0$ with the condition $a - b = 1$, then the value of 'p' is

(Q.4) If $\sqrt{x-1}-\sqrt{x+1}+1=0$, then value of 4x?

(Q.5) If one root of the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ is 1, then Find the other root .

(Q.6) If a & b are the roots of $x^2 - px + q = 0$, then $a^2 + b^2$ = is

(Q.7) The difference of the roots of $x^2 - 7x - 9 = 0$ is

Q.8) If $b^2 - 4ac = 0$ then roots of equation will be _____ and _____

(Q.9) A dealer sells a toy for Rs 24 and gains as much percent as the cost price of the toy. Find the cost price of the toy.

(Q.10) Find the sum and product of zeroes of cubic polynomials $p(x) = 3x^3 - 5x^2 - 11x - 3$

Q.11) Find the values of *k* for which the given equation has equal roots.

$$x^2 + k(4x + k - 1) + 2 = 0$$

(Q.12) Solve by factorization method

$$a^2b^2x^2 + b^2x - a^2x - 1 = 0$$

(Q.13) If one root of the quadratic equation $2x^2 + kx - 6 = 0$ is 2, find the value of *K*. Also find the other root.

(Q.14) Divide 16 into two parts such that twice the square of the larger part exceeds the square of the smaller part by 164.

(Q.15) A two digit numbers is such that the product of its digit is 18. When 63 is subtracted from the number, the digits interchange their places. Find the numbers.

(Q.16) A person on tour has Rs 360 for his expenses. If he extends his tour for 4 days he has to cut down his daily expense by Rs 3. Find the original duration of the tour.

(Q.17) Seven years ago Varun's age was five times the square of Swati's age. Three years hence Swati's age will be two fifth of Varun's age. Find then present age.

Arithmetic Progressions

(Q.1) Find AM between $(5)^{1/2}$ and $(10)^{1/2}$ is

(Q.2) What is the 10^{th} term of the AP: 3, 10, 17...

(Q.4) How many three-digit numbers are divisible by 7?

(Q.5) The 8th term of an AP is 32 and its 12th term is 52. What is the AP?

(Q.6) Find the first three terms of the series if the sum of n terms is $\frac{n(n+1)}{2}$

(Q.7) In a flower bed, there are 23 rose plants in the first row, 19 in the second, 15 in the third, and so on. There are 7 rose plants in the last row. How many rows are there is the Flower bed?

(Q.8) The 17^{th} term of an A.P. exceeds its 10^{th} term by 7.Find the common difference.

(Q.9) How many terms of the A.P. 3,5,7,9,… must be added to get the sum 120?

(**Q.10**) Find the sum of the first 24 terms of the A.P: 5, 8, 11, 14…
(Q.11) Find the number of terms in an A.P, in which the first term=5, common difference=3 and the last term =83
(Q.12) How many terms are there in the AP: 6,10,14,18…174
(Q.13) Find the 10^{th} term of the series 63,58,53,48…
Q.14) Find three numbers in an A.P. whose sum is 15 and product 80
(Q.15) The sum of the first 30 terms of an A.P. is 1635.if its last term is 98, find the first term and the common difference of the given A.P.
(Q.16) Shobha dutta started work in 1995 at an annual salary of Rs. 5000 and received an increment of Rs.200 each year, in which year did her income reach Rs.7000?
(**Q.17**) Find the sum of the first 40 positive integers divisible by 6
(**Q.18**) If the 3^{rd} and the 9^{th} terms of an A.P. are 4 and -8 respectively. Which term of the A.P. will be 0?

Introduction to Trigonometry

(Q.1) In ΔABC $\angle$A = 30°, $\angle$B = 90°, AC = 4 cm then its area =
(Q.2) Fill in the blank: $1+\tan^2 A =$.....
(Q.3) If $\sin\theta + \sin^2\theta = 1$ then $\cos^2\theta + \cos^4\theta$ =
(Q.4) If sin 3A = cos (A – 26°), where 3A an acute angle, find the value of A.
(Q.5) The length of shadow of a tower is $\frac{1}{\sqrt{3}}$ times that of its length. The angle of elevation of the sun is
(Q.6) If sin (A – B) =1/2, cos (A + B)=1/2, 0° <(A + B) $\leq$ 90°, A > B, find A and B.

(Q.7) If $\tan\alpha+\sin\alpha = m \;\&\; \tan\alpha-\sin\alpha = n$ then $m^2 - n^2$ =
(Q.8) Evaluate: $\frac{\sin^2 45^\circ + \cos^2 45^\circ}{\tan^2 60^\circ}$

(Q.9) In a ΔABC, right angled at B, if $AB = 4$ and $BC = 3$, find the value of $\sin A$ and .
(Q.10) If $\tan\theta + \frac{1}{\tan\theta} = 2$, find the value of $\tan^2\theta + \frac{1}{\tan^2\theta}$.

(Q.11) If cosec 2, find the value of tan A.
(Q.12) A Δ ABC is right angled at B and $\angle A = \angle C$. Is cosA = cosC ?
(Q.13) In a Δ ABC, right angled at B, BC=3 and AC=6. Determine $\angle BCA$ and $\angle BAC$.

(Q.14) If $\cot\theta = \frac{7}{8}$, find $\frac{(1+\sin\theta)(1-\sin\theta)}{(1+\cos\theta)(1-\cos\theta)}$.

(Q.15) Prove that $\frac{\cos A}{1+\sin A} + \frac{1+\sin A}{\cos A} = 2\sec A$

(Q.16) Prove that

(Q.17) Prove that $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A} = 1+\cos ecA\sec A$

(Q.18) If $\tan A+\sin A = m$ and $\tan A-\sin A = n$, prove that $\left(m^2-n^2\right)^2 = 16mn$

Some Applications of Trigonometry

(Q.1) The angle of elevation of the top of building from the foot of tower is 45° and the angle of elevation of the top of the tower from the foot of the building is 60°. If the tower is 50 m high find the height of building ?

(Q.2) A kite is flying at a height of 60m above the ground. The string attached to kite is tied to a point. The inclination of string with the ground is 30°. Find length of the string. Assuming there is no slack in the string.

(Q.3) A tower stands vertically on the ground from a point on the ground which is 15 m away from the foot of tower if the height of tower is $15\sqrt{3}$ meters find the angle of elevation.

(Q.4) From the top of a 10 m height building the angle of elevation of the top of a cable tower is 60° and angle of depression of its foot is 45°, determine the height of the towers.

(Q.5) The altitude of the sun at any instant is60^0. The height of the vertical pole that will cast a shadow of 30 m is

(Q.6) The angle of elevation of the top of tower from a point on the ground which is 40 m away from the foot of tower is 45°, then what is the height of tower

(Q.7) If the angle of elevation of a tower from two points distant a and b (a>b) from its foot and in the same straight line from it are30^0 and60^0, then find height of the tower.

(Q.8) A tower stands vertically above from the ground. From a point on the ground which is 15 m away from the foot of the tower, the angle of elevation of the top of the tower is found to be 60^o. Find the height of the tower.

(Q.9) An observer 1.5 m tall is 28.5 m away from a chimney. The angle of elevation of the

top of the chimney from her eyes is 45^o. What is the height of the chimney?

(Q.10) A bridge across a river makes an angle of 45^o with the river bank. If the length of the bridge across the river is 50m, what is the width of the river?

(Q.11) A circus artist is climbing a 20 m long rope, which is tightly stretched and tied from the top of a vertical pole to the ground. Find the height of the pole if the angle made by the rope with the ground level is 30^0.

(Q.12) Two ships are sailing in the sea on either side of a lighthouse. The angles of depression of the two ships are observed as 60^0 and 45^0 respectively. If the distance between the two ships is 100 m, find the height of the lighthouse.

(Q.13) The shadow of a tower standing on a level ground is found to be 40 m longer when the sun altitude is 30^o than when it is 60^o. Find the height of the tower.

(Q.14) From a point on a bridge across a river, the angles of depression of the banks on opposite sides of the river are 30^o and 45^o, respectively. If the bridge is at a height of 3 m from the banks, find the width of the river.

(Q.15) From a point on the ground 40m away from the foot of a tower, the angle of elevation of the top of the tower is 30^0. The angle of elevation of the top of a water tank (on the top of the tower) is 45^O. Find the height of the tower and depth of the tank.

(Q.16) The angles of elevation of the top of a tower from two points at distances a and b metres from the base and in the same straight line with it are complementary, prove that the height of the tower is $\sqrt{ab}$ metres.

(Q.17) From the top of the hill, the angles of depression of two consecutive kilometer stones due east are found to be 30^o and 45^o. Find the height of the hill.

(Q.18) Two pillars of equal height are on either side of a road, which is 100 m wide. The angles of elevation of the top of the pillars are 60^o and 30^o at a point on the road between the pillars. Find the position of the point between the pillars and the height of each pillar.

(Q.19) A round balloon of radius r subtends an angle α at the eye of the observer while the angle of elevation of its centre is β . Prove that the height of the centre of the balloon is $r \sin\beta \operatorname{cosec}\alpha/2$.