

SECTION A

Question numbers 1 to 10 carry 3 marks each.

Q. 1. For what value of a, the system of linear equations:

$$ax + 3y = a - 3; 12x + ay = a;$$

Ans. (a = -6)

Q. 2. Find the GCD and LCM of the following polynomials:

$$18(x^2 - 9x^2 + 8x) \text{ and } 24(x^2 - 3x + 2)$$

Ans. [6(x-1); 72 (x-1) (x-2) (x-8)]

Or

If $x - a$ is the GCD $x^2 - x - 6$ and $x^2 + 3x - 18$, find the value of a.

Ans. (a = 3)

Q. 3. Find the values of k so that $(x - 1)$ is a factor of $k^2 x^2 - 2kx - 3$.

Ans. (k = 3 or k = -1)

Q. 4. Determine value(s) of p for which the quadratic equation $4x^2 - 3px + 9$ has real roots.

Ans. ($p \geq +4$ or $p \leq -4$)

Q. 5. Find the centroid of $\triangle ABC$ *XP and XQ*, whose vertices are A(-1,0), B(5, -2) and C(8, 2).

Ans. (4, 0)

Q. 6. How many terms of the sequence 18, 16, 14, ... should be taken so that their sum is zero?

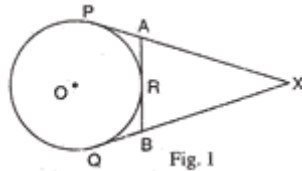
Ans. (19)

Q. 7. A card is drawn from an ordinary pack and a gambler bets that it is a spade or an ace. What are the odds against his winning this bet?

Ans. (9 : 4)

Q. 8. In fig 1, *XP and XQ* are two tangents to a circle with centre O from a point X outside the circle. ARB is tangent to circle at R.

Prove that $XA + AR = XB + BR$



Q. 9. The mean of 30 observations was 150. It was detected on checking that one observation of 165 was wrongly copied as 135 for the computation of mean. Find the correct mean.

Ans. (151)

Or

Find the value of p if mean of the following distribution is 7.5:

x	3	5	7	9	11	13
y	6	8	15	p	8	4

Ans. (p = 3)

Q. 10. Find the ratio in which the line segment joining (2, -3) and (5,6) is divided by x-axis. **Ans. (1 : 2)**

SECTION B

Question numbers 11 to 20 carry 4 marks each.

Q. 11. Solve the following system of linear equations graphically:

$$2x - 3y = 1, 3x - 4y = 1$$

Does the point (3, 2) lie on any of the lines? Write its equation.

Ans. (x = -1, y = -1; 3x - 4y = 1)

Q.12. Solve for x and y: $\frac{4}{x} + 5y = 7, \frac{3}{x} + 4y = 5$

Ans. (x = 1/3, y = -1)

Or

Father's age is three times the sum of ages of his two children. After 5 years his age will be twice the sum of age of two children. Find the age of father.

Ans. (45 years)

Q.13. What should be added to $\frac{1}{x^2 - 6x + 8}$ to get $\frac{2x - 7}{(x - 2)(x - 3)(x - 4)}$?

Ans. $\left(\frac{1}{x^2 - 5x + 6}\right)$

Or

A card is drawn at random from a well shuffled deck of 52 cards. Find the probability of getting
 (a) a Queen (b) a Diamond (c) a King or an Ace (d) a red Ace.

Ans. (i) 1/13 (ii) 1/4 (iii) 2/13 (iv) 1/26

Q. 14. The annual income of Kapil (excluding HRA) is Rs.1,85,000. He contributes Rs.4,500 per mon in Provident Fund. How much should he pay annually towards LIC Premium to get the maximum rebate? Find the income tax to be paid by Kapil in the last month of the year if he paid Rs. 900 per month as income tax for the first eleven months.

Assume the following for calculating income tax:

- (a) Standard Deduction :
 (i) 40% of the total income subject to a maximum of Rs.30,000 in case the total annual income is up to Rs.1,00,000
 (ii) Rs.30,000 in case the total annual income is from Rs.1,00,001 to Rs.5,00,000

(b) Rates of income tax :

<i>Slab</i>	<i>Income tax</i>
(i) Upto Rs.50,000	No tax
(ii) From Rs.50,001 to Rs. 60,000	10% of the amount exceeding Rs. 50,000
(iii) From Rs.60,001 to Rs. 1,50,000	Rs.1,000+20% of the amount exceeding Rs. 60,000
(iv) Above Rs.1,50,000	Rs.19,000+30% of the amount exceeding Rs.1,50,000
(c) Rebate in tax	(i) 20% of the amount of saving Subject to maximum Rs. 14,000, if gross income is upto Rs. 1,50,000 (ii) 15% of the amount of saving subject to a maximum of Rs.10,500, if gross income is above Rs. 1,50,000 but not exceeding Rs. 5,00,000

Q 15. Find the common difference of an A.P. whose 1st term is 100 and the sum of whose 1st six terms is 5 times the sum of the next 6 terms. **Ans. (-10)**

Q.16 Prove that: $\frac{\cos A}{1 - \tan A} - \frac{\sin 2A}{\cos A - \sin A} = \sin A + \cos A$.

Q. 17. Without using trigonometric tables evaluate the following:

$$\frac{\cos 58^\circ}{\sin 32^\circ} + \frac{\sin 22^\circ}{\cos 68^\circ} - \frac{\cos 38^\circ \operatorname{cosec} 52^\circ}{\tan 18^\circ \cdot \tan 35^\circ \cdot \tan 60^\circ \cdot \tan 72^\circ \cdot \tan 35^\circ}$$

Ans. $\left(\frac{6 - \sqrt{3}}{3}\right)$

Q. 18. AB is a diameter and AC is a chord of a circle such that $\angle BAC = 30^\circ$. If the tangent at C intersects AB produced in D, prove that BC = BD.

Q. 19. Construct a triangle ABC in which BC = 6 cm, $\angle A = 60^\circ$ and median AD = 5 cm. Also, construct another

triangle BPQ similar to $\triangle BCA$ such that the side $BP = \frac{3}{2} BC$. Also write the steps of construction.

Q. 20. A briefcase is sold for Rs.3,600 cash or for Rs.1,200 cash down payment followed by two monthly instalments of Rs.1,220 each. Compute the rate of interest charged under the instalment scheme.

Ans. (13.41% p.a.(approx.)

Q 21. The distance between Mumbai and Pune is 192 km. Travelling by Deccan Queen, it takes 48 minutes less than another train. Calculate the speed of the Deccan Queen if the speed of the two trains differ by 20 km/hr.

Ans. (80 km/hr)

Or

*A farmer wishes to grow a 100 m² rectangular vegetable garden. Since he has with him only 30 m barbed wire, he fences three sides of the rectangular garden letting compound wall of his house act as the fourth side-fence, Find the dimensions of his garden.

Ans. (10 m ; and 10 m or 20 m and 5m)

Q. 22. In a right angled triangle, the square on hypotenuse is equal to the sum of squares on other two sides. Prove it.

Use the above to prove the following:

In a triangle ABC, AD is perpendicular on BC. Prove that $AB^2 + CD^2 = AC^2 + BD^2$.

Q. 23. If a chord is drawn through the point of contact of tangent to a circle, then prove that the angles which this chord makes with the given tangent are equal respectively to the angles formed in the corresponding alternate segment. Using the above theorem, prove the following:

If $\triangle ABC$ is isosceles with AB = AC, prove that the tangent at A to the circumcircle of $\triangle ABC$ is parallel to BC.

Q. 24. A toy is in the form of a cone mounted on a hemisphere of radius 3.5 cm. The total height of the toy is 15.5 cm. Find the total surface area of the toy. (Take $\pi = 22/7$)

Ans. (214.5 cm²)

Q. 25. From a window (60 metres high above the ground) of a house in a street the angles of elevation and depression of the top and the foot of another house on opposite side of street are 60° and 45° respectively. Show

that the height of the opposite house is $60(1 + \sqrt{3})$ metres.

Or

If the angle of elevation of a cloud from a point h metres above a lake is α and the angle of depression of its

reflection in the lake is β , prove that the height of the cloud is $\frac{h(\tan \beta + \tan \alpha)}{\tan \beta - \tan \alpha}$.

