

Time: 3 Hours
General Instructions

Max. Marks: 80
Answers at end

1. All questions are compulsory
2. The question paper consists of 25 questions divided into three sections A, B and C. Section A contains 7 questions of 2 marks each, Section B is of 12 questions of 3 marks each and Section C is of 6 questions of 5 marks each.
3. There is no overall choice. However, internal choice has been provided in two questions of two marks each, two questions of three marks each and two questions of five marks each.
4. In question on construction, the drawing should be neat and exactly as per the given measurement.
5. Use of calculators is not permitted. However, you may ask for Mathematical tables.

SECTION – A

1. Solve the following system of equations: $\frac{9}{x+1} - \frac{8}{y-1} = 1, \frac{3}{x+1} + \frac{4}{y-1} = 2, x \neq -1, y \neq 1$

OR

Solve the following system of linear equations for x and y :

$$ax + by = 2ab, bx + ay = a^2 + b^2$$

2. The HCF and LCM of two polynomials p(x) and q(x) are (x + 3) and $x^3 + 4x^2 + x - 6$ respectively. If $p(x) = x^2 + 5x + 6$, find q(x).
3. Solve the following quadratic equation for x : $x^2 - 2(a + 2)x + (a + 1)(a + 3) = 0$.
4. Determine the A.P. whose 5th term is 15 and the sum of its 3rd and 8th terms is 34.
5. A loan of Rs. 3280 is to be paid back in two equal semi-annual instalments. If the interest is charged at 10% per annum, compounded semi-annually, find the value of each instalment.

6. The perimeters of two similar triangles are 36 cm and 48 cm respectively. If one side of the first triangle is 9 cm, what is the corresponding side of the other triangle ?

OR

Prove that a cyclic parallelogram is a rectangle.

7. Cards numbered 3, 4, 5, 6,-----, 17 are put in a box and mixed thoroughly. A card is drawn at random from the box. Find the probability that the card drawn bears :
- (i) An even Number (ii) A number divisible by 3 or 5

SECTION – B

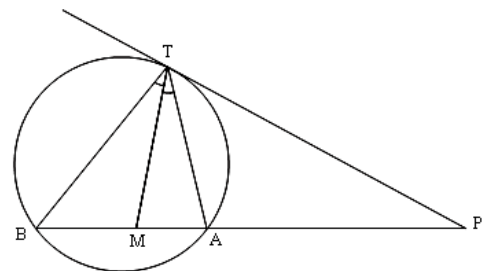
8. Solve the following system of linear equations graphically: $3x + y - 12 = 0$, $x - 3y + 6 = 0$
Also find the coordinates of the points where the lines meet the x – axis.
9. Express the following expression as a rational expression in lowest terms :
- $$\frac{x^3 - 8}{x^2 - 4} \times \frac{x^2 + 6x + 8}{x^2 - 2x + 1} \div \frac{x^2 + 2x + 4}{x^2 + 2x - 3}$$
10. Rs. 1200 were distributed equally among certain number of students. Had there been 8 more students, each would have received Rs. 5 less. Find the number of students.
11. Find the sum of all three digit numbers each of which leave the remainder 3 when divided by 5.

OR

How many terms of the A.P. 78, 71, 64, are needed to give the sum 468 ? Also find the last term of this A.P.

12. A bicycle is available for Rs. 1425.00 cash or for 20% of the cash value as cash down payment followed by three equal monthly instalments. If the rate of interest charged under the instalment scheme is 16%, find each instalment.

13. In Fig., PT is a tangent and PAB is a secant to the circle. If bisector of $\angle ATB$, meets AB at M, prove that ΔMPB is isosceles.



14. Construct a quadrilateral ABCD, with $\angle A = 45^\circ$, $AB = 5.1\text{cm}$, $AC = 6\text{cm}$, $AD = 4.2\text{cm}$ and $BC = 3.6\text{cm}$. Construct a quadrilateral $ABC'D'$ similar to quadrilateral ABCD such that its diagonal $AC' = 8\text{cm}$.
15. Show that : $(\sin \theta + \operatorname{cosec} \theta)^2 + (\cos \theta + \sec \theta)^2 = 7 + \tan^2 \theta + \cot^2 \theta$

OR

Without using trigonometric tables, find the value of

$$\sin 31^\circ \sec 59^\circ + \left(\frac{\tan 67^\circ}{\cot 23^\circ} \right)^2 + \sin^2 35^\circ - \cos^2 55^\circ$$

16. Find the coordinates of a point P on y-axis, equidistant from two points A(-3, 4) and B (3, 6) on the same plane.
17. A solid iron spherical ball is melted and recast into smaller balls of equal size. If the radius of the smaller ball is $\frac{1}{8}$ th of the original ball. Find the number of small balls made, assuming that there is no wastage of metal in process.
18. Find the value of K for which the points A(-5, 1), B (1, K) and C(4, -2) are collinear. Also find the ratio in which B divides AC.
19. The following table shows the monthly expenditure of a firm. Draw a pie-chart for the data :

Item	Amount (in lacs of Rs)
Rent	1560
Wages	840
Electricity and Water	600
Taxation	1320

SECTION C

20. Annual income of Mrs. Promila, who is a senior citizen is Rs 4,10,000. She donates Rs 30,000 to Prime Minister's Relief Fund (100% exemption) and Rs 20,000 to a charitable society (50% exemption). She contributes Rs 60,000 towards PPF annually and pays a quarterly premium of Rs 4,500 towards life insurance. She also purchases NSCs for Rs 30,000. Find the amount she has to pay towards income tax for the financial year. Use the following for calculating income tax.
- (a) Savings : 100% exemption for savings upto Rs 1,00,000.
- (b) Rate of income tax for senior citizens :

Taxable Income	Rate of Tax	Surcharge	Educational cess
Up to Rs.1,85,000	Nil	Nil	Nil
Rs.1,85,001 to Rs. 2,50,000	20% of total Income exceeding Rs.1,85,000	Nil	2 % of income tax
Rs.2,50,001 to Rs.10,00,000	Rs.13,000 + 30% of total income exceeding Rs.2,50,000	Nil	2% of income tax
Above Rs.10,00,000	Rs.2,38,000 + 30% of total income exceeding Rs.10,00,000	10% of income tax	2% of income tax and surcharge

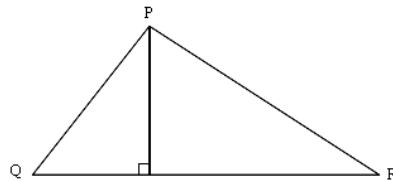
21. Prove that in a right triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

Use the above theorem in Fig., to prove that :

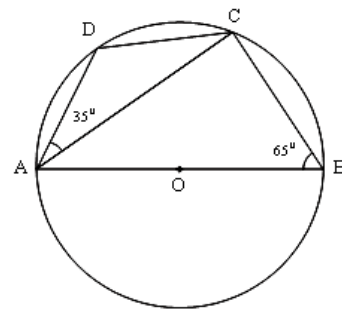
$$PR^2 = PQ^2 + QR^2 - 2QM \cdot QR$$

OR

Prove that the sum of either pair of the opposite angles of



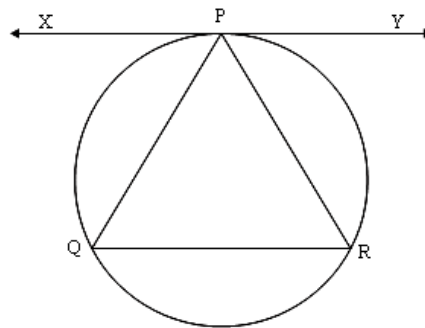
Using the above theorem, find the angles ACD and BAC, if AB is a diameter of the circle in fig..



22. If a line touches a circle and from the point of contact, a chord is drawn show that the angles which the chord makes with the given line are respectively equal to the angles formed in the corresponding alternate segments.

Using the above theorem, prove that in fig.,

$XY \parallel QR$, given that XY is a tangent to the circle at P and $PQ = PR$.



23. Find the mean marks of the following data :

Marks	Below 20	Below 40	Below 60	Below 80	Below 100
No of Students	15	31	55	70	80

24. A straight road leads to the foot of a tower 150 metres high. From the top of the tower the angles of depression of two cars standing on the road are observed to be 30° and 60° respectively. Find the distance between the two cars.

OR

Two poles of equal heights stand vertically opposite to each other on either side of a road, which is 100 metres wide. From a point on the road between the poles, the angles of elevation of the tops of the poles are 30° and 60° . Find the height of the poles. Also find the distance of the point from the feet of the poles.

25. A circus tent of total height 50 metres is to be made in the form of a right circular cylinder surmounted by a right circular cone. If the height and radius of the conical portion of the tent are 15 metres and 20 metres respectively. Find the cost of the cloth required, at the rate of Rs 14 per square metre to make the tent. (Take $\pi = 22 / 7$)

ANSWERS

1. $x = 2, y = 5$ or $x = b, y = a$

2. $x^2 + 2x - 3$

3. $(a + 1), (a + 3)$

4. $-1, 3, 7, 11, \dots$

5. Rs. 1764

6. 12 cm

7. (i) $\frac{7}{15}$ (ii) $\frac{7}{15}$

8. $x = 3, y = 3, (4,0), (-6,0)$

9. $\frac{x^2 + 7x + 12}{x - 1}$

10. 40

11. 99090 or 13, - 6

12. Rs. 390

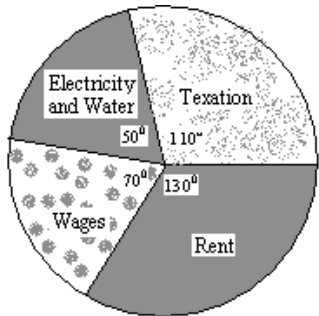
15. 2

16. (0,5)

17. 512

18. $k = -1$

19.



20. Rs.19380

21. $\angle ACD = 130^\circ, \angle BAC = 25^\circ$

23. 47.25

24. 173.2 m or 43.25 m, 75 m from pole having elevation of 30°

25. Rs. 83600