

General Instructions:

- 1) All questions are compulsory.
- 2) The question paper consists of thirty questions divided into 4 sections A, B, C and D. Section A comprises of ten questions of 01 mark each, Section B comprises of five questions of 02 marks each, Section C comprises ten questions of 03 marks each and Section D comprises of five questions of 06 marks each.
- 3) All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
- 4) There is no overall choice. However, internal choice has been provided in one question of 02 marks each, three questions of 03 marks each and two questions of 06 marks each. You have to attempt only one of the alternatives in all such questions.
- 5) In question on construction, drawing should be near and exactly as per the given measurements.
- 6) Use of calculators is not permitted.

SECTION A

Question 1

1. If α and β are the zeros of the quadratic polynomial $f(x) = x^2 - px + q$, then find the value of $\alpha^2 + \beta^2$

Question 2

2. If $f(x) = 2x^3 - 13x^2 + 17x + 12$, then find its value at $x = -\frac{1}{2}$.

Question 3

3. An unbiased die is thrown. What is the probability of getting a number greater than 3?

Question 4

4. When do you say two triangles are similar?

Question 5

5. How many balls, each of radius 1 cm, can be made from a solid sphere of lead of radius 8 cm?

Question 6

6. Find the value of x , if the mode of the following data is 25:
15, 20, 25, 18, 14, 15, 25, 15, 18, 16, 20, 25, 20, x , 18

Question 7

7. Sum of two numbers is 35 and their difference is 13. Find the numbers

Question 8

8. Find θ , if $\sin(\theta+36^\circ)=\cos\theta$, where $(\theta+36^\circ)$ is an acute angle.

Question 9

9. Define secant of a circle.

Question 10

10. If the perimeter of a semi-circular protractor is 66 cm, find the diameter of the protractor.

SECTION B**Question 11**

11. Evaluate $\left(\frac{\sin 35^\circ}{\cos 55^\circ}\right)^2 + \left(\frac{\cos 55^\circ}{\sin 35^\circ}\right)^2 - 2\cos 60^\circ$

Question 12

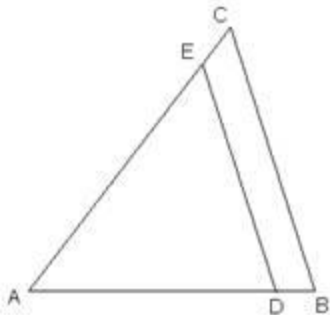
12. If α and β are the zeros of the quadratic polynomial $f(x)=ax^2+bx+c$, then evaluate $\alpha^2/\beta + \beta^2/\alpha$

Question 13

13. Tickets numbered from 1 to 20 are mixed up together and then a ticket is drawn at random. What is the probability that the ticket has a number which is a multiple of 3 or 7?

Question 14

14. In the given figure, $DE \parallel BC$. If $AD = x$, $DB = x - 2$, $AE = x + 2$ and $EC = x - 1$, find the value of x .

**Question 15**

15. ABC is an isosceles triangle with $AC = BC$. If $AB^2=2AC^2$, prove that $\triangle ABC$ is right triangle.

SECTION C**Question 16**

16. Find the values of a and b so that $x^4+x^3+8x^2+ax+b$ is divisible by x^2+1

Question 17

17. Prove that $\sqrt{2} + \sqrt{5}$ is irrational.

Question 18

18. Students of a class are made to stand in rows. If one student is increased in each row, then the number of rows is decreased by two. If however one student is less in each row then there would be three rows more. Find the number of students in the class.

Question 19

19. By applying division algorithm, prove that the polynomial $g(x) = x^2 + 3x + 1$ is a factor of the polynomial $f(x) = 3x^4 + 5x^3 - 7x^2 + 2x + 2$

Question 20

20. Prove that (4, -1), (6, 0), (7, 2) and (5, 1) are the vertices of a rhombus. Is it a square?

Question 21

21. Prove that $\frac{\sin \theta}{1 - \cos \theta} + \frac{\tan \theta}{1 + \cos \theta} = \sec \theta \operatorname{cosec} \theta + \cot \theta$

Question 22

22. Find the coordinates of the centre of the circle passing through the points (0, 0), (-2, 1) and (-3, 2). Also, find its radius.

Question 23

23. Take a point O on the plane of the paper. With O as centre draw a circle of radius 3 cm. Take a point P on this circle and draw a tangent at P

Question 24

24. The perimeter of a sector of a circle of radius 5.4 cm is 17.4 cm. Find the area of the sector.

Question 25

25. From an external point P, two tangents PA and PB are drawn to the circle with centre O. Prove that OP is the perpendicular bisector of AB.

SECTION D**Question 26**

26 Determine the height of a mountain if the elevation of its top at an unknown distance from the base is 30° and at a distance 10 km further off from the mountain, along the same line, the angle of elevation is 15°

Question 27

27. Water is flowing at the rate of 5 km / hr through a pipe of diameter 14 cm into a rectangular tank

which is 50 m long and 44 m wide. Determine the time in which the level of the water in the tank will rise by 7 cm.

Question 28

28. ABC is a right-angled triangle right angled at A. A circle is inscribed in it. The lengths of the two sides containing the right angle are 6 cm and 8 cm. Find the radius of the circle.

Question 29

29. A plane left 30 minutes later than the scheduled time and in order to reach its destination 1500 km away in time it has to increase its speed by 250 km / hr from its usual speed. Find its usual speed.

Question 30

30. Compute the median from the following data:

Mid-Value	115	125	135	145	155	165	175	185	195
Frequency	6	25	48	72	116	60	38	22	8