PACE
IIT & MEDICAL

Sub. : Maths **Total Marks : 80**
Std. X (CBSE) **Time:3 hours**

Prelim Question Paper - 04

SECTION A

Section A consists of 20 questions of 1 mark each.

1. The pair of linear equations $x + 2y = 5$ and $3x + 12y = 10$ has
   a) unique solution
   b) no solution
   c) more than two solution
   d) infinitely many solutions

2. If the probability that it will rain tomorrow is 0.75, then the probability that it will not rain tomorrow, is
   a) 0 b) 1
   c) 0.50 d) 0.25

3. Two tangents, drawn at the end points of diameter of a given circle are always
   a) parallel b) perpendicular
   c) intersect each other
   d) None of the above

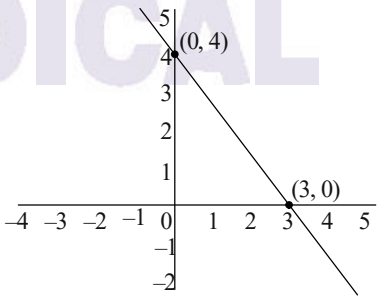
4. If the distance between the points $(x, -1)$ and $(3, 2)$ is 5 units, then the value of x is
   a) -7 or -1 b) -7 or 1
   c) 7 or 1 d) 7 or -1

5. In ΔABC, right anght angled at B, if base line is AB = 12 and BC = 5, then the value of cos C is
   a) $\frac{5}{13}$ b) $\frac{13}{5}$
   c) $\frac{5}{17}$ d) $\frac{17}{5}$

6. If median = 137 and mean = 137.05, then the value of mode is
   a) 156.90 b) 136.90
   c) 186.90 d) 206.05

7. $\tan^2\theta \sin^2\theta$ is equal to
   a) $\tan^2\theta - \sin^2\theta$
   b) $\tan^2\theta + \sin^2\theta$
   c) $\frac{\tan^2\theta}{\sin^2\theta}$ d) $\sin^2\theta.\cot^2\theta$

8. The given linear polynomial $y = f(x)$ has



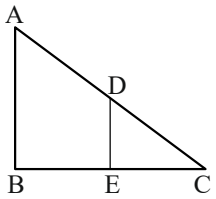
   a) 2 zeroes
   b) 1 zero and the zero is '3'
   c) 1 zero and the zero is '4'
   d) No zero

9. Two APs have the same common difference. The first term of one of these is –1 and that of the other is –8. Then, the difference between their 4th terms is

a) 1 b) 8

c) 7 d) 9

10. In ΔABC, $DE \parallel AB$. AB = a, DE = x, BE = b and EC = c. Express x in terms of a, b and c



a) $\frac{ac}{b}$ b) $\frac{ac}{b+c}$

c) $\frac{ab}{c}$ d) $\frac{ab}{b+c}$

11. The distance between two parallel tangents to a circle of radius 7 cm, is

a) 7 cm b) 0 cm

c) 14 cm d) None of these

12. The ratio in which the line $3x + y - 9 = 0$ divides the segment joining the points (1, 3) and (2, 7) is

a) 3 : 4 b) 4 : 3

c) 2 : 3 d) 3 : 2

13. A pole 6 m high casts a shadow $2\sqrt{3}$ m long on the ground, then the Sun's elevation is

a) 60^0 b) 45^0

c) 30^0 d) 90^0

14. How many terms are there in the arithmectic series 1 + 3 + 5 + ... + 73 + 75?

a) 28 b) 30

c) 36 d) 38

15. The circumference of a circle is equal to the sum of the circumferences of two circles having diameters 34 cm and 28 cm. The radius of the new circle is

a) 30 cm b) 31 cm

c) 32 cm d) 25 cm

16. If radius of circle is 3 cm and tangent drawn from an external point to the circle is 4 cm, then the distance from centre of circle to the external point is

a) 3 cm b) 2 cm

c) 5 cm d) 4 cm

17. Two cones have their heights in the ratio 1 : 4 and radii in the ratio 4 : 1. The ratio of their volumes is.

a) 1 : 4 b) 4 : 1

c) 2 : 1 d) 1 : 2

18. The probability of getting 101 marks in out of 100 marks is

a) 1 b) $\frac{1}{2}$

c) 0 d) 2

Direction : In the question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option.

19. **Assertion (A) :** $5x^2 + 14x + 10 = 0$ has no real roots.

Reason (R) : $ax^2 + bx + c = 0$ has no real roots if $b^2 < 4ac$

a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A)

c) Assertion (A) is true but Reason (R) is false

d) Assertion (A) is false but Reason (R) is true

20. **Assertion (A) :** $\sqrt{2}$ is an irrational number,

Reason (R) : If p be a prime, then $\sqrt{p}$ is an irrational number.

a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)

b) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A)

c) Assertion (A) is true but Reason (R) is false

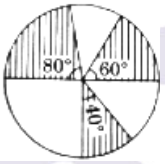
d) Assertion (A) is false but Reason (R) is true

SECTION B

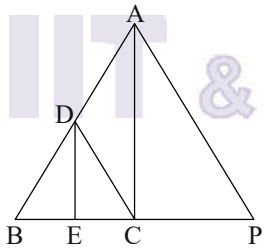
Section B consists of 5 questions of . 2 marks each.

21. Prove that $\sqrt{2}$ is an irrational number.

22. In the given figure, three sectors of a circle of radius 7 cm, making angles of 60^0, 80^0, 40^0 at the centre are shown. Find the area (in cm^2) of the shaded region.



23. In given ΔABC, DE || AC. IF DC || AP, where point P lies on BC produced, then prove that $\frac{BE}{EC} = \frac{BC}{CP}$.



OR

In ΔABC and ΔDEF, $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$. Then, show that the two triangles are similar but not congruent.

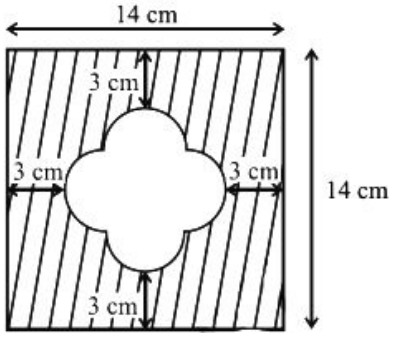
24. If $\tan(A + B) = \sqrt{3}$ and $(A - B) = \frac{1}{\sqrt{3}}$

$0^0 < A + B \leq 90^0$, $A > B$, then find A and B.

25. With vertices A, B and C of ΔABC as centres, arcs are drawn with radii 14 cm and the three portions of the triangle, so obtained are removed. Find the total area removed from the triangle.

OR

Find the area of the unshaded region shown in the given figure.



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SECTION C

Section C consists of 6 questions of 3 marks each.

26. If the zeroes of the quadratic polynomial $x^2 + (a + 1)x + b$ are 2 and – 3 then find the value of a and b.

27. Prove the trigonometric identity

$$\sqrt{\frac{\operatorname{cosec} A + 1}{\operatorname{cosec} A - 1}} + \sqrt{\frac{\operatorname{cosec} A - 1}{\operatorname{cosec} A + 1}} = 2\sec A.$$

OR

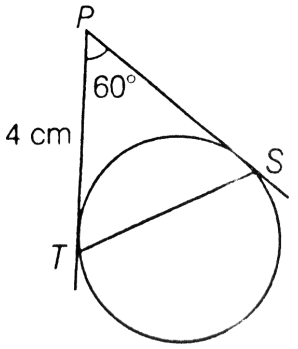
If $\tan\theta + \sin\theta = m$ and $\tan\theta - \sin\theta = n$, then show that $(m^2 - n^2)^2 = 16\ mn$ or $(m^2 - n^2) = 4\sqrt{mn}$.

28. Two people are 16 km apart on a straight road. They start walking at the same time. If they walk towards each other with different speeds, they will meet in 2 h. Had they walked in the same direction with same speeds as before, they would have met in 8 h. Find walking speeds.

29. Find the largest positive integer that will

divide 398, 436 and 542 leaving remainders 7, 11 and 15, respectively.

30. In the given figure, PT and PS are tangents to a circle from a point P such that PT = 4 cm and $\angle TPS = 60^0$.



Find the length of chord TS. How many lines of same length TS can be drawn in the circle ?

OR

AB is a diameter and AC is a chord of a circle such that $\angle BAC = 30^0$. If the tangent at C intersects AB produced at D, then prove that BC = BD.

31. Find the mean of the following frequency distribution.

Classes	Frequency
25 - 30	14
30 – 35	22
35 – 40	16
40 – 45	6
45 – 50	5
50 – 55	3
55 – 60	4

SECTION D

Section D consists of 4 questions of 5 marks each.

32. A train travels at a certain average speed for a distance of 54 km and then travels a distance of 63 km at an average speed of 6 km/h more than the first speed. If it takes 3 h to complete the journey, what was its first average speed ?

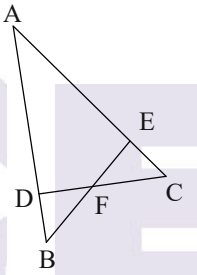
OR

Two pipes together can fill a tank in $\frac{15}{8}$ h. The pipe with larger diameter takes 2h less than the pipe with smaller diameter to fill the tank separately. Find the time in which each pipe can fill the tank separatelly.

33. a) State and prove Basic Proportionality theorem.

b) In the given figure $\angle CEF = \angle CFE$. F is the mid-point of DC.

Prove that $\frac{AB}{BD} = \frac{AE}{FD}$



34. The mean of the following frequency table is 50 but the frequencies f_1 and f_2 in class interval 20-40 and 60-80 are missing. Find the missming frequencies.

Class Interval	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100	Total
Frequency	17	f_1	32	f_2	19	120

35. Water is flowing at the rate of 15 km/h through a pipe of diameter 14 cm into a cuboidal pond which is 50 m long and 44 m wide. In what time will the level of water in pond rise by 21 cm?

What should be the speed of water, if the rise in water level is to be attained in 1 h ?

OR

A tent is in the shape of a cylinder surmounted by a conical top. If the height and radius of the cylindrical part are 2 m and 14 m, respectively and the total height

of the tent is 13.5 m, find the area of the canvas required for making the tent,

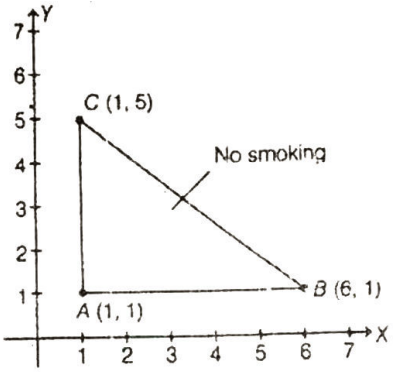
keeping a provision of 26 m^2 of canvas for stitching and wastage. Also, find the cost of the canvas to be purcased at the rate of ₹ 500 per m^2.

SECTION E

Case study based questions are compulsory.

36. **No smoking compaign**

All of them know that smoking is injurious for health. So, college students decide to make a campaign.



To raise social awareness about hazards of smoking, a school decided to start "No SMOKING" campaign.

10 students are asked to prepare campaign banners in the shape of triangle (as shown in the figure)

On the basis of above information, answer the following questions.

i) If cost of per cm^2 of banner is ₹ 2, then find the overall cost incurred on such campaign. 2

OR

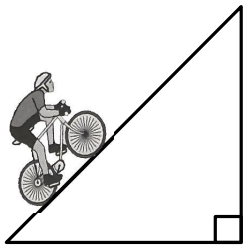
If we want to draw a circumscribed circle of given, then find the coordinates of the centre of circle.

ii) If we draw the image of figure about the line BC, then find the total area. 1

iii) Find the centroid of the given triangle. 1

37. **Case Study :**

A cyclist is climbing through a 20 m long rope which is highly stretched and tied from the top of a vertical pole to the ground as shown below



Based on the above information, answer the following questions

i) Find the height of the pole, if angle made by rope with the gound level is 60^0. 1

ii) If the angle made by the rope with the ground level is 45^0, then find the height of the pole. 2

OR

If the angle made by the rope with the ground level is 45^0 and 3 m rope is broken, then what will be the height of the pole.

iii) If the angle made by the rope with the ground level is 60^0 then calculate the distance between artist and pole at ground level. 1

38. **Case Study :**

Your elder brother wants to buy a car and plans to take loan from a bank for his car. He repays his total loan of ₹ 118000 by paying every month starting with the first installment of ₹ 1000. If he increases the installment by ₹ 100 every month.

On the basis of above information, answer the following questions

i) What amount does he still have to pay after 30th installment ? 1

ii) Find the amount paid by him in 30th installment. 2

OR

Find the amount paid by him in the 30 installments.

iii) If total installments are 40, then what amount paid in the last installment ? 1

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