PACE
IIT & MEDICAL

Sub. : Maths | **Total Marks : 80**
Std. X (CBSE) | **Prelim Question Paper - 03** | **Time:3 hours**

SECTION A

Section A consists of 20 questions of 1 mark each.

1. If HCF (306, 657) = 9, what will be the LCM (306, 657) ?

   a) 12338 b) 22338
   c) 23388 d) 22388

2. For what value of k, –4 is a zero of the polynomial $x^2 - x - (2k + 2)$?

   a) 7 b) 8 c) 9 d) 10

3. If the pair of linear equations $3x + y = 3$ and $6x + ky = 8$ does not have a solution, then the value of k is

   a) 2 b) –3
   c) 0 d) 1

4. The non-zero value of k for which the quadratic equation $3x^2 - kx + k = 0$ has equal roots, is

   a) 10 b) 11
   c) 12 d) 14

5. Which term of the AP 2, –1, –4, –7, ... is – 40?

   a) 8^{th} b) 11^{th}
   c) 15^{th} d) 23^{rd}

6. If the point p(k, 0) divides the line segment joining the points A(2, –2) and B(–7, 4) in the ratio 1 : 2, then the value of k is

   a) 1 b) 2
   c) –2 d) –1

7. The probability of passing a certain test is $\frac{x}{24}$. If the probability of not passing is $\frac{7}{8}$, then x is equal to

   a) 2 b) 3
   c) 4 d) 6

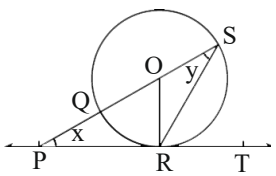
8. If in two triangles $\triangle FED$ and $\triangle PQR$, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is not true ?

   a) $\frac{EF}{PR} = \frac{DF}{PQ}$ b) $\frac{DE}{QR} = \frac{EF}{QP}$
   c) $\frac{DE}{QR} = \frac{DF}{PQ}$ d) $\frac{EF}{RP} = \frac{DE}{QR}$

9. 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

10. In the given figure, PT is a tangent to a circle with centre O, at point R. If diameter SQ is produced, it meets with PT at point P with $\angle SPR = x$ and $\angle QSR = y$, then the value of $\angle x + 2\angle y$ is



a) 60^0 b) 30^0
c) 0^0 d) 90^0

11. $\sin^6\theta + \cos^6\theta$ is equal to

a) $3\sin^2\theta\cos^2\theta$ b) $(\sin^3\theta + \cos^3\theta)^2$

c) $\frac{3\sin^3\theta\cos^3\theta}{\text{cosec}\theta\sec\theta}$ d) $1-3\sin^2\theta\cos^2\theta$

12. If the perimeter and the area of a circle are numerically equal, then the radius of the circle is

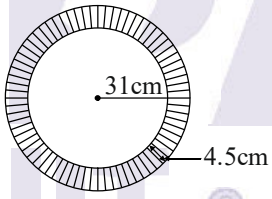
a) 2 units b) π units
c) 4 units d) 7 units

13. If $8\tan\theta = 15$, then the value of $\sin\theta - \cos\theta$ is

a) $\frac{7}{17}$ b) $\frac{17}{7}$

c) $\frac{15}{17}$ d) $\frac{8}{17}$

14. The area of the shaded portion is



a) 940.5 cm^2 b) 930.5 cm^2
c) 400.5 cm^2 d) 510.5 cm^2

15. If $\tan^2 45^0 - \cos^2 30^0 = x \sin 45^0 \cos 45^0$, then the value of x is

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

c) 2 d) $\frac{1}{3}$

16. Which of the following numbers cannot be the probability of happening of an event?

a) 0 b) $\frac{7}{0.01}$

c) 0.07 d) $\frac{0.07}{3}$

17. C is mid-point of PQ is P is (4, x), C is (y, –1) and Q is (–2, 4), then x and y respectively are

a) –6 and 1 b) –6 and 2
c) 6 and –1 d) 6 and 2

18. If every term of the statistical data consisting of n terms is decreased by 2, then the mean of the data is

a) decreases by 2
b) remains unchanged
c) decreases by 2n
d) decreases by 1

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):** The common difference of an AP, whose n^{th} term is $a_n = (3n + 7)$, is 3.

Reason(R): The n^{th} term of an AP is $a_n = a + (n - 1)d$.

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) :** Total surface area of the top is the sum of the curved surface area of the hemisphere and the curved surface area of the cone.

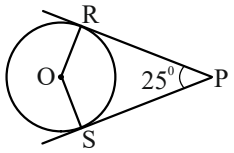
Reason (R) : Top is obtained by fixing the plane surfaces of the hemisphere and cone together.

SECTION B

Section B consists of 5 questions of 2 marks each.

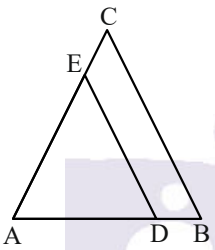
21. Using prime factorisation, find HCF and LCM of 96 and 120.

22. In the given figure, if $\angle RPS = 25^0$, then find the value of $\angle ROS$



23. In given figure, DE || BC. If AD = x.

DB = x – 2, AE = x + 2 and EC = x - 1, Find the value of x.



24. Prove that

$(\text{cosec } A - \sin A)(\sec A - \cos A) = \dfrac{1}{\tan A + \cot A}$

OR

If $\cos\theta + \sin\theta = \sqrt{2}\cos\theta$, then prove that $\cos\theta - \sin\theta = \sqrt{2}\sin\theta$

25. The short and long hands of a clock are 6 cm and 8 cm long. respectively. Then, find the sum of the distance travelled by their tips in 1 day. [take $\pi = 22/7$]

OR

The radius of the wheel of a bus is 25 cm. If the speed of the bus is 33 km/h, then how many revolutions will the wheel make in 1 min?

SECTION C

Section C consists of 6 questions of 3 marks each.

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

27. If α and β are the zeroes of the quadratic polynomial $f(x) = 3x^2 - 5x - 2$, then find the value of $\alpha^3 + \beta^3$.

28. Three chairs and two tables cost Rs. 1850 Five chairs and three tables cost Rs 2850. Find the cost of seven chairs and three tables.

OR

The sum of a two-digit number and the number obtained by reversing the digits is 66. If the digit of the number differ by 2. Find the number. How many such numbers are there?

29. Prove that the angle between the two tangents drawn from external point to a circle is supplementary to the angle sub-tended by the line segment joining the points of contact at the centre.

OR

The radii of two concentric circles are 13 cm and 8 cm. AB is a diameter of the bigger circle. BD is a tangent to the smaller circle touching it at D. Find the length AD.

30. If $\tan A = n \tan B$ and $\sin A = m \sin B$, then prove that $\cos^2 A = \dfrac{m^2 - 1}{n^2 - 1}$.

31. A bag contains 18 balls out of which, x balls are red.

i) If one ball is drawn at random from the bag. then what is the probability that it is red ball?

ii) If 2 more red balls are put in the bag, then the probability of drawing a red ball will be 9/8 times that of probability of red ball coming in part (i). Find the value of x.

SECTION D

Section D consists of 4 questions of 5 marks each.

32. A motor boat whose speed is 18 km/h in still water takes 1 h more to go 24 km upstream than to return downstream to the same spot. Find the speed of stream.

OR

Two water taps together can fill a tank in $9\frac{3}{8}$ h. The tap of larger diameter takes 10 h less than the smaller one to fill the tank separately.Find the time in which each tap can seperately fill the tank.

33. BL and CM are medians of $\triangle ABC$ right angled at A. Prove that

$$4\left(BL^2 + CM^2\right) = 5BC^2$$

34. From a solid cylinder whose height is 12 cm and diameter is 10 cm, a conical cavity of same height and same diameter is hollowed out. Find the volume and total surface area of the remaining solid.

OR

A right angled triangle whose sides are 3 cm and 4 cm (other than hypotenuse) is made to revolve about its hypotenuse. Find the volume and surface area of the double cone, so formed. [choose the value of π as found appropriate]

35. If the median of the distribution given below is 30, then find the values of x and y.

Class interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	Total
Number of Student	5	x	20	15	y	5	60

SECTION E

Case study based questions are compulsory.

36. Your friend Veer wants to participate in a 200 m race. He can currently run that distance in 51 sec and with each day of practice it takes him 2 sec less. He wants to do in 31 sec.

i) If n^{th} term of an AP is given by $a_n = 2n + 3$, then find the common difference of an AP. 1

ii) Find the term s of AP for the given situation and determine the 10th terms from the end. 2

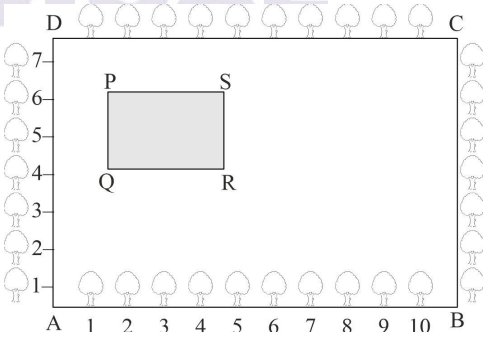
OR

What is the minimum number of days he needs to practice till his goal is achieved?

iii) Find the value of x, for which 2x, x + 10, 3x + 2 are three consecutive terms of an AP. 1

37. **Tree Plantation to control Pollution**

The class X students of a secondary school in Krishnagar have been alloted a rectangular plot of land for this gardening activity.



Sapling of Gulmohar are planted on the boundary at a distance of 1 m from each other. There is a rectangular gracy lawn in the plot as shown in above figure.

The students sowing seeds of flowering plants on the remaining area of the plot.

i) Find the coordinates of point Q and S. 1

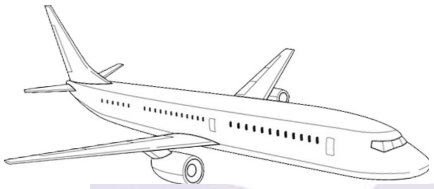
ii) If the point m divides the line QS in the ratio 3 : 2, then find the coordinates of m. 2

OR

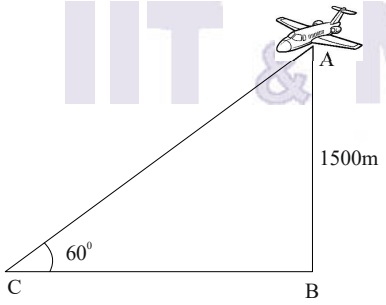
If the point G divides the line QR in the ratio 1 : 2, then find the coordinates of G.

iii) Find the distance between the vertices of diagonal Q and S. 1

38. **Flight Features :** The aviation technology has evolved many upgradations in the last few years. It has taken in account, speed, direction, and distance as well as other features of the flight. Even the wind plays a vital role, when a plane travels.



Angle of elevation : The angle of elevation of an object viewed is the angle formed by the line of sight with the horizontal when it is above the horizontal level.



Based on the above information, answer the following questions

i) If the point C moves towards the point B, then how does the angle of elevation vary? 1

ii) Find the distance of point C from the object. 2

OR

What is the value of distance BC ?

iii) If angle of elevation changes from 60^0 to 45^0, then what will be the new distance of BC? 1

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