Directorate of Education, GNCT of Delhi

Practice Paper (Session: 2023-24)

Class – X

Subject – Mathematics

Max. Marks: 80   **Duration: 3 hours**

General Instructions:

1. This Question Paper has 5 Sections 'A', 'B', 'C', 'D' and 'E'.
2. Section A has 20 MCQs carrying 1 mark each
3. Section B has 5 questions carrying 02 marks each.
4. Section C has 6 questions carrying 03 marks each.
5. Section D has 4 questions carrying 05 marks each.
6. Section E has 3 case based questions (04 marks each) with sub parts of the values of 1, 1 and 2 marks each respectively.
7. All Questions are compulsory. However, an internal choice in 2 Questions of 5 marks, 2 Questions of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E.
8. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.
9. Use of calculator is not permitted.
   <u>Please do write down the Serial Number of the question before attempting it.</u>

SECTION A

Section A consists of 20 questions of 1 mark each.

1. The probability of happening of an event is $\frac{3}{7}$. The probability of not happening of that event is :

   (a) $\frac{1}{10}$ (b) $\frac{4}{7}$ (c) $\frac{2}{5}$ (d) $\frac{3}{10}$

2. The value of m for which the system of equations $6x - 3y + 10 = 0$ and $2x - my = -9$ has no solution is:

   (a) -1   (b) 1   (c) -3   (d) 3

3. HCF of co-prime numbers is always _____ .

   (a) 0   (b) 1   (c) largest number   (d) product of all numbers

4. If α and β are the zeroes of the polynomial p(x) = x^2 – ax – b, then the value of $\alpha^2 + \beta^2$ is:

   (a) $a^2 - 2b$ (b) $a^2 + 2b$ (c) $b^2 - 2a$ (d) $b^2 + 2a$

5. A quadratic polynomial, sum of whose zeroes is -3 and product is -10 is :
    (a) $x^2 - 3x - 10$ (b) $x^2 - 3x + 10$ (c) $x^2 + 3x + 10$ (d) $x^2 + 3x - 10$

6. Given that HCF (336,54) is 6 then LCM (336,54) is :
    (a) 3024   (b) 3360   (c) 2688   (d) 2016

7. The prime factorization of 234 is:
    (a) 2 x 2 x 3 x 13   (b) 2 x 3 x 3 x 13
    (c) 2 x 3 x 13   (d) 2 x 2 x 2 x 13

8. The area of a quadrant of a circle having radius 14 cm is: (Take $\pi = \frac{22}{7}$)
    (a) 145 cm^2 (b) 186 cm^2 (c) 168 cm^2 (d) 154 cm^2

9. The median of the given data with the observations in ascending order is 27.5.The value of x is:
    24, 25, 26, x+2, x+3, 30, 33, 37
    (a) 25   (b) 27   (c) 27.5   (d) 25.5

10. In the given figure, AP, AQ and BC are tangents to the circle. If AB = 5 cm, AC = 6 cm and BC = 4 cm, then the length of AP (in cm) is :
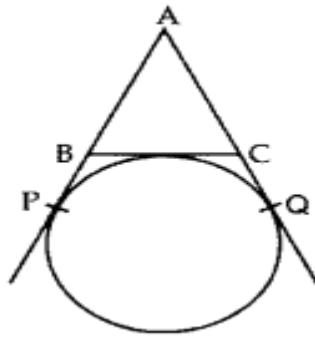

    (a) 4.5   (b) 7.5   (c) 5   (d) 5.5

11. A bag contains 6 red balls and 5 blue balls. One ball is drawn at random. The probability of getting a blue ball is:
    (a) $\frac{6}{11}$ (b) $\frac{5}{11}$ (c) $\frac{6}{5}$ (d) $\frac{5}{6}$

12. A pair of linear equations of two variables has unique solution. What type of lines will its graph represent?
    (a) parallel   (b) intersecting   (c) co - incident   (d) perpendicular

13. If $\triangle ABC \sim \triangle DEF$ and $\angle A = 45^0$, $\angle C = 55^0$, then the value of $\angle E$ is:
    (a) 45^0 (b) 75^0 (c) 55^0 (d) 80^0

14. A pendulum swings through an angle of 30^0 and describes an arc 17.6 cm in length. The length of pendulum is:
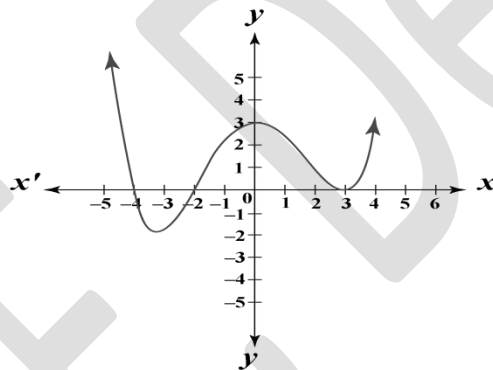
  (a) 26.2 cm   (b) 33.6 cm   (c) 28.5 cm   (d) 32.4 cm

15. A surveyor wants to find out the height of a tower. He measures $\angle A$ as $\tan A = \frac{3}{4}$ .What is the height of the tower if A is 40 m from its base as shown in the figure?

40 m
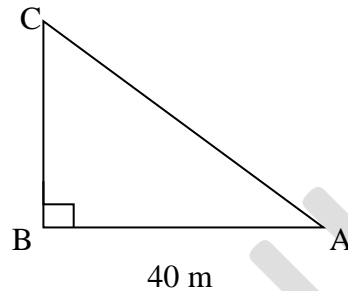
  (a) 20 m   (b) 10 m   (c) 30 m   (d) 40 m

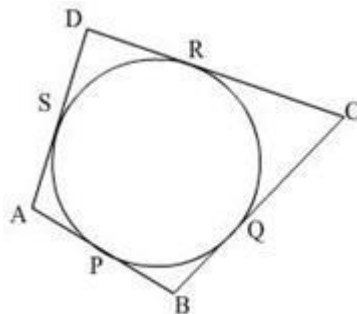16. The number of zeroes of the polynomial shown in the below graph is :

  (a) 1   (b) 2   (c) 4   (d) 3

17. If $\operatorname{cosec} \theta = \frac{3}{2}$, then $4(\operatorname{cosec}^2\theta + \cot^2\theta)$ is equal to :

  (a) 18   (b) 10   (c) 14   (d) 6

18. In the given figure, the quadrilateral ABCD circumscribes a circle. Here PB + CR is equal to :

  (a) AB   (b) BC   (c) CD   (d) AD

Directions for Q 19 & 20 : There is one Assertion (A) and one Reason (R). Choose the correct answer of these questions from the four options (a),(b),(c) and (d) given below :

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

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

    (c)   Assertion (A) is true but reason (R) is false.

    (d)   Assertion (A) is false but reason (R) is true.

19. Assertion (A) : a,b,c are in AP if and only if $2b = a + c$

    Reason (R) : The sum of first n odd natural numbers is n^2 .

20. Assertion (A) : If the points A(4,3) and B(x,5) lie on a circle with centre O(2,3) then the value of x is 2.

   Reason (R) : The centre of a circle is the mid-point of each chord of the circle.

SECTION –B

Section B consists of 5 questions of 2 marks each.

21. Find the area of a sector of a circle with the radius 6 cm if angle of the sector is 60^0 .

<div align="center">OR</div>

    The minute hand of a clock is 12 cm long. Find the area of the face of the clock described by the minute hand in 35 minutes.

22. In the given figure, find the value of x which will make DE‖ BC.
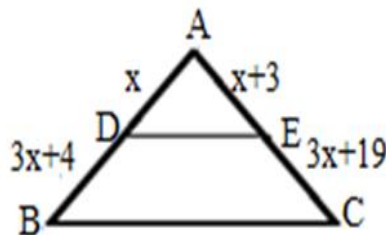
23. If $\cos A = \frac{7}{25}$, find the value of tan A + cot A.

<div align="center">OR</div>

    If $5x = sec\theta$ and $\frac{5}{x} = tan\theta$, then find the value of $5\left(\frac{x^2-1}{x^2}\right)$.

24. A right triangle having sides a, b and c ,where c is the hypotenuse, is circumscribing a circle. Prove that the radius r of the circle is given by r $= \frac{(a+b-c)}{2}$.

25. How many terms of the AP: 24 , 21 , 18…… must be taken so that their sum is 78?
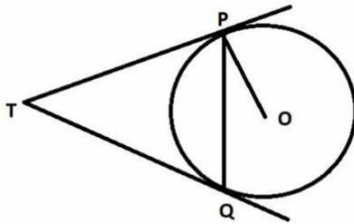
SECTION – C

Section C consists of 6 questions of 3 marks each.

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

27. Prove that: $\dfrac{(cos\theta - sin\theta + 1)}{(cos\theta + sin\theta + 1)} = cosec\ \theta + cot\ \theta$

28. In figure, two tangents TP and TQ are drawn to a circle with centre O from an external point P. Prove that ∠PTQ=2 ∠OPQ.

29. 90 cards numbered from 1 to 90 are placed in a box. If one card is drawn at random from the box find the probability that it is:
    (i)   a two-digit number
    (ii) a perfect square
    (iii) a number divisible by 5.

<div align="center">OR</div>

Red queen and a black jack are removed from a pack of 52 playing cards. Find the probability that the card drawn from the remaining cards is:
    (i)   a red card
    (ii) neither a jack nor a king
    (iii) either a king or a queen.

30. Find the value of p for which the quadratic equation $px(x – 2) + 6 = 0$ has two equal roots.

<div align="center">OR</div>

One year ago, a man was 8 times as old as his son. At present, his age is equal to the square of his son's age in years. Find their present ages.

31. A well of diameter 3m is dug 14m deep. The earth taken out of it has been spread evenly all-around tit in the shape of a circular ring of width 4m to form a embankment. Find the height of the embankment.

SECTION – D

Section D consists of 4 questions of 5 marks each.

32. Find the number of terms in an A.P. 18,15,12,......., – 48 and also the sum of all its terms.

33. State and prove Basic Proportionality Theorem.

34. Prove that the points A(0, -1), B(-2, 3), C(6, 7) and D(8, 3) are the vertices of a rectangle ABCD.

OR

Points A(-1, y) and B(5, 7) lie on a circle with centre O(2, -3y). Find the values of y. Hence find the radius of the circle.

35. A statue which is x m tall stands on the top of 100m long pedestal from a point on the ground. The angle of elevation of the top of the statue is 60^0 and from the same point, the angle of elevation of the top of the pedestal is 45^0. Find the height of the statue.

OR

Two poles of equal heights are standing opposite each other on either side of the road, which is 100 m wide. The angles of elevation of the top of the poles, from a point between them on the road, are 30^0 and 60^0 respectively. Find the height of the poles and the distances of the point from the poles. (See in figure)
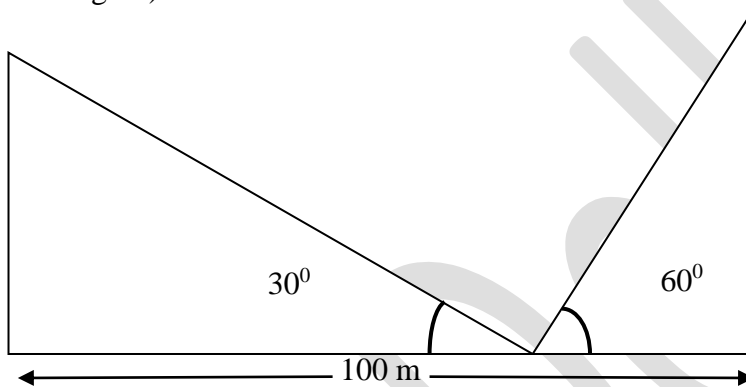
SECTION – E

Section E has 3 case based questions of 04 marks each.

36. Currency is a medium of exchange for goods and services. Ashok made a payment to shopkeeper, for the article he purchased, in the denomination of ₹500 and ₹ 20. He paid ₹ 2640 to the shopkeeper. If all the denomination of ₹ 500 is to be changed by ₹ 100 then the boy could have paid ₹ 640 only. Assume the number of currency notes of ₹ 500 as 'f' and the number of currency notes of ₹ 20 as 'g'.

Based on the above information, answer the following questions:
  i) Write a linear equation representing the amount paid by Ashok.   1

ii) If Ashok had to pay ₹ 2800 to the shopkeeper, how many ₹20 notes did he need? 1

iii) Find the number of notes in the denomination of ₹500 Ashok had? 2

OR

How many total currency notes did Ashok gave to shopkeeper?

37. All the students were very excited for the Annual Sports Day celebration in the school. In a running competition, the time taken by students was noted down. The following data was obtained:

Time (in seconds)	0-20	20-40	40-60	60-80	80-100
No. of students	1	4	3	7	5

Based on the above information, answer the following questions:

i) Find the sum of the lower limits of the median class and modal class. 1

ii) What is the class mark of modal class? 1

iii) Find the mean of the above distribution. 2

OR

Find the median run time (in seconds).

38. An engineer is planning to make all the Pillars of the Metro green with plants to make these beautiful and to contribute for healthy environment as shown in the picture. Observe the picture and answer the questions if dimension of one pillar is 1.5 m X 1.5 m X 20 m.

Based on the above information, answer the following questions:

i) What is the shape of the pillars? 1

ii) How much cement is used to fill the pillar? 1

iii) Find the lateral surface area of one pillar. 2

OR

Find the cost of the plantation if it costs ₹ 50 per m^2.