Class- X Session- 2024-25

Subject- Mathematics (Standard)

SP1

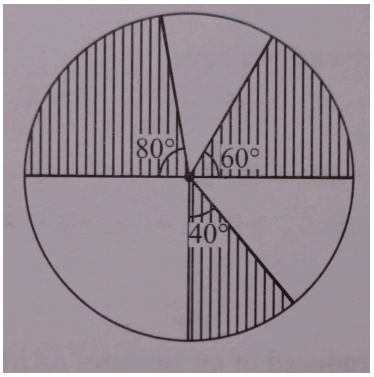
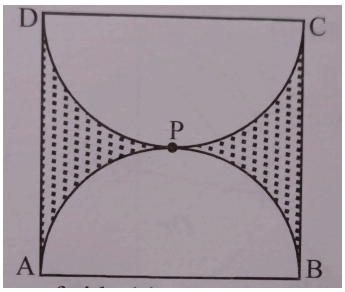
Time Allowed: 3 Hrs. **Maximum Marks : 80**

General Instructions:

1. This Question Paper has 5 Sections A-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 integrated units of assessment (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 2Qs of 5 marks, 2 Qs 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

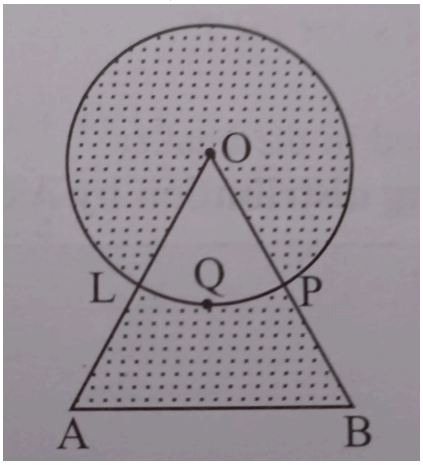
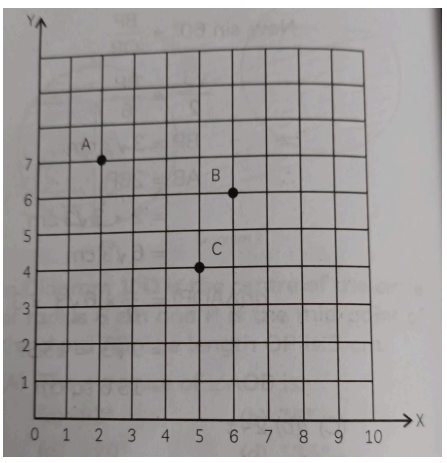
58. Draw neat figures wherever required. Take π =22/7 wherever required if not stated.

S.NO	SECTION A **Section A consists of 20 questions of 1 mark each.**	MARKS
1	If $m = pq^3$ and $n = p^3q$ then find the HCF(m, n).	1
2	If HCF (336,54) = 6 ,then find the LCM (336,54)	1
3	Find the difference between the zeros of the polynomial $3x^2 - 7x + 4$, without finding the zeros.	1
4	If α and β are the zeroes of the polynomial $x^2 + 3x + 6$. Find the value of $\alpha^2 + \beta^2$.	1
5	Find the value of k if the product of the roots of the equation $x^2 - 9x + k = 10$ is 5.	1
6	Find the distance between two points whose coordinates are $(3cos\theta, -3sin\theta)$ and $(-3cos\theta, 3sin\theta)$.	1
7	If $sinA = \frac{24}{25}$ then find the value of $cosA$	1
8	The radii of the two circles are 4cm and 3cm respectively. Find the diameter of the circle having an area equal to the sum of the areas of the two circles	1
9	In the given figure, three sectors of a circle of radius 7 cm, making angles 60°,80° , and 40° at the center are shaded. Find the area of the shaded region.	1

		
10	Find the perimeter of the shaded region in the figure, if ABCD is a square of side 14 cm and APB and CPD are semi circles. 	1
11	If mean and mode of a distribution are 26.7 and 25.6 respectively. Find the median of the distribution.	1
12	If $u_i = \frac{x_i - 20}{10}$, $\Sigma f_i u_i = 30$ and $\Sigma f_i = 40$, then find the mean $\bar{x}$.	1
13	If a letter of the English alphabet is chosen at random then what is the probability that the letter is a consonant ?	1
14	A bag contains 3 red, 5 black and 7 red balls. A ball is drawn from the bag at random. What is the probability that the ball drawn is not black?	1
15	Write the probability of getting 53 Saturdays in a non-leap year.	1
16	For what values of k, the lines $(k + 1)x + 3ky + 15 = 0$ $5x + ky + 5 = 0$ intersect?	1
17	Give the condition for a pair of linear equations $a_1x + b_1y + c_1 = 0, a_2x + b_2y + c_2 = 0$ to be dependent.	1
18	The pair of equations $4x - 5y = 7,\ 12x - 15y + 21 = 0$ have _____ solutions.	1
	DIRECTION: In question number 19 and 20, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option	
19	***Statement A (Assertion):*** The ratio in which the y-axis divide the line segment joining points (-3, -4) and (1, -2) is 3 :1 ***Statement R(Reason)*** **:** The coordinates of a point P(x,y) that divides the line segment joining the points A (x1,y1) and B(x2,y2) in the ratio m:n is $P(x, y) = (\frac{mx_2 + nx_1}{m+n}, \frac{my_2 + ny_1}{m+n})$	1

	(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 and 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	***Statement A (Assertion):*** sinA=$\frac{\sqrt{3}}{2}$ and cosB=$\frac{1}{\sqrt{2}}$ then A-B = 30 ***Statement R(Reason)*** **:** Trigonometric ratios are applied in a right angled triangle only. (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 and reason for (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.	1
	SECTION B **Section B consists of 5 questions of 2 marks each.**	
21	If $\frac{1}{3}$ is a zero of polynomial $p(x) = 2x^3 + 3x^2 - kx + 7$. Find the value of k.	2
22	If α, β are zeros of $x^2 + 5x + 5$, find the values of $\alpha^{-1} + \beta^{-1}$. OR If the sum of the zeroes of the quadratic polynomial $ky^2 + 2y - 3k$ is equal to twice their product, find the value of k.	2
23	The sum of two natural numbers is 240 and they are in the ratio 3;5. Find the numbers.	2
24	If $sinA = \frac{1}{2}$ and $cosB = \frac{1}{2}$ then find $cot(B - A)$ OR If $tan\,\theta = \frac{3}{4}$, the value of $\frac{4\,sin\theta - 2\,cos\theta}{4\,sin\theta + 3\,cos\,\theta}$	2
25	The radius of the wheel is 0.25 m. How many revolutions will it make in covering 11000 m? **OR** The perimeter of a circle is equal to twice that of square, then find the ratio of their areas.	2
	SECTION C **Section C consists of 6 questions of 3 marks each.**	
26	Prove $\sqrt{3} + \sqrt{4}$ is an irrational number.	3
27	If one zero of the polynomial $x^2 - 8x + k$ exceeds the other by 2, find the value of k.	3

28	If $\sqrt{3}\ sin\theta\ =\ cos\ \theta$, find the value of $\frac{sin\ \theta\ .\ tan\ \theta\ (1+cot\ \theta)}{sin\ \theta + cos\ \theta}$	3
29	Find the missing frequencies in the following distribution, given that median of the distribution is Rs 41.50 and the total number of observations is 100: Daily Earnings (in Rs): 10 - 20 | 20 - 30 | 30 - 40 | 40 - 50 | 50 - 60 | 60 - 70 Number of persons: 4 | 28 | f_1 | 20 | f_2 | 16 OR Find the median for the following data: Marks: Less than 10 | Less than 30 | Less than 30 | Less than 70 | Less than 90 | Less than 110 | Less than 130 | Less than 150 Number of Students: 0 | 10 | 25 | 43 | 65 | 87 | 96 | 100	3
30	A test was conducted and marks of 100 students were recorded as follows.Find the mode Marks: No of students 20-30: 4 30-40: 12 40-50: 14 50-60: 16 60-70: 20 70-80: 16 80-90: 10 90-100: 8	3
31	The probability of getting a rotten egg from a lot of 400 eggs is ¼. Find the number of the good eggs OR A bag contains cards which are numbered from 2 to 90. A card is drawn a random from the bag. Find the probability that it bears (i) a two digit number (ii) a perfect square (iii) a number not divisible by 2	3
	SECTION D **Section D consists of 4 questions of 5 marks each**	

32	Solve graphically $2x + 3y = 12$ and $2y - 1 = x$. Determine the coordinates of the vertices of the triangle formed by the lines represented by these equations with the x-axis. OR Solve graphically the following system of equations $2x - 3y - 6 = 0$ $2x + y + 10 = 0.$ Shade the region enclosed between the two lines and x-axis. Also find the area of the shaded region.	5
33	Using the distance formula, prove that the points A(3,2), B(-2,-3) and C(2,3) form a triangle OR The center of a circle is $(x + 2,\ x - 1)$ .Find x if the circle passes through (2,-2) and (8, -2).	5
34	Prove that $\frac{tanA}{1-cotA} + \frac{cotA}{1-tanA} = 1 + tanA + cotA = 1 + secA\, cosecA$	5
35	Find the area of the shaded region in the figure, where a circle of radius 6 cm has been drawn with vertex O of an equilateral triangle OAB of side 12 cm. ($\Pi = 3.14$, $\sqrt{3}$ =1.73) 	5
	SECTION E **Case study based questions are compulsory.**	
36	The Resident Welfare Association (RWA) of a M2K Society in Azadpur have put up three electric poles A, B and C in a society's common park near Tower A. Despite these three poles, some parts of the park are still in dark. So, RWA decides to have one more electric pole D in the park.  	

	(A) Find the position of the pole C (B) Find the distance of the pole B form the corner O of the park OR Find the distance between poles A and C (C) The position of the fourth pole D so that four points A, B, C and D form a parallelogram	1 2 1
37	A bread manufacturer wants to know the lifetime of the product. For this, he tested the life time of 400 packets of bread. The following tables gives the distribution of the life time of 400 packets. **Lifetime (in hours)** / **Number of packets (Cumulative frequency)** 150 – 200 : 14 200 – 250 : 70 250 – 300 : 130 300 – 350 : 216 350 – 400 : 290 400 – 450 : 352 450 – 500 : 400 Based on the above information, answer the following questions. (i) If m be the class mark and b be the upper limit of a class in a continuous frequency distribution, then find the lower limit of the class (ii) Find the average lifetime of a packet OR Find the median lifetime of a packet (iii) If empirical formula is used, then find the modal lifetime of a packet	1 2 1
38	A linguist is performing statistical analysis of word frequency distributions as part of her quantitative stylistics to understand the measurable aspects of the lexical structure. She picks a random newspaper sentence (structure of which is shown below) that has 20 words in it. *The* (1) *quality* (2) *magnification* (8) *is thorough.* (20) Number of words (1-20) The number of letters in each word is counted and the table below shows the frequency distribution: **Number of letters**: 2 3 4 5 6 7 **Frequency**: 1 4 5 3 5 2	

	(A) A word is chosen a randomly from the whole sentence. What is the probability that it has 4 letters? (B) A word is chosen at random from those with an odd number of letters. What is the probability that it has 7 letters? (C) One person chooses a word at random from the whole sentence, Another person then chooses a word at random from the whole sentence. What is the probability that the first person chooses a 2-letter word and the second person chooses a 6-letter word? OR Find the mean number of letters in the whole sentence.	1 1 2