This Question Paper contains 12 printed pages.
(Section - A, B, C & D)

Sl.No:

12 (E)

(MARCH, 2024)

Time : 3 Hours] ***[Maximum Marks : 80***

Instructions :

1) **Write in a clear legible handwriting.**
2) **This question paper has four Sections A, B, C & D and Question Numbers from 1 to 54.**
3) **All Sections are compulsory. General options are given.**
4) **The numbers to the right represent the marks of the question.**
5) **Draw neat diagrams wherever necessary.**
6) **New sections should be written in a new page. Write the answers in numerical order.**
7) **Calculator, digital watch or smart watch is not allowed.**

SECTION - A

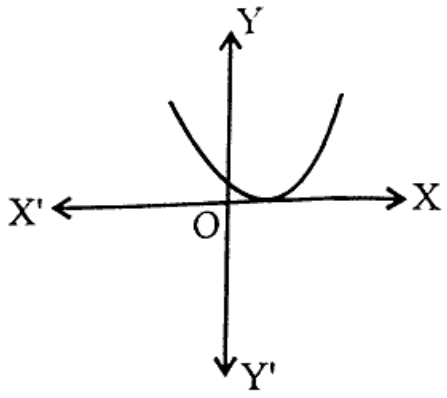
- **Answer the following as per instruction given (Questions : 1 to 24) (1 mark each).** **[24]**
- **Choose the correct option from the question given below (Questions : 1 to 6).**

1) If HCF (85, 153) = 85 m – 153 then m = _____. **[1]**

(A) 1 (B) 2

(C) 3 (D) 4

2) The graph of $y = P(x)$ is given below, the number of zeroes of $P(x)$ = _____. [1]



(A) 1 (B) 2

(C) 3 (D) 0

3) $x + 2y - 4 = 0$ and $2x + 4y - 12 = 0$, the geometrical representation of the pair so formed is _____. [1]

(A) Intersecting lines (B) Coincident lines

(C) Parallel lines (D) None of the above

4) If quadratic equation $3x^2 - 4\sqrt{3}x + k = 0$ has two equal roots then k = _____. [1]

(A) 2 (B) –4

(C) –2 (D) 4

5) 30^{th} term of the AP : 10, 7, 4, ... is _____. [1]

(A) 97 (B) 77

(C) –77 (D) –87

6) E and F are points on the sides PQ and PR respectively of a ΔPQR and $EF \| QR$. If PE = 4 cm, PF = 8 cm and RF = 9 cm then QE = _____ cm. [1]

(A) 1.5 (B) 2.5

(C) 4.5 (D) 3.5

■ **Fill in the blanks with correct option as to make the given statement correct (Questions : 7 to 12).**

7) If the distance between the points $(-5,7)$ and $(a,3)$ is $4\sqrt{2}$ then $a =$ _____.

$(0,-1,1)$ **[1]**

8) $\sqrt{1-(\sec^2\theta - \tan^2\theta)} =$ _____. $(2,0,\sqrt{2})$ **[1]**

9) A line intersecting a circle in two points is called a _____. (secant, chord, tangent) **[1]**

10) The minute hand of a clock swept _____ angle in 5 minutes. (10°, 20°, 30°) **[1]**

11) The total surface area of a cone is _____. $(\pi rl,\ 2\pi rh,\ \pi rl + \pi r^2)$ **[1]**

12) If a empirical relationship between the three measures of central tendency is $Z = 3M - 2\bar{x}$ then $\frac{M-\bar{x}}{Z-M} =$ _____. $\left(\frac{1}{2},\ -\frac{1}{2},\ 2\right)$ **[1]**

■ **State whether the following statements are true or false: (Questions : 13 to 16).**

13) The sum of the probability of all the elementary events of an experiment is zero. **[1]**

14) The zero of the linear polynomial $ax + b$ is $-\frac{a}{b}$. **[1]**

15) A quadratic equation $100x^2 - 20x + 1 = 0$ has two equal real roots. **[1]**

16) The distance of a point $P(-6,8)$ from the origin is –10. **[1]**

■ **Answer the following in one sentence or word or figure (Questions : 17 to 20):**

17) If the radius of a sphere is increased by 10% then what percentage of increased in surface area of a sphere. **[1]**

18) What is the mean of first ten Natural numbers? **[1]**

19) What is the HCF of 18 and 81? **[1]**

20) A quadratic equation $9x^2 - mx - 1 = 0$ has two opposite roots then what is the value of m? **[1]**

■ **Match the following pairs : (Questions : 21 to 24)** **[4]**

Pair No. 1 :

	A	B
21)	$\alpha + \beta + \gamma$	(a) $-b/a$
22)	$\frac{1}{\alpha} + \frac{1}{\beta}$	(b) c/a
		(c) $-b/c$

Pair No. 2 :

	A	B
23)	sin30°	(a) 1
24)	tan45°	(b) $\sqrt{3}/2$
		(c) $\sqrt{1/4}$

SECTION - B

■ **Answer the following briefly with calculation : (Any 9) (Questions : 25 to 37) (Each correct answer carries 2 marks).** **[18]**

25) Given that HCF (306, 657) = 9, Find LCM (306, 657). **[2]**

26) Solve the following pair of linear equations $\frac{x}{2}+\frac{2y}{3}=-1$ and $x-\frac{y}{3}=3$. **[2]**

27) Find the roots of the following quadratic equation by factorisation: **[2]**

$\sqrt{2}\,x^2+7x+5\sqrt{2}=0$

28) Find the discriminant of the quadratic equation $2x^2-6x+3=0$ and hence find the nature of its roots. Find them, if they are real. **[2]**

29) Determine the AP whose 3rd term is 5 and the 7th term is 9. **[2]**

30) Evaluate : $2\tan^2 45°+\cos^2 30°-\sin^2 60°$. **[2]**

31) Prove that $\frac{\cos A}{1+\sin A}+\frac{1+\sin A}{\cos A}=2\sec A$. [2]

32) A tangent PQ at a point P of a circle of radius 5 cm meets a line through the centre O at a point Q so that OQ = 12 cm. Find the length of PQ. [2]

33) Two cubes each of volume 64 cm^3 are joined end to end. Find the surface area of the resulting cuboid. [2]

34) Find mode of data for one classical distribution data in the symbols: [2]

$l=3,\ h=2,\ f_0=7,\ f_1=8$ and $f_2=2$

35) The following frequency distribution gives the monthly consumption of electricity of 68 consumers of a locality. Find the mean of the data. [2]

Monthly Consumption (in units)	Number of Consumers
65 - 85	4
85 - 105	5
105 - 125	13
125 - 145	20
145 - 165	14
165 - 185	8
185 - 205	4

36) If $P(A) = (0.8)^2$ then find $P(\bar{A})$. [2]

37) A die is thrown once. Find the probability of getting [2]

i) a prime number

ii) an odd number

SECTION - C

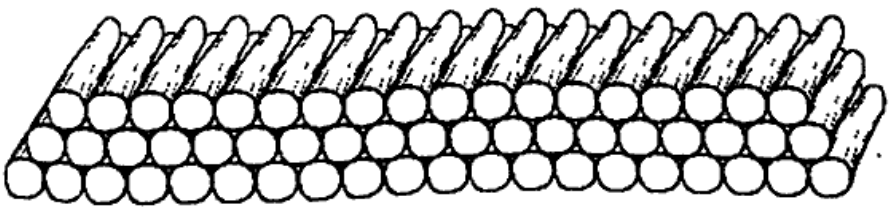
■ **Answer the following as asked with calculation : (Any Six) (Questions : 38 to 46) (Each carries 3 Marks).** [18]

38) Find the zeroes of the polynomial $x^2 - 5$ and verify the relationship between the zeroes and the co-efficients. [3]

39) Find a quadratic polynomial whose zeroes are $\alpha = 5 + \sqrt{3}$ and $\beta = 5 - \sqrt{3}$. [3]

40) Determine the AP whose third term is 16 and the 7^{th} term exceeds the 5^{th} term by 12. [3]

41) 200 logs are stacked in the following manner 20 logs in the bottom row, 19 in the next row, 18 in the row next to it and so on. In how many rows are the 200 logs placed and how many logs are in the top row? [3]

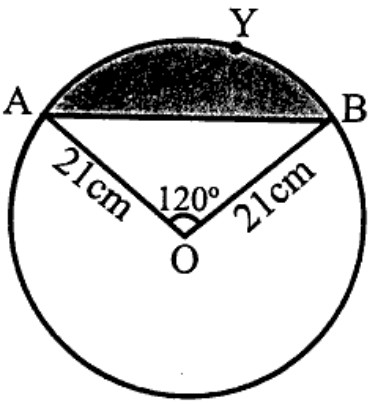


42) Find the ratio in which the line segment joining $A(1,-5)$ and $B(-4,5)$ is divided by the x-axis. Also find the co-ordinates of the point of division. **[3]**

43) Two concentric circles are of radii 5 cm and 3 cm. Find the length of the chord of the larger circle which touches the smaller circle. **[3]**

44) Two tangents TP and TQ are drawn to a circle with centre O from an external point T. Prove that $\angle PTQ = 2\angle OPQ$. **[3]**

45) Find the area of the segment AYB in given figure, if radius of the circle is 21 cm and $\angle AOB = 120°$. $\left(\text{Use } \pi = \frac{22}{7}\right)$ **[3]**



46) Five cards - the ten, jack, queen, king and ace of diamonds are well-shuffled with their face downwards. One card is then picked up at random. **[3]**

i) What is the probability that the card picked up is the queen?

ii) If the queen is drawn and put aside. What is the probability that the second card picked up is:

a) an ace?

b) a queen?

SECTION - D

■ **Answer the following questions : (any Five) (Questions : 47 to 54) (Each carries 4 Marks).** **[20]**

47) The sum of the digits of a two digit number is 9. Also, nine times this number is twice the number obtained by reversing the order of the digits. Find the number. **[4]**

48) A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. Find the speed of the train. **[4]**

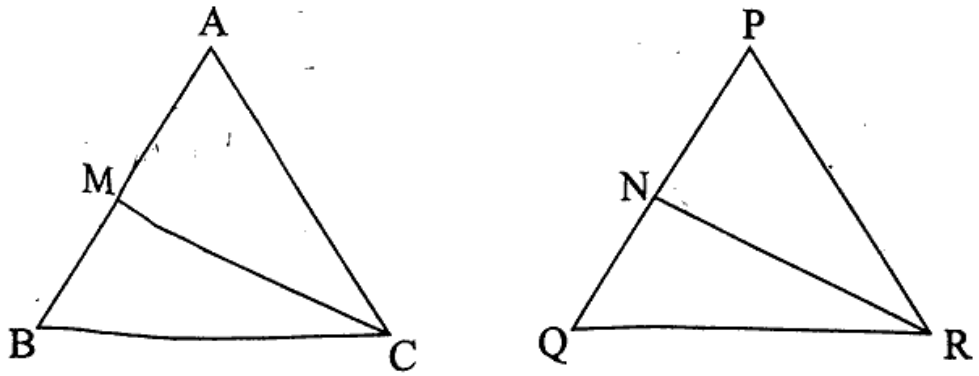
49) State the Basic Proportionality Theorem and prove it. **[4]**

50) In given figure, CM and RN are respectively the medians of ΔABC and ΔPQR. If $\Delta ABC \sim \Delta PQR$, prove that : **[4]**

i) $\Delta AMC \sim \Delta PNR$

ii) $\frac{CM}{RN} = \frac{AB}{PQ}$

iii) $\Delta CMB \sim \Delta RNQ$



51) A 1.5 m tall boy is standing at some distance from a 30 m tall building. The angle of elevation from his eyes to the top of the building increases from 30° to 60° as he walks towards the building. Find the distance he walked towards the building. **[4]**

52) A cubical block of side 7 cm is surmounted by a hemisphere. What is the greatest diameter the hemisphere can have? Find the surface area of the solid. **[4]**

53) Ravi, an engineering student, was asked to make a model shaped like a cylinder with two cones attached at its two ends by using a thin aluminium sheet. The diameter of the model is 3 cm and its length is 12 cm. If each cone has a height of 2 cm, find the volume of air contained in the model that Ravi made. (Assume the outer and inner dimensions of the model to be nearly the same). **[4]**

54) If the median of the distribution given below is 28.5, find the values of x and y. **[4]**

Class Interval	Frequency
0 - 10	5
10 - 20	x
20 - 30	20
30 - 40	15
40 - 50	y
50 - 60	5
Total	60