



## POST MID TERM EXAMINATION (2025-26)

Class: X  
Subject: Mathematics (041)

Duration: 3 hours  
Max. Marks: 80

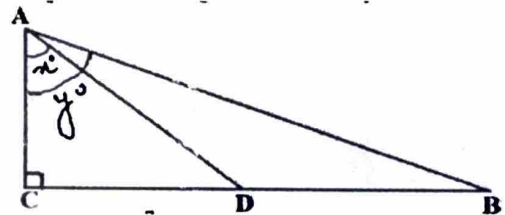
## General Instructions:

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 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 2marks questions of Section E
8. Draw neat figures wherever required. Take  $\pi = 22/7$  wherever required if not stated.

## SECTION A

This section consists of 20 questions of 1 mark each.

- Q 1. In the figure, D is the mid-point of BC, then the value of  $\frac{\cot y^\circ}{\cot x^\circ}$  is
- (A) 2  
(B)  $\frac{1}{2}$   
(C)  $\frac{1}{4}$   
(D) 3

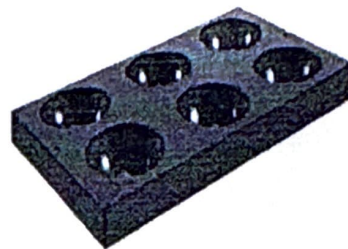


- Q 2. The pair of linear equations  $3x + 4y = k$ ,  $9x + 12y = 6$  has infinitely many solutions if
- (A)  $k = 2$  (B)  $k = 6$   
(C)  $k = 3$  (D)  $k = 4$
- Q 3. Let a and b be two positive integers such that  $a = p^3q^4$  and  $b = p^2q^3$ , where p and q are prime numbers. If  $\text{HCF}(a, b) = p^m q^n$  and  $\text{LCM}(a, b) = p^r q^s$ , then  $(m + n)(r + s)$  is equal to
- (A) 30 (B) 15  
(C) 35 (D) 72
- Q 4. There are 2 containers completely filled with oil. One is a cubical container of side 5 m. Another is a cylindrical container of base diameter 14 m and height 10 m. Oil from both these containers is poured into an empty cuboidal container such that it is half full. What is the capacity of the cuboidal container? (Note: Take  $\pi = 22/7$ )
- (A)  $1665 \text{ m}^3$  (B)  $3330 \text{ m}^3$   
(C)  $12320 \text{ m}^3$  (D)  $12570 \text{ m}^3$
- Q 5. A wheel chair ramp needs to be built from the ground to a door that is 2 m above the ground if the angle of elevation for the ramp is  $30^\circ$ , what should be the length of the ramp?

- (A)  $2\sqrt{3}$  m (B) 2 m  
(C)  $4\sqrt{3}$  m (D) 4 m

Q 6. It is a plastic block of dimensions 20 cm × 10 cm × 4 cm. There are 6 hemispherical moulds in it, each of diameter 4 cm. What is the net volume of the plastic block, excluding the hemispheres?

- (A)  $32\pi$  cm<sup>3</sup>  
(B) 800 cm<sup>3</sup>  
(C)  $(800 - 256\pi)$  cm<sup>3</sup>  
(D)  $(800 - 32\pi)$  cm<sup>3</sup>



(1)

Q 7. In the figure, a hemisphere of radius 2 cm is mounted over a right circular cylinder of radius 5 cm and height 14 cm. The total surface area of the given solid is

- (A)  $169\pi$  cm<sup>2</sup>  
(B)  $194\pi$  cm<sup>2</sup>  
(C)  $198\pi$  cm<sup>2</sup>  
(D)  $202\pi$  cm<sup>2</sup>



(1)

Q 8. The sum of zeroes of the polynomial  $\sqrt{2}x^2 - 17$  are given as

- (A)  $\frac{17\sqrt{2}}{2}$  (B)  $-\frac{17\sqrt{2}}{2}$   
(C) 0 (D) 1

(1)

Q 9. Given below is an arithmetic progression. Find the value of X and Y.

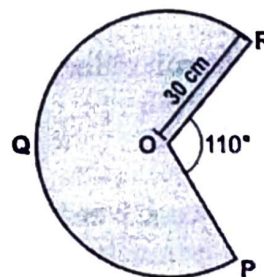
11, X,  $12\frac{1}{2}$ ,  $13\frac{1}{4}$ , Y

- (A)  $X = 11\frac{1}{2}$ ,  $Y = 13\frac{1}{2}$  (B)  $X = 11\frac{1}{2}$ ,  $Y = 14\frac{1}{2}$   
(C)  $X = 11\frac{3}{4}$ ,  $Y = 14\frac{1}{4}$  (D)  $X = 11\frac{3}{4}$ ,  $Y = 14$

(1)

Q10. In the figure, is the remaining part of a circle after removing a sector of angle of  $110^\circ$ . The radius of the circle is 30 cm. O is the centre of the circle. What is the length of the arc PQR?

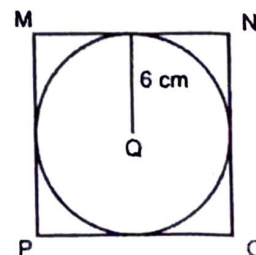
- (A)  $\frac{55\pi}{3}$  cm  
(B)  $\frac{125\pi}{3}$  cm  
(C)  $275\pi$  cm  
(D)  $625\pi$  cm



(1)

Q 11. In the figure, MNOP is a square, and circle with centre Q has a radius of 6 cm. What is the area of the square?

- (A) 24 cm<sup>2</sup>  
(B) 36 cm<sup>2</sup>  
(C) 48 cm<sup>2</sup>  
(D) 144 cm<sup>2</sup>



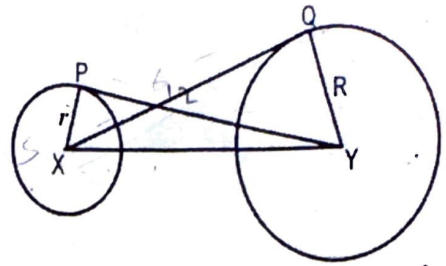
(1)

Q 12. Which point(s) is/are at a distance of 10 units from the point (8, 2)?

i) (0, 8) ii) (0, -4)

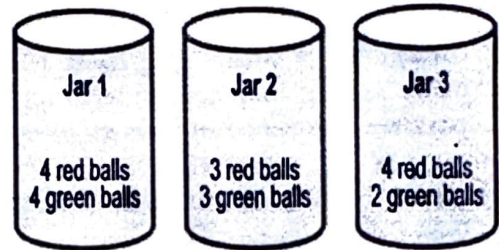
- (A) only i) (B) only ii)  
(C) both i) and ii) (D) neither i) nor ii)

- Q 13. X and Y are the centres of the circles. PY and XQ are tangents. R is the radius of the larger circle and r is the radius of the smaller circle. PY = 12 cm, QX = 8 cm,  $r = 5$  cm. What is the radius of the larger circle (R)?
- (A)  $\sqrt{55}$  cm  
 (B) 7.5 cm  
 (C) 9 cm  
 (D)  $\sqrt{105}$  cm



- Q 14. L (7, -3) is the mid-point of the line segment joining the points M (-16, -11) and N. In which quadrant does the point N lie?
- (A) Quadrant I  
 (B) Quadrant II  
 (C) Quadrant III  
 (D) Quadrant IV

- Q 15. Romy is blindfolded and asked to pick one ball from each of the jars. The chance of Romy picking a red ball is same in
- (A) jars 2 and 3  
 (B) jars 1 and 3  
 (C) jars 1 and 2  
 (D) all the three jars.



- Q 16. The table shows the heights of 50 students in a class. One student of the class is chosen at random. What is the probability that the chosen student's height is 142 cm?
- (A)  $\frac{11}{12}$   
 (B)  $\frac{11}{39}$   
 (C)  $\frac{11}{50}$   
 (D)  $\frac{142}{566}$

Height in cm	Number of students
140	9
141	18
142	11
143	12

- Q 17. The median of grouped data is found using the formula:  $\text{median} = l + \left\{ \frac{(n/2 - cf)}{f} \right\} \times h$  What does f stand for in this formula?
- (A) The frequency of the median class.  
 (B) The cumulative frequency of the median class.  
 (C) The frequency of the class preceding the median class.  
 (D) The cumulative frequency of the class preceding the median class.
- Q 18. The mode and median of a distribution were found to be 22 and 26 respectively. Which of these is the best estimate to the mean using the empirical relation between the mean, median and mode?
- (A) 15.5  
 (B) 28  
 (C) 29  
 (D) 34

**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.

- (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.

- Q 19. **Statement A (Assertion):** If  $\text{HCF}(a, b) = 4$  and  $ab = 96 \times 404$ , then  $\text{LCM}(a, b) = 9696$ . (1)  
**Statement R(Reason):** LCM of two numbers 'a' and 'b' =  $ab \div \text{HCF}$  ✓
- Q 20. **Statement A(Assertion):** At a given point on a circle, more than one tangent can be drawn. (1)  
**Statement R(Reason):** There can be more than one tangent to a circle from a point that lies outside the circle. d

**SECTION B**

**This section consists of 5 questions of 2 marks each.**

- Q 21. If  $\cos(A + 2B) = 0^\circ$ ,  $0^\circ \leq (A + 2B) \leq 90^\circ$  and  $\cos(B - A) = \frac{\sqrt{3}}{2}$ ,  $0^\circ \leq (B - A) \leq 90^\circ$ , then find the value of  $\text{cosec}(2A + B)$ . Show complete working. (2)
- Q 22. 105 donkeys, 140 cows and 175 goats have to be taken across a river. There is only one boat which will have to make many trips in order to do so. The lazy boatman has his own conditions for transporting them. He insists that he will take the same number of animals in every trip and they have to be of the same kind. He will naturally like to take the largest possible number of animals each time. Find how many animals went in each trip? (2)
- Q 23. If  $A(5, 2)$ ,  $B(2, -2)$  and  $C(-2, t)$  are the vertices of a right angled triangle with  $\angle B = 90^\circ$ , then find the value of  $t$ . (2)
- Q 24. (A) Two different dice are thrown together. Find the probability that the numbers obtained  
 (i) is a doublet of even numbers?  
 (ii) have a product less than 25? (2)

**OR**

(B) A die is numbered in such a way that its faces show the numbers 1, 3, 3, 4, 2, 6. It is thrown twice and the product of the score is noted. Complete the table and find

- (i) probability of the product to be 18.  
 (ii) probability of the product to be less than 10.

Number in the first column

Number in the first Row

x	1	3	3	4	2	6
1	1	3	3	4	2	6
2						
3	3		9			
4						
6		18			12	
5						

- Q25. (A) The points  $(2, 5)$ ,  $(2, 10)$  and  $(6, 10)$  are the three vertices of a rectangle. Find the fourth vertex? (2)
- OR**
- (B) Find the point which divides the join of  $(-1, 6)$  and  $(7, -2)$  in the ratio 3:5?

**SECTION C**

**This section consists of 6 questions of 3 marks each.**

- Q 26. (A) Prove that  $\sin \theta(1 + \tan \theta) + \cos \theta(1 + \cot \theta) = \sec \theta + \text{cosec } \theta$ . (3)

**OR**

(B) If  $m = \cos \theta - \sin \theta$ , and  $n = \cos \theta + \sin \theta$ , show that  $\sqrt{\frac{m}{n}} + \sqrt{\frac{n}{m}} = \frac{2}{\sqrt{1 - \tan^2 \theta}}$

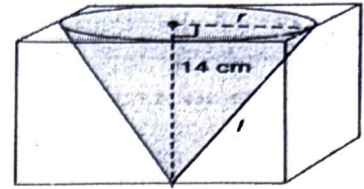
- Q 27. There are 156, 208 and 260 students in groups A, B and C, respectively. Buses are to be hired for a field trip. Find the minimum number of buses to be hired, if the same number of students of the same group should be accommodated in each bus. (3)

- Q 28. (A) If  $\alpha$  and  $\beta$  are the zeroes of  $x^2 - x - 2$ , form a quadratic polynomial whose zeroes are  $2\alpha + 1$  and  $2\beta + 1$ . (3)

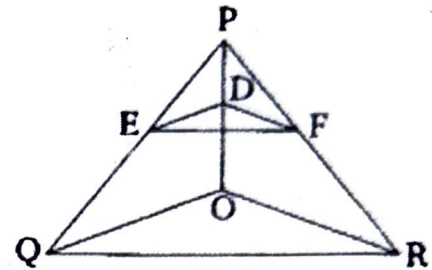
OR

(B) Find the zeroes of a quadratic polynomial  $f(x) = p(x^2 + 1) - x(p^2 + 1)$  and verify the relationship between the zeroes and the coefficients.

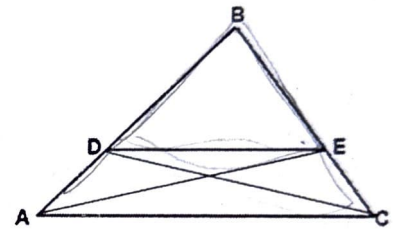
- Q 29. A cone of maximum size is carved out from a cube of edge 14 cm. Find the surface area of the cone and of the remaining solid left out after the cone carved out. (Use  $\sqrt{5} = 2.24$ ) (3)



- Q 30. In the given figure,  $DE \parallel OQ$  and  $DF \parallel OR$ . Show that  $EF \parallel QR$ . (3)



- Q 31. In  $\Delta ABC$ ,  $AE$  and  $CD$  are respectively perpendiculars to  $BC$  and  $AB$ . Show that  
 (i)  $\Delta ABE \sim \Delta CBD$   
 (ii)  $BA \times CD = CB \times AE$   
 (iii)  $\Delta ABC \sim \Delta DBE$   
 (iv)  $AB \times BE = BC \times BD$  (3)



### SECTION D

This section consists of 4 questions of 5 marks each.

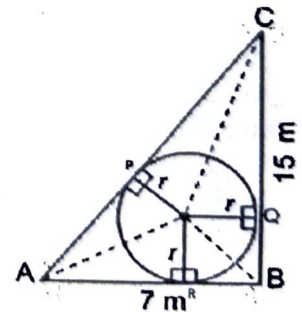
- Q 32. (A) Solve the pair of equations:  $217x + 131y = 913$   
 $131x + 217y = 827$  (5)

OR

(B) Susan invested certain amount of money in two schemes A and B, which offer interest at the rate of 8 % per annum and 9 % per annum respectively. She received ₹1860 as annual interest. However, had she interchanged the amounts of investments in the two schemes, she would have received ₹20 more as annual interest. How much money did she invest in each scheme?

- Q 33. A backyard is in the shape of a  $\Delta ABC$  with right angled at B,  $AB = 7$  M and  $BC = 15$  m. A circular pit was dug inside it such that it touches the walls  $AC$ ,  $BC$  and  $AB$  at  $P$ ,  $Q$  and  $R$  respectively such that  $AP = x$  m. Answer the following questions: (5)

- (i) Find the length of  $AR$  in terms of  $x$ . Give reason.  
 (ii) Write the type of quadrilateral  $BQOR$ .  
 (iii) Find the area of  $\Delta ABC$   
 (iv) Find the length  $PC$  in terms of  $x$  and hence find the value of  $x$ .



- Q 34. Survey manager of Verka dairy has recorded monthly expenditure on milk of 100 families of a housing society, which is given in the frequency distribution table. Find the detailed answers to the following questions (5)

Monthly Expenditure (in ₹)	0-175	175-350	350-525	525-700	700-875	875-1050	1050-1225
No. of families	10	14	15	x	28	7	5

- How many families spend between ₹ 525 - ₹ 700 on milk?
- What is the upper limit of median class?
- What is the median expenditure on milk?
- What is the lower limit of modal class?
- What is the modal expenditure on milk?

Q 35. (A) ₹ 9000 were divided equally among a certain number of persons. Had there been 20 more persons, each would have got ₹160 less. Find the original number of persons. (5)

OR

(B) Solve for x :  $5^{2x} - 3 \times 5^{2x+1} - 250 = 0$   $5^{2x} \times 5 - 3 \times 5^{2x} \times 5^1 - 250 = 0$

### SECTION E

This section consists of 3 Case-study based questions of 4 marks each.

Q 36. Shekhar is analyzing a sequence of numbers in a puzzle. The numbers, which include both positive and negative values, are written in cards arranged in a row following an arithmetic progression. On his first try, Shekhar identifies the 6<sup>th</sup> and 14<sup>th</sup> numbers in the sequence and finds that their sum is - 76. On his second try, he checks the 8<sup>th</sup> and 16<sup>th</sup> numbers and discovers that their sum -96. Based on the above information, answer the following questions.

- What is the difference between the numbers on any two consecutive cards? (1)
  - What is the number on the first card? (1)
  - (A) What is the number on the 19<sup>th</sup> card? (2)
- OR
- (B) What is the number on the 23<sup>rd</sup> card? (2)

Q 37. An archery target board consists of three concentric circles with centre O. The innermost circle has a radius of 7 cm, the middle circle has a radius of 14 m and the outer circle has a radius of 28 cm. The target board is divided into four equal parts by AC and BD, which are the diameters of the outermost circle. The scoring system of the game is as follows:

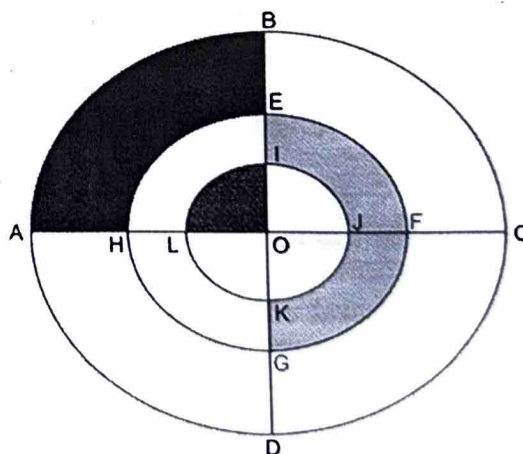
Area LIO = 10 points

Area KJIEFG = 7 points

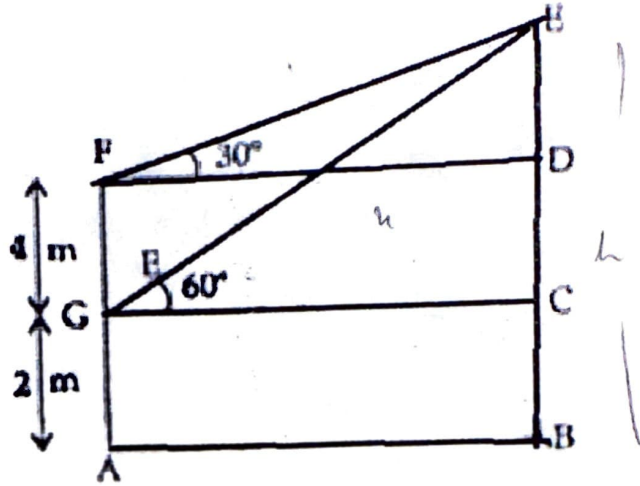
Area ABEH = 4 points

Based on the above information, answer the following questions:

- Find the area of the sector in which 10 points can be scored. Show working. (1)
  - Find the Area KJIEFG. Show working. (1)
  - (A) Find the length of the boundary in which 4 points can be scored. Show working. (2)
- OR
- (B) Find the area of the boundary in which 4 points can be scored. Show working.



Q 38. There are two windows in a house. First window is at the height of 2m above the ground and other window is at 4m vertically above the lower window. Ankit and Radha are sitting inside the two windows at points G and F respectively. At an instant, the angles of elevation of a balloon at E from these windows are observed to be  $60^\circ$  and  $30^\circ$  respectively as shown. Given the height of the balloon from the ground is  $h$  and the horizontal distance between wall and point just below balloon is  $x$  m. Based on the above information, answer the following questions.



(i) Who is closer to the balloon? Why?

(ii) What is the value of  $x$ ?

(iii) (A) Find the value of  $h$ .

OR

(B) Find the length of EC.

(1)

(2)

(1)