*Answers to this paper must be written on the single line paper.*
*You will not be allowed to write during the first 15 minutes.*
*The time at the head of this paper is the time allowed for writing the answers.*

*Attempt all questions from **Section A** and **any four** questions from **Section B**.*
***All working, including rough work, must be clearly shown and must be done on the same***
*sheet as the rest of the answer.*
***Omission of essential working will result in loss of marks.***

## Section A

**Question 1:**

**(i) . For any positive integer n, $n^3 - n$ is**

 **(a) divisible by 8**

 **(b) divisible by 11**

 **(c) divisible by 7**

**(d) divisible by 6**

**(ii) The constant should be added and subtracted to solve the quadratic equation $4x^2 - \sqrt{3}x - 5 = 0$ by the method of completing the square is**

 **(a) 9/16**

 **(b) 3/16**

 **(c) ¾**

 **(d) √3/4**

**(iii) For the following distribution:**

| Class: | 0 - 5 | 5 – 10 | 10 – 15 | 15 – 20 | 20 – 25 |
|--------|-------|--------|---------|---------|---------|
| Frequency: | 10 | 15 | 12 | 20 | 9 |

**the sum of lower limits of the median class and modal class is**

 **(a) 15**

**(b) 25**

**(c) 30**

 **(d) 35**

**(iv) Input GST paid by the shopkeeper to the dealer is ₹ 5000 and**

**output GST collected by the shopkeeper from a consumer is ₹5,500.**

**GST paid by the shopkeeper to the government is**

(a) ₹ 5,000

(b) ₹ 5,500

c) ₹ 500

d) ₹ 1,000

(v) If the point P(2, 1) lies on the line segment joining points A(4, 2) and B(8, 4), then

(a) AP = (1/3)AB

(b) AP = PB

(c) PB = (1/3)AB

(d) AP = (1/2)AB

(vi) . 12 solid spheres of the same size are made by melting a solid metallic cylinder of base diameter 2 cm and height 16 cm. The radius of each sphere is

(a) 2 cm

(b) 1.5 cm

(c) 1 cm

(d) 3 cm

(vii) If the area of a sector of a circle of radius 36 cm is 54 π cm2 , then the length of the corresponding arc of the sector is

(a) 2π cm

(b) 5π cm

(c) 3π cm

(d) 4π cm

(viii) At one end A of a diameter AB of a circle of radius 5 cm, tangent XAY is drawn to the circle. The length of the chord CD parallel to XY and at a distance 8 cm from A is

(a) 4 cm

(b) 5 cm

(c) 6 cm

(d) 8 cm

(ix) If the angles of elevation of the top of a tower from two points at the distance of 9 m and 4 m from the base of tower and in the same straight line with it are complementary, then the height of the tower (in m) is

(a) 8

 (b) 7

(c) 6

(d) 10

(x)  If the first term of an AP is –5 and the common difference is 2, then the sum of the first 6 terms is

(a) 0

(b) 5

(c) 6

 (d) 15

(xi)  If in a triangle, square of one side is equal to the sum of the squares of the other two sides, then the angle opposite the first side is

 (a) an acute angle

 (b) obtuse angle

(c) a right angle

 (d) a reflex angle

(xii)  Graphically, the pair of equations $6x - 3y + 10 = 0$ and $2x - y + 9 = 0$ represents two lines which are

 (a) parallel

 (b) intersecting at exactly two points

 (c) coincident

 (d) intersecting at exactly one point

(xiii)  A girl calculates that the probability of her winning the first prize in a lottery is 0.08. If 6000 tickets are sold, how many tickets has she bought?

 (a) 40

 (b) 240

(c) 480

 (d) 750

(xiv) The zeroes of the quadratic polynomial x2 + kx + k, k ≠ 0,

 (a) cannot both be positive

 (b) cannot both be negative

 (c) are always unequal

(d) are always equal

(xv)

The median of a grouped frequency distribution is found graphically by drawing:

(a)  a linear graph

(b)  a histogram

(c)  a frequency polygon

(d)  a cumulative frequency curve

Question 2:

(i)      Find the ratio in which the x-axis divides internally the line joining points A (6, -4) and
          B ( -3, 8).

(ii)     Four rotten apples are accidently mixed with 15 good ones. One apple is picked at random. What is the probability that it is a good one?

(iii)    In the given figure , AC is a tangent to circle at point B. ΔEFD is an equilateral triangle and ∠CBD = 40°. Find:
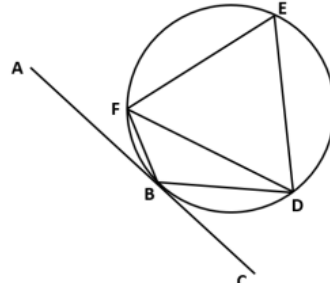
(a) ∠BFD
(b) ∠FBD
(c) ∠ABF

**Question 3:**

(i)     A drone camera is used to shoot an object P from two different positions R and S along the same vertical line QRS. The angle of depression of the object P from these two positions are 35° and **6666°** respectively as shown in the diagram. If the distance of the object P from point Q is 50 metres, then find the distance between R and S correct to the nearest meter.
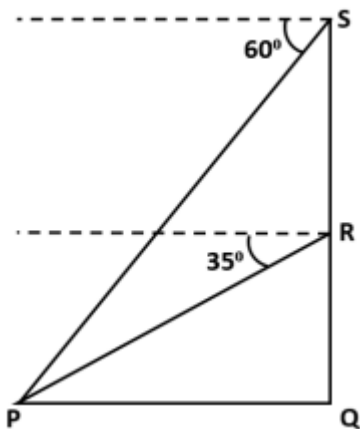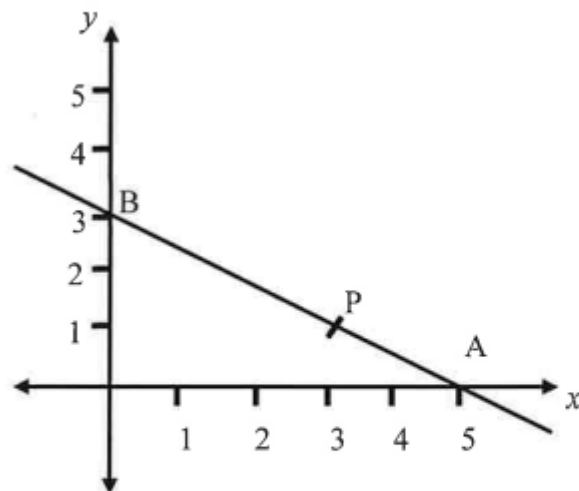


(ii) In the given figure, PT is a tangent to the circle at T, chord BA is produced to meet the tangent at P. Perpendicular BC bisects the chord TA at C. If PA = 9cm and TB = 7cm, find the lengths of:

(a) AB

(b) PT
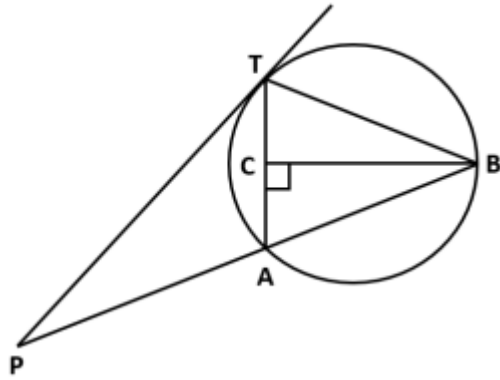
**(iii)**

From the given figure:



(a) Write down the coordinates of A and B.

(b) If P divides AB in the ratio 2:3, find the coordinates of point P

(c) Find the equation of a line parallel to line AB and passing through origin.

**Section B**

**Question 4:**

**(i)How many solid right circular cylinders of radius 2 cm and height 3 cm can be made by melting a solid right circular cylinder of diameter 12 cm and height 15 cm?**

(ii)
$$\frac{\cos^2 A}{\cos A - \sin A} + \frac{\sin A}{1 - \cot A} = \sin A + \cos A$$

**(iii)** Use graph paper for this question, take 2 cm = 10 marks along one axis and 2 cm = 10 students along the other axis. The following table shows the distribution of marks in a 50 marks test in Mathematics:

| Marks | 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 |
|---|---|---|---|---|---|
| No. of Students | 6 | 10 | 13 | 7 | 4 |

**Question 6:**

**(i)** Find the equation of the perpendicular dropped from the point P (-1,2) onto the line joining A (1,4) and B (2,3).

**(ii)** A solid piece of wooden cone is of radius OP = 7 cm and height OQ = 12 cm. A cylinder whose radius and height equal to half of that of the cone is drilled out from this piece of wooden cone. Find the volume of the remaining piece of wood. (Use, $\pi$ = **22/7** )
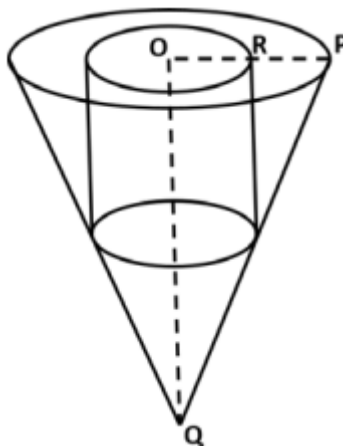


**(iii)** Use a graph sheet for this question, take 2cm = 1 unit along both x and y axis:

**(a)** Plot the points A (3,2) and B (5,0). Reflect point A on the y-axis to A´. Write co-ordinates of A´.

**(b)** Reflect point B on the line AA´ to B´. Write the co-ordinates of B´.
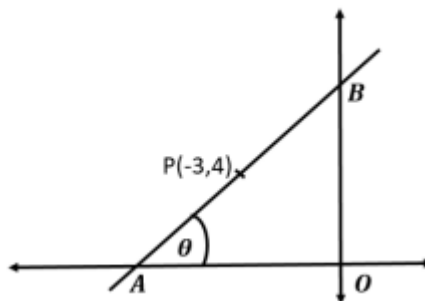
**(c)** Name the closed figure A'B'AB.

**Question 7:**

**(i)** In the given figure, the sides of the quadrilateral PQRS touches the circle at A,B,C and D. If RC = 4 cm, RQ = 7 cm and PD = 5cm. Find the length of PQ



**(ii)** Prove that:

$$\frac{sin^3\theta + cos^3\theta}{sin\,\theta + cos\,\theta} = 1 - sin\,\theta\,cos\,\theta$$
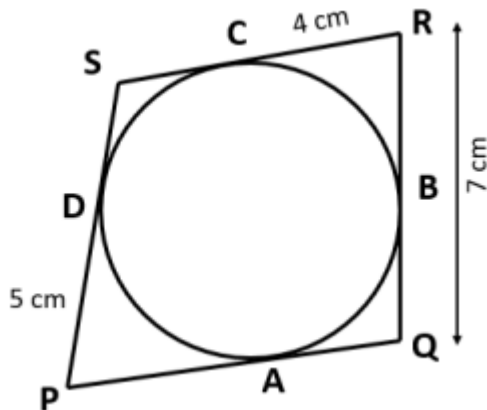
**(iii)** In the given diagram, OA = OB, $\angle OOOOOO = \theta\theta\;aaaaaa$ the line AB passes through point P (-3, 4).



Find: (a) Slope and inclination ($\theta$) of the line AB

(c) Equation of the line A

## Question 8:

i) A box contains tokens numbered 5 to 16. A token is drawn at random. Find the probability that the token drawn bears a number divisible by:

(a) 5

(b) Neither by 2 nor by 3

(ii)  An aeroplane is flying horizontally along a straight line at a height of 3000 m from the ground at a speed of 160 m/s. Find the time it would take for the angle of elevation of

the plane as seen from a particular point on the ground to change from 60⁰ to 45⁰. Give your answer correct to the nearest second.

**Question 9**

**(i(Given that the mean of the following frequency distribution is 30, find the missing frequency 'f'**

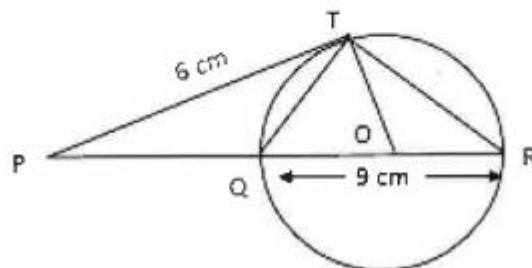| Class Interval | 0 – 10 | 10 – 20 | 20–30 | 30 –40 | 40 – 50 | 50 – 60 |
|---|---|---|---|---|---|---|
| Frequency | 4 | 6 | 10 | f | 6 | 4 |

**Question 10:**

**(i)**

$A = \begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix}, B = \begin{bmatrix} 6 \\ 1 \end{bmatrix}$ and $C = \begin{bmatrix} -4 \\ 5 \end{bmatrix}$, Evaluate AB – 5C

**(ii)**

In the given figure, O is the centre of circle. The tangent PT meets the diameter RQ produced at P.

(a) Prove $\triangle PQT \sim \triangle PTR$

(b) If $PT = 6\ cm, QR = 9\ cm$. Find the length of PQ



**(iii)**

Factorise the given polynomial completely, using Remainder Theorem:

$6x^3 + 25x^2 + 31x + 10$