

SECTION A

ALL QUESTIONS ARE COMPULSORY:

Q1) a) Given $P = \{x: 5 < 2x-1 \leq 11, x \in \mathbb{R}\}$ L4

$Q = \{x: -1 \leq 3+4x < 23, x \in \mathbb{Z}\}$

Represent P and Q on two different number lines.
Write down the elements of $P \cap Q$.

b) ₹ 250 is divided equally among certain number of children. If there were 25 children more, each would have received 50 paise less. Find the number of children. L3

c) What least number must be subtracted from each of the numbers 7, 17 and 47 so that the remainders are in continued proportion? L3

Q2) a) Find the value of 'k' if $x-2$ is a factor of $x^3 + 2x^2 - kx + 10$. Hence, determine whether $(x+5)$ is also a factor. L3

b) $A = \begin{bmatrix} 3 & 2 \\ 0 & 5 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 0 \\ 1 & 4 \end{bmatrix}$ L3

find $A^2 - B^2$

c) How many whole numbers, each divisible by 7, lie between 200 and 500? L2

d) Find the 19th term of the series: L2

$\sqrt{3} + \sqrt[3]{3} + \frac{1}{3\sqrt{3}} + \dots$

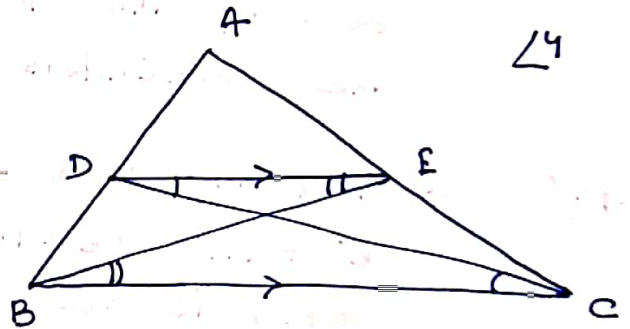
Q37 a) A manufacturer in Bhubaneswar manufactures a machine and marks it at ₹ 6,00,000. He sells the machine to a wholesaler in Satna (M.P) at a discount of 20%. The wholesaler sells the machine to a dealer in Raipur (C.G) at a discount of 10% on the marked price. If the rate of GST is 28%, find the tax paid by the wholesaler to the central-government. $\angle 3$

b) The points $(k, 3)$, $(2, -4)$ and $(-k+1, -2)$ are collinear. Find k . $\angle 3$

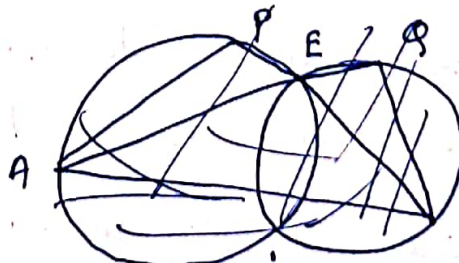
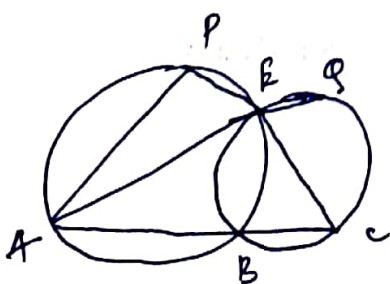
c) In the given figure, DE is parallel to the base BC of triangle ABC and $AD:DB = 5:3$. Find the ratio:

i) $\frac{AD}{AB}$ and then $\frac{DE}{BC}$

ii) $\frac{\text{Area of } \triangle DEF}{\text{Area of } \triangle DEC}$



Q47 a) In the given figure; ABC, AEQ and CEP are straight lines. Show that $\angle APE$ and $\angle CQE$ are supplementary.



b) Draw an inscribing circle of a regular hexagon of side 5.8 cm. ∠3

c) The length of the shadow of a tower standing on level plane is found to be 2y metres longer when the sun's altitude is 30° than when it was 45° . Prove that the height of the tower is $y(\sqrt{3} + 1)$ m. ∠4

SECTION B

Answer any four questions.

Q5 a) The total number of observations in the following distribution table is 120 and their mean is 50. Find the values of missing frequencies f_1 and f_2 . ∠3

class	0-20	20-40	40-60	60-80	80-100
Freq.	17	f_1	32	f_2	19

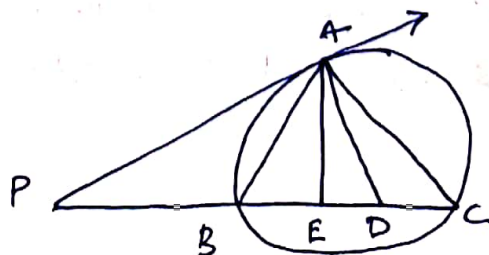
b) Prove:

$$\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A} \quad \angle 3$$

c) In the given fig., PA is a tangent to the circle, PBC is secant and AD bisects $\angle BAC$.

Show that $\triangle PAD$ is an isosceles triangle. ∠4

Show that $\angle CAD = \frac{1}{2} [\angle PBA - \angle PAB]$



Q6) a) From a well-shuffled deck of 52 playing-cards, queen of hearts, Jack of spade, Ace of diamond, 2 number cards of clubs are removed. One card is drawn at random. Find the probability that the card drawn will:

- i) be a black card
- ii) be a face card
- iii) be a face card of red colour.

b) Prove that:

$$\frac{\cos A}{1 - \tan A} + \frac{\sin A}{1 - \cot A} = \cos A + \sin A$$

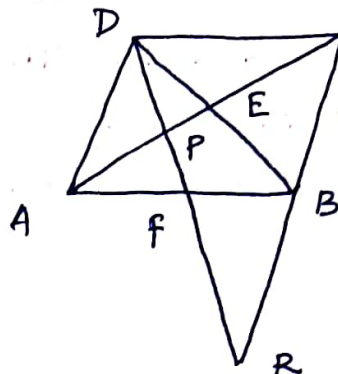
c) A lab assistant has a solution of 50% acid and other which has 25% acid. How much of each should be mixed to make 10 lbs. of 40% acid solution?

Q7) a) A man wished to give ₹ 12 to each person and found that he fell short of ₹ 6 when he wanted to give to all the persons present. He, therefore, distributed ₹ 9 to each person and found that ₹ 9 were left over. How much money did he have and how many persons were there?

b) Find the value of $\sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}$

c) Find the vertices of a triangle, the mid-points of whose sides are (3, 1), (5, 6) and (-3, 2).

- Q87 a) Given: ABCD is a rhombus, DPR and CBR are straight lines. L3

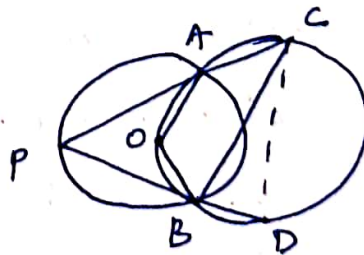


- b) Find the area of the canvas required to make a conical tent 14m high and 96m in diameter. Given that:

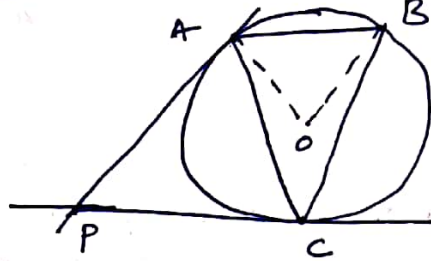
- i) 20% of the canvas is used in folds and stitchings. L3
- ii) Canvas used in folds and stitching is 20% of the curved surface area of the tent.

- c) In the given figure, the centre O of the small circle lies on the circumference of the bigger circle. If $\angle APB = 75^\circ$ and $\angle BCD = 40^\circ$, L4

- find: $\angle AOB$
 $\angle ACB$
 $\angle ABD$
 $\angle ADB$



- Q97 a) In the given fig., O is the centre of the circumcircle ABC. Tangents at A and C intersect at P. Given angle AOB = 140° and angle APC = 80° , find angle BAC. L3



- b) Show that the points P(a, b+c), Q(b, c+a) and R(c, a+b) are collinear. L3
- c) The product of 3rd and 8th terms of a G.P is 243. If its 4th term is 3, find its 7th term. L2
- d) The first term of an A.P is 20 and the sum of its seven terms is 2100; find the 31st term of this A.P. L2

- Q107 a) If $x = \frac{\sqrt{a+1} + \sqrt{a-1}}{\sqrt{a+1} - \sqrt{a-1}}$, using properties of proportion show that: L3

$$x^2 - 2ax + 1 = 0.$$

- b) A man bought an article for ₹x and sold it for ₹16. If his loss was x%, find the cost price of the article. L3
- c) An observer on the top of a cliff, 200m above the sea-level, observes the angles of depression of the two ships to be 45° and 30° respectively. Find the dist. between the ships, if the ships are:
 i) on the same side of the cliff
 ii) on the opp. sides of the cliff L4