GUNDECHA EDUCATION ACADEMY

COMMON PRELIMINARY EXAMINATION 2018-2019

STD: X

$2\frac{1}{2}$ hours

DATE: 03.01.19

Marks: 80

MATHEMATICS

(Two hours and a half)

Answers to this Paper must be written on the paper provided separately.

You will **not** be allowed to write during the first 15 minutes.

This time is to be spent in reading the question paper.

The time given 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.

The intended marks for questions or parts of questions are given in brackets [ ].

Mathematical tables are provided.

SECTION A (40 marks)

Attempt *all* questions from this section

Question 1

(a) Prove that: $(\sec^2 x - 1)\cot^2 x = 1$. $\frac{\cos}{\sin}$ [3]

(b) If $A = \begin{bmatrix} 2 & 3 \\ -1 & x \end{bmatrix}$ and $B = \begin{bmatrix} -0.5 & y \\ 0.5 & -2 \end{bmatrix}$, given $A + 2B = 2I$, I is the identity

matrix of order 2 x 2, find x and y. $\left[x = 6 \quad y = -\frac{3}{2}\right]$ [3]

(c) Find the values of 'p' for which the given quadratic equation has equal

roots $9x^2 + px + 1 = 0$. Also find the roots of x. $\boxed{p = 6}$ [4]

Question 2

(a) In the figure alongside. AD and CB are perpendicular to AB, CO = 6 cm and DO = 9 cm and the area of $\triangle BOC$ = 108 cm², find the area of $\triangle AOD$. [3]
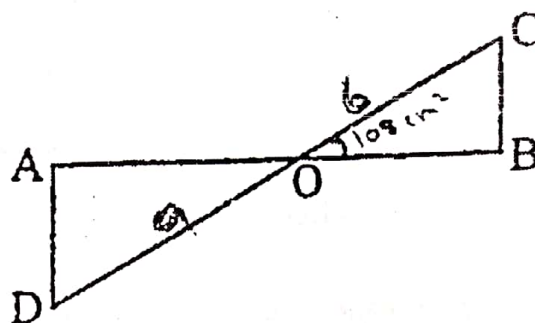
$\boxed{\therefore \; 2.43 \, cm^2}$

(b) A cylinder whose height is 8 cm and radius of its base is 4 cm, is melted. How many spheres of radius 2 cm can be made? $\boxed{24}$ [3]

(c) A straight line passes through the points P(−1, 4) and Q(5, −2). It intersects the co-ordinate axes at points A and B. M is the mid-point of the segment AB. Find : [4]
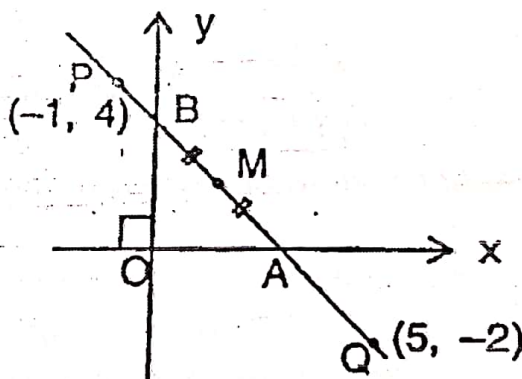
(i) the equation of the line.

(ii) the co-ordinates of A and B.

(iii) the co-ordinates of M.

Question 3

(a) Construct a regular hexagon of side 4.7 cm. Inscribe a circle in it. [3]

(b) If $y = \dfrac{2pq}{p+q}$, then find : $\dfrac{y+p}{y-p} + \dfrac{y+q}{y-q}$ [3]

(c) If 11 is the mean of 3, 8, 11, 2, x, 21, 19, 13, 17, find 'x' and the median of the given data. $\boxed{-74}$ [4]
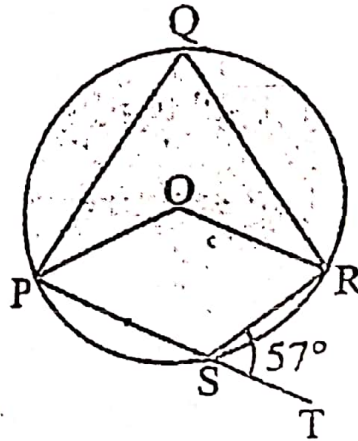

Question 4

(a) Solve the following inequation and represent the solution set on the number line: [3]

$$-2\frac{5}{6} < \frac{1}{2} - \frac{2x}{3} \le 2 \text{, where } x \in N$$ $-2.25 \le x < -3.5$

(b) For what value of k, 2k – 7, k + 5 and 3k + 2 are three consecutive terms of an A.P. $k = 12$ [3]

(c) In the given figure, O is the centre of the circle. Determine :

(i) ∠PQR

(ii) Reflex ∠POR [4]

SECTION B (40 marks)

(Attempt any four questions from this section)

Question 5

(a) If the first term of GP is 3 and the sum of the second and third term is 90. Find the common ratio of G.P. [3]

(b) If $Q = \begin{bmatrix} 3 & -5 \\ -4 & 2 \end{bmatrix}$ and $Q^2 - 5Q = kI$, where I is an identity matrix of order 2 x 2. Find the value of scalar factor k. [3]

(c) The points are A(2, 0) and B(5, –3). [4]

(i) Name the axis in which A is an invariant point.
(ii) Give example of one more point which invariant under the axis found in (i)
(iii) Find B' the image of the point B when reflected in the origin.
(iv) Find the co-ordinate of B" when B is reflected in the Y-axis.

Question 6

(a) A man sells 60 shares. The face value of each share of the company is ₹15 paying 12% dividend. He sells each share at ₹21 and invests proceeds in another company where the face value of each share is ₹6 paying 8% dividend. He buys the shares in the second company at ₹9 each. Find the difference in his dividend earned. [3]

(b). A man is standing on the bank of a river, finds that the angle subtended by a tree on the opposite bank is 60°, he moves 60 m back and observes that the angle of elevation is changed to 30°. Find the height of the tree and the width of the river. [3]

(c) Use ruler and compasses only for the following question. All construction lines and arcs must be clearly shown. Construct a ΔABC in which AB = 7 cm, ∠CAB = 60°, AC = 5 cm. Construct the locus of

(i) Points equidistant from AB and AC.
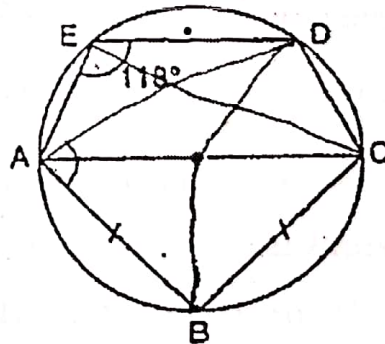
(ii) Points equidistant from BA and BC.

Hence construct a circle touching the three sides of the triangle internally [4]

Question 7

(a) In the adjoining figure; AC is diameter of the circle. AB = BC and ∠AED = 118°. calculate :

(i) ∠DEC (ii) ∠DAB

[3]

(b) A boy spends ₹10 on first day, ₹20 on second day, ₹40 on third day and so on. Find how much, in all, will he spend in 12 days?. $=\boxed{40950}$ [3]

(c) What number must be added to each of the numbers 6, 15, 20 and 43 to make them in proportion? $\boxed{\dfrac{-528}{32}}$ [4]

✓ Question 8

(a) A die has 6 faces marked by the given numbers as shown below : [3]

| 1 | 2 | 3 | -1 | -2 | -3 |

The die is thrown once. What is the probability of getting :

(i) a positive integer? $\frac{1}{2}$

(ii) an integer greater than –3? $\frac{5}{6}$

(iii) the smallest integer? $\boxed{\frac{1}{6}}$

(b) Given that x + 2 and x – 3 are factors of $x^3 + ax + b$; calculate the values of a and b. $\boxed{A = -7}$ $\boxed{b = -6}$ [3]

(c) The given block is made of two solids : a cone and a hemisphere. If the Height and the base radius of the cone are 24 cm and 10 cm respectively and the diameter of the hemisphere is 10 cm; find the total surface area of the block. Correct your answer upto one decimal place.

(Take π = 3.142) [4]
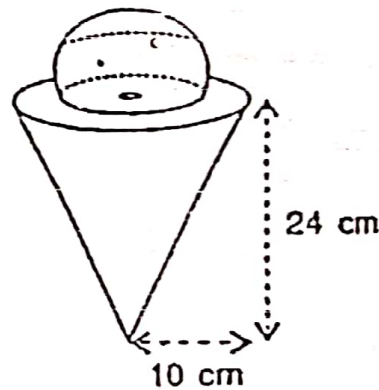
24 cm

10 cm

Question 9

(a) Prove that : $\sqrt{\dfrac{1-\sin A}{1+\sin A}} = \sec A - \tan A$ [3]

(b) The co-ordinates of the centroid of a triangle PQR are (2, –5). If Q(–6, 5), R = (11, 8), calculate the co-ordinate of P. [3]

(c) Five years ago, a woman's age was the square of her son's age. Ten years hence her age will be twice that of her son's age. Find :
(i) the age of the son five years ago.
(ii) the present age of the woman. [4]

Question 10

(a) Solve the following equation for x and give your answer correct to two significant figures :

$$3x^2 + 5x - 9 = 0$$ [4]

(b) The daily wages of 80 workers in a project are given below :

Wages (in ₹)	400–450	450–500	500–550	550–600	600–650	650–700	700–750
No. of workers	2	6	12	18	24	13	5

Use a graph paper to draw an ogive for the above distribution. (Use a scale of 2 cm = ₹ 50 on x-axis and 2 cm = 10 workers on y-axis). Use your ogive to estimate :

(i) the median wages of the workers
(ii) the lower quartile wage of workers
(iii) the number of workers who earn more than ₹ 625 daily. [6]

Question 11

(a) Prove that (x – 2) is a factor of $3x^2 - 5x - 2$. Hence, factorise the given expression. [3]

(b) Aamir has a recurring deposit account in a bank. He deposits ₹ 2500 per month for 2 years. If he gets ₹ 66250 at the time of maturity, find :

(i) the interest paid by the bank.
(ii) the rate of interest. [3]

(c) Find the mode of the following frequency distribution : [4]

Class interval	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Frequency	4	7	9	11	6	2