GREENWOOD HIGH

PRELIMINARY EXAMINATION 1- DECEMBER 2019

SUBJECT – MATHEMATICS

Grade: 10 Time: $2\frac{1}{2}$ hrs

Date: 9/12/2019 Max. Mark: 80

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.

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*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.

This paper consists of 5 printed sides

SECTION A (40 Marks)

(*Attempt all questions from this Section*)

Question 1

a) The polynomials $ax^3 - 7x^2 + 7x - 2$ and $x^3 - 2ax^2 + 8x - 8$ when divided by $x - 2$ leave the same remainder. Find the value of a. [3]

b) Prove the trigonometric identity given below:

$$\frac{\text{Tan } A}{1-Cot\ A} + \frac{Cot\ A}{1-Tan\ A} = 1 + Tan\ A + Cot\ A$$ [3]

c) IQ of 50 students was recorded as follows. [4]

IQ Score	80–90	90–100	100–110	110–120	120–130	130–140
No. of Students	6	9	16	13	4	2

Draw a histogram for the above data and estimate the mode. Also state the modal class.

Question 2

a) It costs Rs 2200 to paint the inner curved surface of a cylindrical tank 10 m deep. If the rate of painting is Rs 20 per m^2, find

i) The inner curved surface area of the tank

ii) The radius of the base

iii) The capacity of the tank in kilo litre. [3]

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b) Find the sum of first 17 terms of an AP, whose 4^{th} and 9^{th} terms are -15 and -30 respectively. [3]

c) Solve the equation $5x^2 - 3x - 4 = 0$ and give your answer correct to 3 significant figures. [4]

Question 3

a) Find x and y if $\begin{bmatrix} 3 & -2 \\ -1 & 4 \end{bmatrix} \begin{bmatrix} 2x \\ 1 \end{bmatrix} + 2\begin{bmatrix} -4 \\ 5 \end{bmatrix} = 4\begin{bmatrix} -2 \\ y \end{bmatrix}$ [3]

b) Richard has a recurring deposit account in a post office for 3 years at 8% per annum SI. If he gets Rs 1998 as interest at the time of maturity, find

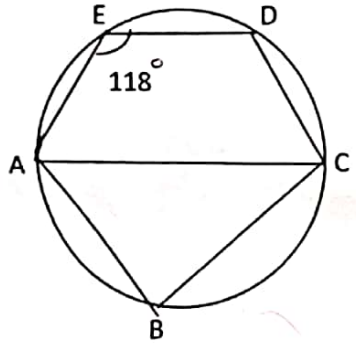
i) The monthly installment

ii) The amount of maturity [3]

c) In the adjoining figure, AC is a diameter of the circle. [4]
If AB = BC, and ∟AED = 118°, then find

i) ∟DEC

ii) ∟DAB



Question 4

a) A child's game has eight triangles of which three are blue and the rest are red, and ten squares of which six are blue and the rest are red. One piece is lost at random. Find the probability that it is a

i) Triangle

ii) Square of blue colour

iii) Triangle of red colour [3]

b) Solve the following inequation and represent the solution set on the number line.
$-3 + x \leq \frac{8x}{3} + 2 \leq \frac{14}{3} + 2x$, where $x \in I$. [3]

c) Find the equation of the line passing through the point $(0, -2)$ and the point of intersection of the lines $4x + 3y = 1$ and $3x - y + 9 = 0$ [4]

SECTION B (40 Marks)

(Attempt any four questions from this section)

Question 5

a) Mr Sharma invests Rs 4500 in 8%, Rs 10 shares at Rs 15. He sells the shares when the price rises to Rs 30 and invests the proceeds in 12 %, Rs 100 shares at Rs 125. Calculate the following:

i) The sale proceeds

ii) The number of Rs 125 shares he buys

iii) The change in his annual income from dividend [3]

b) Given $A \cdot \begin{bmatrix} 3 & 5 \\ 0 & -7 \end{bmatrix} = [6 \quad 3]$. Find

i) The order of matrix A

ii) The Matrix A [3]

c) Use graph paper to answer the following questions. (Take 2 cm = 1 unit on both the axes). [4]

i) Plot the points A(−4 , 2) and B (2 , 4)

ii) A' is the image of A when reflected in the y-axis. Plot it on the graph paper and write the coordinates of A'.

iii) B' is the image of B when reflected in the line AA'. Write the coordinates of B'.

iv) Write the geometric name of the figure ABA' B'.

Question 6

a) The sum of some terms of a GP is 315 whose first term and common ratio are 5 and 2 respectively. Find the last term and the number of terms. [3]

b) Using the properties of proportion, solve for x in the following: [3]

$$\frac{x^4 \div 1}{2x^2} = \frac{17}{8}$$

c) Prove the following trigonometric identity : [4]

$$(1 \div \text{Cot A} \div \text{Tan A})(\text{Sin A} - \text{Cos A}) = \frac{\text{Sec A}}{\text{Cosec}^2\text{A}} - \frac{\text{Cosec A}}{\text{Sec}^2\text{A}}$$

Question 7

a) An article is sold from Jaipur (Rajasthan) to Indore (MP) for Rs 5000 and then from Indore to Bhopal (MP). If the rate of tax under GST system is 18% and the profit made by the dealer in Indore is Rs 2000, Find [3]

i) Net GST payable by the dealer in Indore

ii) CP for the dealer in Bhopal.

b) Find the value of k for which the following quadratic equation has real and equal roots. $k\,x\,(x-2)+6=0$ [3]

c) A model of a ship is made to a scale of 1 : 300. [4]

i) The length of a model is 2m. Calculate the length of the ship.

ii) The area of the deck of the ship is 180000 m². Find the area of the deck of the model.

iii) The volume of the model is 6.5 m³. Calculate the volume of the ship.

Question 8

a) The line joining P(−4, 5) and Q(3,2) intersect the y-axis at R. PM and QN are perpendiculars from P and Q on the x-axis. Find [3]

i) The ratio PR : RQ

ii) The coordinates of R

iii) The area of the quadrilateral PMNQ

b) The weights of 50 apples were recorded as given below. Calculate the mean weight, to the nearest gram, by the Step Deviation Method. [3]

Weight in Grams	80−85	85−90	90−95	95−100	100−105	105−110	110−115
No. of Apples	5	8	10	12	8	4	3

c) Use ruler and compass only for the following question. All construction lines and arcs must be clearly shown: [4]

i) Construct a ΔABC in which BC = 6.5 cm, ∟ABC = 60° , AB = 5 cm.

ii) Construct the locus of points at a distance of 3.5 cm from A.

iii) Construct the locus of points equidistant from AC and BC.

iv) Mark two points X and Y which are at a distance of 3.5 cm from A and also equidistant from AC and BC. Measure XY.

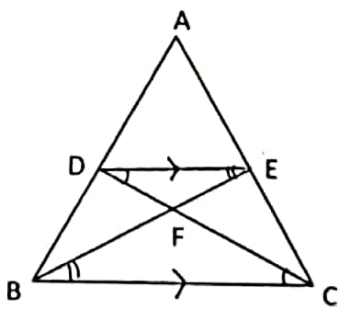
Question 9

a) Which term of AP 4, 11, 18, 25, …. is 42 more than its 25th term. [3]

b) In the given figure, DE || BC of Δ ABC and AD : DB = 5 : 3. Find the ratio: [3]

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

ii) $\frac{ar\,(\Delta DEF)}{ar\,(\Delta DEC)}$

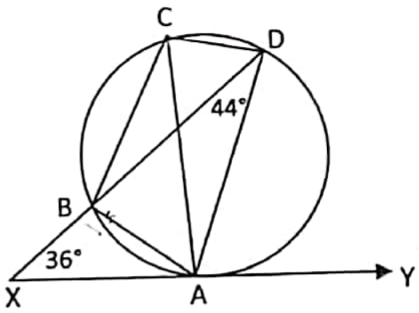


c) A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was Rs 90, find the number of articles produced and cost of each article. [4]

Question 10

a) What number should be subtracted from $2x^3 - 5x^2 + 5x$ so that the resulting polynomial has a factor $2x - 3$. [3]

b) In the adjoining figure, XAY is a tangent. [3]
If ∟BDA = 44°, ∟BXA = 36°, find:
i) ∟BAX
ii) ∟DAY
iii) ∟BCD



c) The surface area of a solid metallic sphere is 2464 cm². It is melted and recast into solid right circular cones of radius 3.5 cm and height 7 cm. Calculate [4]
i) The radius of the sphere
ii) The number of cones recast. (Take $\pi = \frac{22}{7}$)

Question 11

a) Two poles of equal heights are standing opposite to each other on either side of the road which is 80 m wide. From a point between them on the road, the angles of elevation of the top of the poles are 60° and 30° respectively. Find the height of the poles and the distances of the point from the poles to the nearest metre. [4]

b) Attempt this question on graph paper: [6]

Marks obtained by 200 students are given below:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
No. of students	5	10	14	21	25	34	36	27	16	12

Draw an Ogive for the given distribution. From the graph, find
i) The median
ii) The upper quartile
iii) The number of students scoring above 65 marks
iv) If 10 students qualify for merit scholarship, find the minimum marks required to qualify.