Pre- Final Examination 2020

Subject: Mathematics

Inventure Academy

Name:
Grade: 10ICSE

Max Marks: 80
Duration: 2hrs.30min
Date: 13 /1/ 2020

Instructions:

1. Answers to this paper must be written on the paper provided separately.
2. First 15 minutes is to be spent in reading the question paper.
3. The time given at the head of this paper is the time allowed for writing the answers.
4. Attempt **all** questions from **Section A** and any **four** questions from **Section B.**
5. All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer.
6. Omission of essential working will result in loss of marks.
7. The intended marks for questions or parts of questions are given in brackets [ ].

Total Number of Printed Pages: 8

SECTION A:(Answer all the questions)

4 x10=40 Marks

Question 1

(a) A is a dealer in Banaras (U.P.). he supplies goods/services worth Rs. 8000 to a dealer B in Agra (U.P.). Dealer B, in turn, supplies the same goods/services to dealer C in Patna (Bihar) at a profit of Rs. 1200. Find the input and output taxes for the dealer C under GST system; if the rate of GST is 18% and C does not sell his goods/services further. [3]

(b) Mrs Khandelkar invests Rs 900 every month in a recurring deposit account for a period of 3 years at a simple interest rate of 8% pa.

(a) Find the total interest she will earn at the end of the period.

(b) Find the maturity value of her deposits. [3]

(c) Amitesh had 400 shares of Rs 100 each of 'Telco' paying a dividend of 12.5%. He sold them at a market price of Rs 125 and invested the proceeds in Rs 50 shares of 'Adani Motors' available in the market at Rs 80 and paying a dividend of 16%. How many shares of Adani Motors did Amitesh buy and what is the change in his annual income?

[4]

Question 2 [3+3+4]

(a) Solve : $-3 \leq \frac{1}{2} - \frac{2x}{3} \leq 2\frac{2}{3}, x \in N$

(b) Solve the equation $4x^2 - 5x - 3 = 0$ and give your answer correct to two decimal places.

(c) Sixteen cards are labeled as a, b, c, ... m, n, o, p. They are put in a box and shuffled. A boy is asked to draw a card from the box. What is the probability that the card drawn is:

(a) a vowel

(b) a consonant

(c) none of the letters of the word median

Question 3: [3+3+4]

(a) Second term of a geometric progression is 6 and its fifth term is 9 times of its third term. Find the geometric progression. Consider that each term of the G.P.is positive.

(b)

Use a graph sheet for this question.

Take 1 cm = 1 unit along both *x* and *y* axis.

(i) Plot the following points:

A(0,5), B(3,0), C(1,0) and D(1,–5)

(ii) Reflect the points B, C and D on the *y* axis and name them as B', C' and D' respectively.

(iii) Write down the coordinates of B', C' and D'.

(iv) Join the points A, B, C, D, D', C', B', A in order and give a name to the closed figure ABCDD'C'B'.

(c)

Given matrix $A = \begin{bmatrix} 4\sin 30° & \cos 0° \\ \cos 0° & 4\sin 30° \end{bmatrix}$ and $B = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$. If $AX = B$.

(i) Write the order of matrix X.

(ii) Find the matrix 'X'

Question 4: [3+3+4]

(a) Using a ruler and a compass construct a triangle ABC in which AB = 7 cm, ∠CAB = 60° and 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.

(b) A conical tent is to accommodate 77 persons. Each person must have $16m^3$ of air to breathe. Given the radius of the tent as 7 m, find the height of the tent and also its curved surface area.

(c)
If $\frac{7m+2n}{7m-2n}=\frac{5}{3}$, use properties of proportion to find
(i) m:n
(ii) $\frac{m^2+n^2}{m^2-n^2}$

SECTION B:(Answer any four questions) **4 x10=40 Marks**

Question 5: [3+3+4]

(a) (a) A is a dealer in Meerut (U.P.). He supplies goods/services, worth Rs. 15,000 to a dealer B in Ratlam (M.P.). Dealer B, in turn, supplies the same goods/services to dealer C in Jabalpur (M.P.) at a profit of Rs. 3000. If rate of tax (under GST system) is 18%, find
(i) The cost of goods/services to the dealer C in Jabalpur.
(ii) Net tax payable by dealer B.

(b)

An ordinary train takes 3 hours less for a journey of 360kms when its speed is increased by 10km/hr.Fnd the usual speed of the train.

(c)
Find the values of m and n when the polynomial $f(x)= x^3 - 2x^2 + mx + n$ has a factor (x+2) and leaves a remainder 9 when divided by (x+1).

[3+3+4]

Question 6:

(a) Mr. Patel deposit Rs 2,250 per month in a recurring deposit account for a period of 3 years. At the time of maturity, he gets Rs 90,990.

(i) Find the rate of interest per annum.

(ii) Find the total interest earned by Mr. Patel.

(b) If $A = \begin{bmatrix} 1 & 3 \\ 3 & 4 \end{bmatrix}$, $B = \begin{bmatrix} -2 & 1 \\ -3 & 2 \end{bmatrix}$ and $A^2 - 5B^2 = 5C$.

Find the matrix C where C is a 2 by 2 matrix.

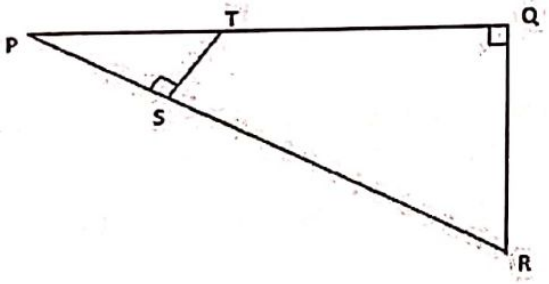
(c) Find three numbers in A.P. whose sum is 24 and whose product is 440.

Question 7:

(a) In the given figure, $\angle PQR = \angle PST = 90°$, PQ = 5 cm and PS = 2 cm.

(i) Prove that $\Delta PQR \sim \Delta PST$.

(ii) Find Area of ΔPQR : Area of quadrilateral SRQT.



(b) How much should a man invest in Rs. 50 shares selling at Rs. 60 to obtain an income of Rs. 450, if the rate of dividend declared is 10%. Also find his yield percent, to the nearest whole number.

(c)

Prove that

$$\frac{\sin\theta - 2\sin^3\theta}{2\cos^3\theta - \cos\theta} = \tan\theta$$

Question 8: [3+3+4]

(a) If b is the mean proportion between a and c, show that

$$\frac{a^4+a^2b^2+b^4}{b^4+b^2c^2+c^4}=\frac{a^2}{c^2}$$

(b) M and N are two points on the X axis and Y axis respectively.

P (3, 2) divides the line segment MN in the ratio 2 : 3.

Find:

(i) the coordinates of M and N

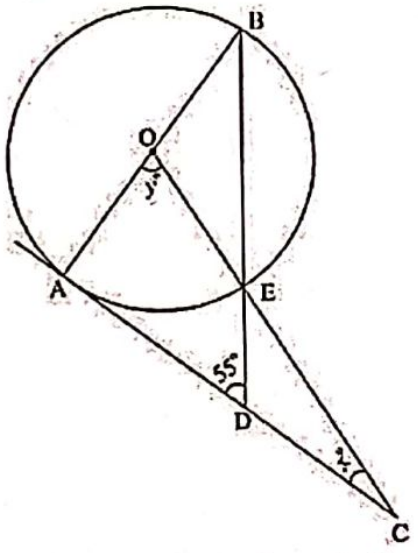
(ii) slope of the line MN.

(c) A cylindrical beaker of 7 cm diameter is partly filled with water. Determine the number of spherical marbles of diameter 1.4 cm that are to be submerged in it to raise the water level by 5.6 cm

Question 9: [3+3+4]

(a) In the given figure AC is a tangent to the circle with centre O.

If $\angle ADB = 55°$, find x and y. Give reasons for your answers.



(b) The model of a building is constructed with the scale factor 1 : 30.

(i) If the height of the model is 80 cm, find the actual height of the building in meters.

(ii) If the actual volume of a tank at the top of the building is 27 m^3, find the volume of the tank on the top of the model.

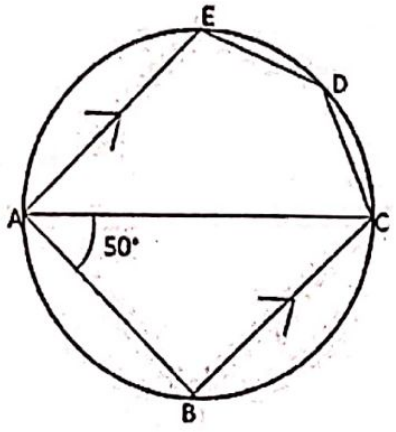
(c) In the given figure, ABCDE is a pentagon inscribed in a circle such that AC is a diameter and side BC//AE. If $\angle BAC = 50°$, find giving reasons:

(i) $\angle ACB$

(ii) $\angle EDC$

(iii) $\angle BEC$

Hence prove that BE is also a diameter



Question 10: [4+3+3]

(a) Use graph paper for this question.

The marks obtained by 120 students in an English test 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	9	16	22	26	18	11	6	4	3

Draw the ogive and hence, estimate:

(i) the median marks.

(ii) the number of students who did not pass the test if the pass percentage was 50.

(iii) the upper quartile marks.

(b) A man observes the angle of elevation of the top of the tower to be 45°. He walks towards it in a horizontal line through its base. On covering 20 m the angle of elevation changes to 60°. Find the height of the tower correct to 2 significant figures.

(c)

The product of two consecutive natural numbers which are multiples of 3 is equal to 810. Find the two numbers.

Question 11: [3+3+4]

(a) The data on the number of patients attending a hospital in a month are given below. Find the average (mean) number of patients attending the hospital in a month by using the shortcut method.

Take the assumed mean as 45. Give your answer correct to 2 decimal places.

Number of patients	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70
Number of Days	5	2	7	9	2	5

(b) Using properties of proportion solve for x, given

$$\frac{\sqrt{5x}+\sqrt{2x-6}}{\sqrt{5x}-\sqrt{2x-6}}=4$$

(c)

The vertices of a ΔABC are A(3, 8), B(−1, 2) and C(6, −6). Find:

(i) Slope of BC.

(ii) Equation of a line perpendicular to BC and passing through A.

*****All the best*****