FIRST PRELIM EXAM 2019-20

Std: X **Marks:80**

Date: 09/12/19 **Subject: Mathematics** **Dur. : 2 hrs 30 mins**

Section A (40 marks)
[Attempt all questions from this section]

Question 1 :-

a) A shopkeeper sells some edible oil for Rs 7200 at its M.P. The shopkeeper pays GST of Rs 120 to the Government . If the GST charged throughout is 5%, calculate the price paid by the shopkeeper for the oil inclusive of tax. 3

b) Solve the linear in-equation and graph the solution set on the number line:-

$$-2\frac{1}{6} \le \frac{x}{3} - 1\frac{1}{6} < \frac{5}{6} \; ; \; x \in I$$ 3

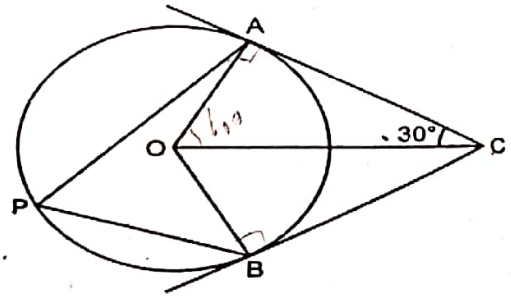
c) Find the 20th term of an AP whose third term is 7 and the 7th term exceeds three times the third term by 2. Also find the nth term. 4

Question 2 :-

a) Shivangi deposits Rs 500 every month in a RD account scheme and receives Rs 16550 at the end of 2 ½ years. Calculate the rate of interest given by the bank. 3

b) Without solving the quadratic equation find the value of m for which the roots are real and equal.:- $4x^2 + (m - 2)x + 1 = 0$ 3

c) In the given figure, O is the centre of the circle. If $\angle ACO = 30^0$, find $\angle BCO$, $\angle AOB$, $\angle APB$, $\angle CAB$. 4



Question 3 :-

a) The mean of the following numbers is 13 :-
8, 10, x+1, x+3, x+4 and 19. Find x and hence find median 3

b) Using properties of proportion, solve for x:- 3

$$\frac{x^2 + x - 3}{x - 3} = \frac{4x^2 + 3x - 2}{3x - 2}$$

c) Plot P(6,3) and Q(3,0). Reflect P in X-axis to get P'. O is the origin . Give the geometrical name of the figure POP'Q. Also find its area. 4

Question 4:-

a) $M = \begin{bmatrix} 4 & 1 \\ -1 & 2 \end{bmatrix}$, Find k if $M^2 - 6M + k\,I$ = null matrix. (I is identity matrix) 3

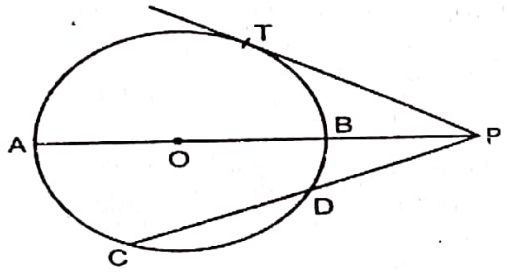
b) If quadrilateral ABCD is a parallelogram with vertices A(3,-1) , B(5,6) and C(7,3), find the coordinates of vertex D. 3

c) The total surface area of a right circular cone of slant height 17 cm is 200π cm^2. Find the radius, height and volume of cone. 4

Section B (40 marks)
(Attempt any 4 questions from this section)

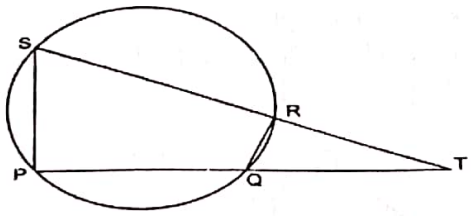
Question 5 :-

a) In the figure given below, chord AB and chord CD intersect at point P. PT is a tangent to the circle at T, if CD = 3.5 cm, DP = 4.5 cm, PB = 3 cm, find radius and length of the tangent PT. 3



b) $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 1 \\ -1 & 2 \end{bmatrix}$, $C = \begin{bmatrix} 6 & 7 \\ 3 & 1 \end{bmatrix}$. Find A (B + C) 3

c) In the figure given below, PQRS is a cyclic quadrilateral. PQ and SR produced meet at T.



i) Prove that Δ TPS ~ Δ TRQ
ii) Find PS, if TP = 18 cm, RQ = 4 cm, TR = 6 cm.
iii) Find area of Δ RQT, if Area of Δ PTS = 27 cm^2. 4

Question 6 :-

a) Solve the following linear in-equation and graph the solution on the number line:

$$3x + \frac{14}{3} > \frac{4x}{3} - 2 \geq 2x - 4 \; ; \; x \in R$$ 3

b) Prove that :- $\frac{\sin\emptyset - 2\sin^3\emptyset}{2\cos^3\emptyset - \cos\emptyset} = \tan\emptyset$ 3

c) Construct Δ ABC in which BC = 6.5 cm, $\angle$ABC = 60^0, AB = 5 cm.

i) Construct a locus of points at a distance 3.5 cm from point A

ii) Construct the locus of points equidistant from AC and BC

iii) Mark two points X and Y which are at a distance of 3.5 cm from A and also equidistant from AC 4

Question 7 :-

a) Point P divides the join of line segment A (2,5) and B (7,15) in the ratio 2:3. Find :- 4

i) Find the coordinates of point P

ii) Find the equation of the line with gradient $\frac{-5}{3}$ and passing through P.

b) 100 pupils in a school have weights as below:-

Wts (kg)	40 – 45	45 – 50	50 – 55	55 – 60	60 – 65	65 – 70	70 – 75
No of pupils	12	16	30	20	14	5	3

Draw an ogive and determine :- 6

i) The median

ii) The number of pupils who are obese, if weight more than 67 kg is considered obese

iii) The number of pupils whose weight is less than 47 kg

Question 8:-

a) Solve the following quadratic equation and give your answer correct to three significant figures.

$x^2 - 18 = 6x$ 3

b) The first term of GP is 243 and fifth term is 48, find the common ratio and the sum of the first 6 terms of GP. 3

c) Calculate mean by step deviation method:- 4

Class	0 – 10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	12	20	30	38	16	14	12	8

Question 9 :-

a) Draw two concentric circles of 3 cm and 5 cm respectively. From any point P on the outer circle construct two tangents to the inner circle. Measure the length of the tangents. 3

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

i) If the height of the model is 90 cm, find the actual height of the building in metres.

ii) If the actual volume of the tank at the top of the building is 27 cm^3, find the volume of tank of the model in litres. 3

c) Mr Verma invests Rs 9600 in 5%, Rs 100 shares at Rs 80. After a year, he sold these shares at Rs 90 each and invested the proceeds (including his dividend) in 9%, Rs 50 shares at Rs 57. Calculate :-

i) His dividend for 1st year

ii) His annual income in the 2nd year

iii) Percentage increase in his return on his original investment. 4

Question 10 :-

a) Using factor theorem, factorise the given polynomial completely:- 3

$3x^3 + 19x^2 + 16x - 20$

b) Cards are marked with numbers 10 to 50 and well shuffled. One card is drawn at random. What is the probability that it is a number 3

i) Divisible by 5

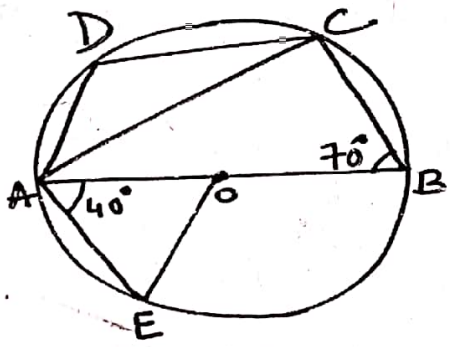
ii) A perfect square

iii) A multiple of 3 and 4

c) In a two digit number, the units place exceeds the tens place by 1, and the product of the given number and the tens digit is 280. Find the number. 4

Question 11 :-

a) In the figure given below, O is the centre $\angle ABC = 70^0$, $\angle OAE = 40^0$. Calculate :- $\angle ADC$, $\angle CAB$, $\angle EOB$. 3



b) A building under construction was observed from a point P which is 1200 m from its base at an angle of elevation of the top as 30^0. After completion when it was again observed from the same point P the angle got changed to 60^0. How much high was the building raised from the time it was first observed . Give the answer to the nearest metre. 3

c) Find the mode of the following using histogram:- 4

Wages(Rs)	40 – 50	50 – 60	60 – 70	70 – 80	80 – 90	90 - 100
No of workers	3	8	12	6	4	2