VIBGYOR HIGH

Second Preliminary Examination

2020-2021

MATHEMATICS

Grade: X **Max. Marks : 80**

Date : 04/01/2021 **Time Allowed: 2hrs 30 min.**

INSTRUCTIONS: -

- **Answers to this paper must be written on the paper 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 question from Section B**
- **The intended marks for the questions or parts of questions are given alongside the questions.**
- **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 the loss of marks.**
- **Geometrical figures to be constructed wherever applicable.**
- **For geometry, figures are to be copied to the answer script.**

SECTION A (40 marks)

(Attempt all questions)

Q.1

(a) If the sum of three numbers in A.P. is 24 and their product is 440, find the numbers. **[3]**

(b) Find the value of k for which the equation $x^2 - 2kx + 7k - 12 = 0$ has equal roots. **[3]**

(c) Two dice are thrown simultaneously. Find the probability of getting :

(i) 11 as the sum of the two numbers that turn up.

(ii) a doublet of even numbers.

(iii) a multiple of 3 as the sum of the two numbers that turn up.

(iv) a total of at least 10. **[4]**

Q.2

(a) Find the co-ordinates of the points of trisection of the line segment joining the points A (- 4, 3) and B (2 , 1). **[3]**

(b) Sandeep opened a Recurring Deposit account in a bank and deposited Rs.300 per month for two years. If he received Rs 7725 at the time of maturity, find the rate of interest per annum. **[3]**

(c) Solve the following inequation and graph the solution on a number line. **[4]**

$$-3 + x \le \frac{8x}{3} + 2 \le \frac{14}{3} + 2x \ , x \in I$$

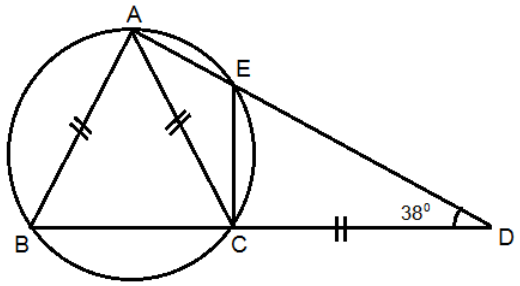
Q.3

(a) Kiran purchases an article for ₹ 5310 which include 10% rebate on the marked price and 18% tax (under GST) on the remaining price. Find the marked price of the article. **[3]**

(b) In the given figure AB = AC = CD and $\angle ADC = 38^{\circ}$. Calculate: **[3]**

(i) $\angle ABC$

(ii) $\angle BEC$



(c) If $(x - 2)$ is a factor of $2x^3 - x^2 - px - 2$;

(i) Find the value of p

(ii) With the value of p, factorize the above expression completely. **[4]**

Q.4

(a) Prove: $\frac{\text{cosec}A}{(\text{cosec}A - 1)} + \frac{\text{cosec}A}{(\text{cosec}A + 1)} = 2\sec^2 A$ **[3]**

(b) If a, b, c, d are in continued proportion, Prove that:

$$\sqrt{ab} + \sqrt{bc} - \sqrt{cd} = \sqrt{(a + b - c)(b + c - d)}$$ **[3]**

(c) If $X = \begin{bmatrix} 4 & 1 \\ -1 & 2 \end{bmatrix}$, show that $6X - X^2 = 9I$ where I is the unit matrix. **[4]**

SECTION B (40 marks)

(Attempt any 4 questions)

Q.5

(a) Mr. Salim, a biscuit manufacturer buys raw goods worth ₹ 1,40,000 from different markets within the state; GST @ 5%. He sold packets of biscuits worth ₹ 2,10,500 in the markets of the neighbouring state. Rate of GST on packets of biscuit is 12%. Find the amount of net GST payable by him. **[3]**

(b) Solve using formula: $5x^2 - 19x + 17 = 0$. Give your answer correct to 3 significant figures. **[3]**

(c) The point P (3, 4) is reflected to P' in the X – axis and O' is the image of O (origin) in the line PP'. Find :

(i) The co- ordinate of P' and O'

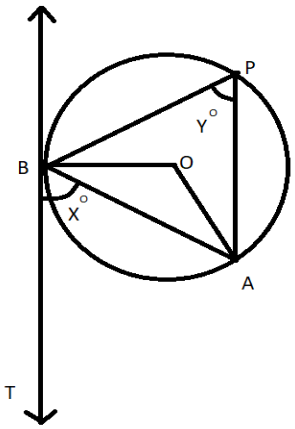
(ii) The length of segments PP' and OO'

(iii) The perimeter of the quadrilateral POP'O' **[4]**

Q.6

(a) The sum of first n terms of an A.P is $4n^2 - n$. If its nth term is 107, find the value of n. Also find the 21^{st} term of this A.P. **[3]**

(b) In the given figure AB is a chord of the circle with centre O and BT is tangent to the circle. If $\angle OAB = 35^0$, find the value of x and y. **[3]**



(c) The following table shows the number of illiterate persons in the age group of (10 – 69) in a town:

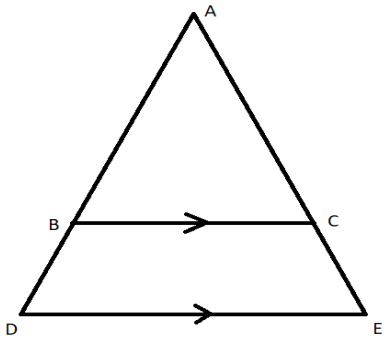
Draw a histogram to represent the above data. Use the graph to find the mode. **[4]**

Also write the modal class.

Age group (in years)	10 - 19	20 - 29	30 - 39	40 - 49	50 - 59	60- 69
No. of illiterate person	50	125	190	275	340	410

Q.7

(a) In the given figure BC // DE, $Ar(\Delta ABC) = 25cm^2$, Ar(trap. BCED) = 24 cm^2 and DE = 14 cm. Calculate the length of BC **[3]**



(b) In what ratio does the point (- 4, b) divide the line segment joining the points P (2, - 2) and Q (- 14, 6)? Hence find the value of b. **[3]**

(c) A tank is filled by three pipes with uniform flow. The first two pipes operating simultaneously, fill the tank in the same time during which the tank is filled by the third pipe alone. The second pipe fills the tank 5 hours faster than the first pipe and 4 hours slower than the third pipe. Find the time taken by the first pipe alone to fill the tank. **[4]**

Q.8

(a) An integer is chosen between 0 and 100. What is the probability that it is **[3]**

(i) Divisible by 7?

(ii) Not divisible by 7?

(b) Prove that : (1 – cos A)(1 + sec A) = tan A sin A **[3]**

(c) An exhibition tent is in the form of a cylinder surmounted by a cone. The height of the tent above the ground is 85 m and the height of the cylindrical part is 50 m. If the diameter of the base is 168 m, find the quantity of canvas required to make the tent. Allow 20 % extra for folds and stitching. Give your answer to the nearest m^2. **[4]**

Q.9

(a) An airplane is flying horizontally with a speed of 173.2 m/sec, at a height of 3000 m. Find the time it would take for the angle of elevation of the plane as seen from a point on the ground to change from 60^o to 30^o. **[4]**

(b) The daily wages of 160 workers in a building project are given below : **[6]**

Wages (in Rs)	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80
No. of worker	12	20	30	38	24	16	12	8

Using a graph paper, draw an Ogive for the above distribution.

Use your Ogive to estimate :

(i) The median wage of the workers.

(ii) The upper quartile wage of the workers.

(iii) The lower quartile wage of the workers.

(iv) The percentage of workers who can earn more than Rs. 45 a day.

Q.10

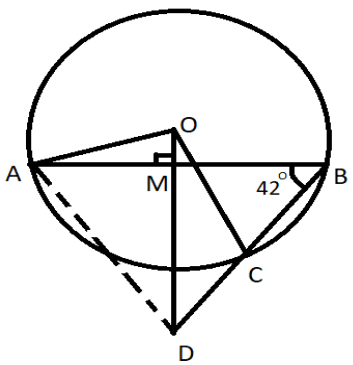
(a) The ratio between the length and the breadth of a rectangular field is 3:2. If only the length is increased by 5 meters, the new area of the field will be 2600 sq.metres. What is the breadth of the rectangular field? **[3]**

(b) Solve using the propertities of proportion : $\frac{\sqrt{3x}+\sqrt{2x-1}}{\sqrt{3x}-\sqrt{2x-1}}=5$ **[3]**

(c) In the figure, O is the centre of the circle, OM $\perp$ AB. If $\angle ABC = 42^o$, calculate **[4]**

(i) $\angle AOC$ (ii) $\angle ODC$.

Hence, prove that ADCO is a cyclic quadrilateral.



Q.11

(a) Find the equation of a line whose y-intercept is $\left(\frac{-3}{2}\right)$ and which passes through the point $(-1,-3)$. **[3]**

(b) If $(\sin\theta + \cos\theta) = m$ and $(\sec\theta + \operatorname{cosec}\theta) = n$, prove that :

$n(m^2 - 1) = 2m$. **[3]**

(c) Using short cut method, find the mean from the following data: **[4]**

Variate(x)	18	19	20	21	22	23	24
Frequency (f)	34	21	24	37	14	32	15

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