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**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.*

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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.*

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

*Mathematical tables are provided.*

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**SECTION A (40 Marks)**

*Attempt **all** questions from this Section.*

**Question 1**

- (a) Find the value of 'k' if  $4x^3 - 2x^2 + kx + 5$  leaves remainder -10 when divided by  $2x + 1$ . [3]
- (b) Amit deposits ₹ 1600 per month in a bank for 18 months in a recurring deposit account. If he gets ₹ 31,080 at the time of maturity, what is the rate of interest per annum? [3]
- (c) A shopkeeper bought an article with market price ₹ 1200 from the wholesaler at a discount of 10%. The shopkeeper sells this article to the customer on the market price printed on it. If the rate of GST is 6%, then find:
- (i) GST paid by the wholesaler.
- (ii) Amount paid by the customer to buy the item. [4]
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**This paper consists of 8 printed pages.**

**ICSE Specimen Question Paper 2020**

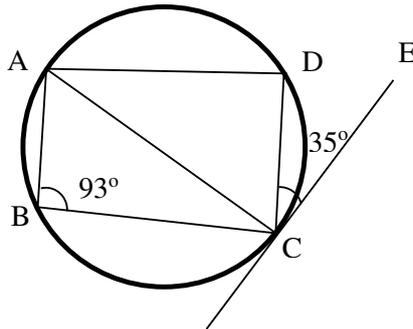
### Question 2

- (a) Solve the following inequation and represent your solution on the real number line:

$$-5\frac{1}{2} - x \leq \frac{1}{2} - 3x \leq 3\frac{1}{2} - x, \quad x \in R \quad [3]$$

- (b) Find the 16<sup>th</sup> term of the A.P. 7, 11, 15, 19.... Find the sum of the first 6 terms. [3]

- (c) In the given figure CE is a tangent to the circle at point C. ABCD is a cyclic quadrilateral. If  $\angle ABC = 93^\circ$  and  $\angle DCE = 35^\circ$ .



Find:

- (i)  $\angle ADC$   
 (ii)  $\angle CAD$   
 (ii)  $\angle ACD$  [4]

### Question 3

- (a) Prove the following identity

$$\frac{\sec A}{\sec A - 1} + \frac{\sec A}{\sec A + 1} = 2\operatorname{cosec}^2 A \quad [3]$$

- (b) Find  $x$  and  $y$  if :

$$3 \begin{bmatrix} 5 & -6 \\ 4 & x \end{bmatrix} - \begin{bmatrix} 6 & y \\ 0 & 6 \end{bmatrix} = 3 \begin{bmatrix} 3 & -2 \\ 4 & 0 \end{bmatrix} \quad [3]$$

- (c) For what value of ' $k$ ' will the following quadratic equation:

$$(k + 1)x^2 - 4kx + 9 = 0 \text{ have real and equal roots? Solve the equations.} \quad [4]$$

**Question 4**

- (a) A box consists of 4 red, 5 black and 6 white balls. One ball is drawn out at random. Find the probability that the ball drawn is:
- black
  - red or white
- [3]
- (b) Calculate the median and mode for the following distribution:
- |                 |    |    |    |    |    |
|-----------------|----|----|----|----|----|
| Weight (in kg)  | 35 | 47 | 52 | 56 | 60 |
| No. of students | 4  | 3  | 5  | 3  | 2  |
- [3]
- (c) A solid cylinder of radius 7 cm and height 14 cm is melted and recast into solid spheres each of radius 3.5 cm. Find the number of spheres formed.
- [4]

**SECTION B (40 Marks)**

*Attempt any **four** questions from this Section*

**Question 5**

- (a) The 2<sup>nd</sup> and 45<sup>th</sup> term of an arithmetic progression are 10 and 96 respectively. Find the first term and the common difference and hence find the sum of the first 15 terms.
- [3]
- (b) If  $A = \begin{bmatrix} 3 & -1 \\ 0 & 2 \end{bmatrix}$ , find matrix  $B$  such that  $A^2 - 2B = 3A + 5I$  where  $I$  is a 2 x 2 identity matrix.
- [3]
- (c) With the help of a graph paper, taking 1cm=1unit along both x and y axis:
- Plot points A (0, 3), B (2, 3), C (3, 0), D (2, -3), E (0, -3)
  - Reflect points B, C and D on the y axis and name them as B', C' and D' respectively.
  - Write the co-ordinates of B', C' and D'.
  - Write the equation of line B' D'.
  - Name the figure BCDD'C'B'B
- [4]

**Question 6**

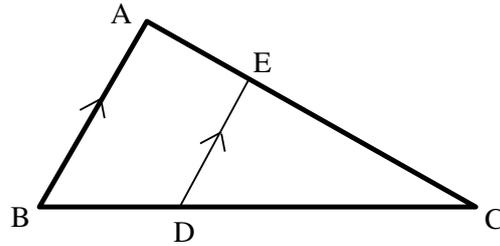
(a) In  $\Delta ABC$  and  $\Delta EDC$ ,  $AB$  is parallel to  $ED$ .  $BD = \frac{1}{3}BC$  and  $AB = 12.3$  cm.

(i) Prove that  $\Delta ABC \sim \Delta EDC$ .

(ii) Find  $DE$

(iii) Find:

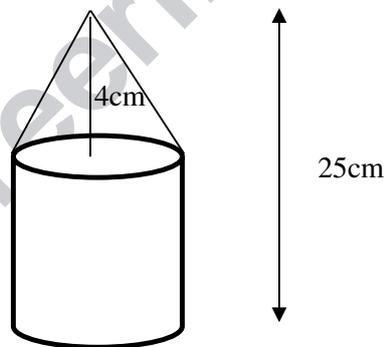
$$\frac{\text{area of } \Delta EDC}{\text{area of } \Delta ABC}$$



[3]

(b) Find the ratio in which the line joining  $(-2, 5)$  and  $(-5, -6)$  is divided by the line  $y = -3$ . Hence find the point of intersection. [3]

(c) The given solid figure is a cylinder surmounted by a cone. The diameter of the base of the cylinder is 6 cm. The height of the cone is 4 cm and the total height of the solid is 25 cm. Take  $\pi = \frac{22}{7}$ .



Find the:

(i) Volume of the solid

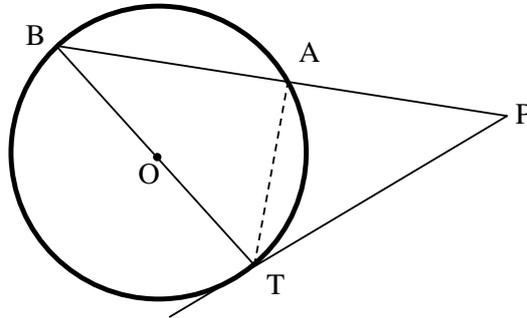
(ii) Curved surface area of the solid

Give your answers correct to the nearest whole number.

[4]

**Question 7**

- (a) In the given figure, PAB is a secant and PT a tangent to the circle with centre O.  
If  $\angle ATP = 40^\circ$ , PA = 9 cm and AB = 7 cm.



Find:

- (i)  $\angle APT$   
 (ii) length of PT [3]
- (b) The 1<sup>st</sup> and the 8<sup>th</sup> term of a GP are 4 and 512 respectively. Find:  
 (i) the common ratio  
 (ii) the sum of its first 5 terms. [3]
- (c) The mean of the following distribution is 49. Find the missing frequency 'a'.

Class	0 – 20	20 – 40	40 – 60	60 – 80	80 – 100
Frequency	15	20	30	<i>a</i>	10

[4]

**Question 8**

- (a) Prove the following identity  
 $(\sin A + \operatorname{cosec} A)^2 + (\cos A + \sec A)^2 = 5 + \sec^2 A \cdot \operatorname{cosec}^2 A$  [3]
- (b) Find the equation of the perpendicular bisector of line segment joining A(4, 2) and B(-3, -5) [3]
- (c) Using properties of proportion, find  $x : y$  if  

$$\frac{x^3 + 12x}{6x^2 + 8} = \frac{y^3 + 27y}{9y^2 + 27}$$
 [4]

**Question 9**

- (a) The difference of the squares of two natural numbers is 84. The square of the larger number is 25 times the smaller number. Find the numbers. [4]
- (b) The following table shows the distribution of marks in Mathematics:

Marks (less than)	No. of students
10	7
20	28
30	54
40	71
50	84
60	105
70	147
80	180

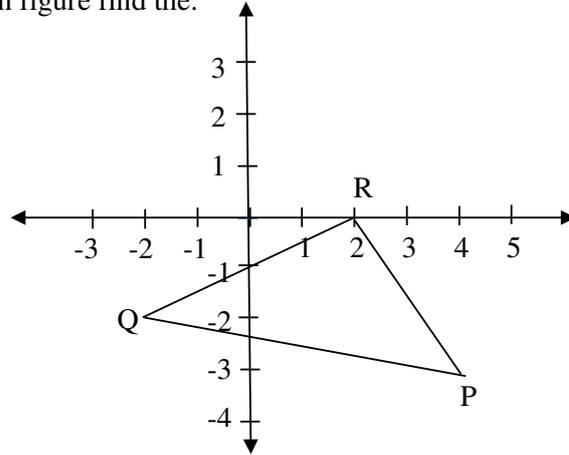
With the help of a graph paper, taking 2 cm = 10 units along one axis and 2 cm = 20 units along the other axis, plot an ogive for the above distribution and use it to find the:

- (i) median.
- (ii) number of students who scored distinction marks (75% and above)
- (iii) number of students, who passed the examination if pass marks is 35%. [6]

**Question 10**

- (a) Prove that two tangents drawn from an external point to a circle are of equal length. [3]

- (b) From the given figure find the:



- (i) Coordinates of points P, Q, R.
- (ii) Equation of the line through P and parallel to QR. [3]
- (c) Ms. Roy went to a departmental store and bought the following items. The GST rates and the quantity of each items and market price of each are given below:

S.No.	Items	Price per item in ₹	Quantity	GST rate	Amount
1.	Walnut	650	1	5%	
2.	Potato Chips	50	2	0%	
3.	Coffee	80	2	18%	

Find the:

- (i) The total amount of SGST paid.
- (ii) The total amount of the bill. [4]

**Question 11**

- (a) Mr. Sharma receives an annual income of ₹ 900 in buying ₹ 50 shares selling at ₹ 80. If the dividend declared is 20%, find the:
- (i) Amount invested by Mr. Sharma.
  - (ii) Percentage return on his investment. [3]
- (b) Two poles AB and PQ are standing opposite each other on either side of a road 200 m wide. From a point R between them on the road, the angles of elevation of the top of the poles AB and PQ are  $45^\circ$  and  $40^\circ$  respectively. If height of AB = 80 m, find the height of PQ correct to the nearest metre. [3]
- (c) Construct a triangle PQR, given  $RQ = 10$  cm,  $\angle PRQ = 75^\circ$  and base  $RP = 8$  cm. Find by construction:
- (i) The locus of points which are equidistant from QR and QP.
  - (ii) The locus of points which are equidistant from P and Q.
  - (iii) Mark the point O which satisfies conditions (i) and (ii). [4]