

**ATUL VIDYALAYA**  
**FIRST PRELIMINARY EXAMINATION 2012-13**  
**MATHEMATICS [TYPE D]**

STD: X  
 DATE:01/10/12  
 SESSION: I

MM : 80  
 TIME:2½ HRS

Answer all questions from section A & any four questions from section B.  
 All working, including the rough work, must be clearly shown & must be done on the same sheet as the rest of the answer. Omission of essential working will result in the loss of marks.

**Section A (40 marks)**  
 (All questions are compulsory)

**Question 1.**

a) Using quadratic formula , solve :  $\frac{21}{x^2} - \frac{29}{x} - 10 = 0$  [4]

b) By increasing the speed of a car by 10 km/hr, the time of journey for a distance of 72 km is reduced by 36 minutes. Find the original speed of the car. [3]

c) If  $x = \frac{6ab}{a+b}$ , prove that  $\frac{x+3a}{x-3a} + \frac{x+3b}{x-3b} = 2$  [3]

**Question 2.**

a) A vertically straight tree, 15m high is broken by the wind in such a way that its top just touches the ground and makes an angle of 60° with the ground. At what height from the ground did the tree break ? ( $\sqrt{3} = 1.73$ ) [4]

b) How many spherical lead shots each 4.2cm in diameter can be obtained from a rectangular solid of lead with dimensions 66cm x 42cm x 21cm ? [3]

c) If the lines  $3x + y = 4$  and  $ax + 2y = 9$  are parallel , find the value of a. What will be the value of a, if the lines are perpendicular ? [3]

**Question3.**

a) Sheeba bought a calculator for Rs. 1026, which includes 5% rebate on the marked price and then 20 % sales tax on the remaining price. Find the marked price of the calculator. [3]

b) Show that  $(3x - 1)$  is a factor of  $6x^2 + 7x - 3$  [2]

c) With out using tables , find the value of  $\frac{\cos^2 67^\circ - \tan^2 23^\circ}{\sec^2 20^\circ - \cot^2 70^\circ}$  [2]

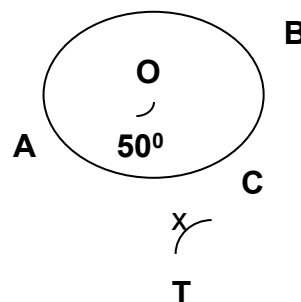
d) If  $2x + 3y : 3x + 5y = 18:29$ , find  $x : y$  [3]

**Question 4.**

a) On a graph paper , plot the points A (-2,0), B(4,0), C(1,4), D(-2,4) and E (4,4). Give the specific name to Quadrilateral ABCD. Draw the lines of the symmetry for the Quadrilateral ABED. Name the common line of symmetry of ABC and Quadrilateral ABED. [4]

b) If the mean of 10 observations is 20 and that of another 15 observations is 16, find the mean of the all 25 observations. [3]

c) In the given figure, AB is a diameter of the circle with centre O and  $\angle OAT = 90^\circ$  and C is a point on the circle. Calculate the numerical value of x. [3]



**Section- B(40 marks)**

( Answer any four questions . All the sub questions of a main question should be answered together)

**Question 5.**

- a) A company with 10000 shares of nominal value Rs.100 declares an annual dividend of 8% to the share holders. [4]
  - i) Calculate the total amount of dividend paid by the company
  - ii) Ramesh had bought 90 shares of the company of Rs.150 per share. Calculate the dividend he receives and the percentage return on his investment.
- b) Draw a circle of radius 3.6cm. Draw two tangents to it inclined at an angle of  $60^\circ$  with each other. [3]
- c) The circumference of a circle is 44cm. [3]
  - i) By how much should the radius be increased to make the circumference 22cm longer ?
  - ii) calculate the area of the larger circle.

**Question 6.**

- a) A vertical tower is 20m high. A man standing at some distance from the tower knows that the cosine of the angle of elevation of the top of the tower is 0.53. How far is he standing from the foot of the tower ? [4]
- b) What is the locus of a point which is equidistant from three given non-collinear points A, B and C ? Justify your answer. [3]
- c) The value of a flat worth Rs. 500000 is depreciating at the rate of 8%p.a. In how many years will its value be reduced to Rs.389344? [3]

**Question 7.**

- a) Simplify :  $-10\frac{1}{3} < \frac{5y}{3} + 3 \leq \frac{y}{2} + 5\frac{1}{3}, y \in R$ . Graph the solution set on the number line. [4]
- b) Determine the value of  $k$  such that  $(x - 5)$  a factor of  $3x^3 - 16x^2 + kx + 50$  [3]
- c) Given  $A = \begin{bmatrix} 2 & 0 \\ 0 & 1 \end{bmatrix}$ ,  $B = \begin{bmatrix} 0 & 1 \\ -2 & 3 \end{bmatrix}$ . Calculate : i)  $3A - 2B$       ii)  $A^2 - BA$  [3]

**Question 8.**

- a) The centre of a circle of radius 13 units is the point (3,6). P(7,9) is a point inside the circle. APB is a chord of the circle such that AP=PB. Calculate the length of AB. [4]
- b) Prove that :  $\sec A (1 - \sin A) (\sec A + \tan A) = 1$  [3]
- c) Find the mean of the following data: [3]

Class	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
Frequency	12	16	6	7	9

**Question 9.**

- a) Weight of 100 students is recorded below: [4]

Weight in Kg	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55	55 - 60
No. of students	4	16	40	22	10	8

Draw an ogive and hence estimate the median, upper quartile and lower quartile.

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b) A (6 , y ), B(- 4 , 9 ) and C ( x , -1) are the vertices of a triangle ABC whose centroid is the origin. Calculate the values of x and y . [3]

c)The king of clubs is removed from a normal pack of cards. One card is selected from the remaining cards. Find the probability of

- i) Selecting a king
- ii) not selecting a king
- iii) selecting a card of clubs [3]

Question 10

a) Rupa’s passbook ha the following entries: [4]

Date 2011	Particulars	Amount (withdrawn in Rs. )	Amount (Deposited in Rs.)	Balance (Rs.)
Feb 19	By cash	----	1000	1000
Feb 25	By cash	-----	2000	3000
March 1	By salary	-----	5000	8000
March 10	To cheque	2000	---	6000
March 27	To cheque	500	----	5500
April 1	By salary	---	5000	10500

Find the amount received by him, if she closes her account on 11<sup>th</sup> April, when interest rate is 5%p.a.

b) The height of a cone is 5cm. Find the height of another cone whose volume is sixteen times its volume and radius equal to its diameter, [3]

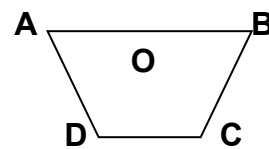
c) A solid metallic cylinder of radius 14cm and height 21cm is melted and recast into 72 equal small spheres. Find the radius of one such sphere [3]

Question 11.

a) The distance by road between two towns a and B is 216 km and by rail it is 200km. A car travels at a speed of x km/hr and train travels at a speed which is 16 km/hr faster than the car. Calculate ;

- i) The time taken by the car to reach town B from A, in terms of x.
- ii) the time taken by the train to reach town B from A in terms of x
- iii) If the train takes 2 hours less than the car to reach town B, obtain an equation in x and solve it. Hence ,find the speed of the train. [4]

b) In the figure, ABCD is a trapezium in which AB || DC and AB =2DC. Determine the ratio of the area of Δ AOB and Δ COD.



[3]

c) Find the length of the medians of a triangle whose vertices are A( 7, - 3) , B( 5, 3) and C (3, -1 ) [3]

