

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

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

M.M - 80
TIME: 2 ½ 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) Find the amount when Rs 10000 is invested for 2½ years at 10% interest compounded yearly. [3]

(b) Given $A = \begin{pmatrix} 2 & -1 \\ 2 & 0 \end{pmatrix}$, $B = \begin{pmatrix} -3 & 2 \\ 4 & 0 \end{pmatrix}$ & $C = \begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$; find the matrix X such that $A + X = 2B + C$. [3]

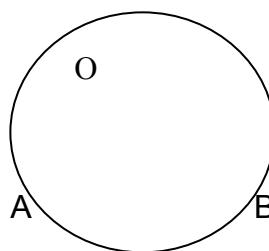
(c) Prove that: $\frac{\sin A \cdot \tan A}{1 - \cos A} = 1 + \sec A$ [4]

Question 2

(a) A man wants to buy 62 shares available at Rs 132 (par value being Rs 100).
(i) How much he will have to invest?
(ii) If the dividend is 7.5%, what will be his annual income?
(iii) If he wants to increase his annual income by Rs 150, how many extra shares should he buy? [3]

(b) Solve the inequation $2x - 3 < x + 2 \leq 3x + 5$; $x \in \mathbb{R}$ & graph the solution set on the number line. [3]

(c) The given figure shows a circle with centre O & $\angle AOB = 90^\circ$. If the radius of the circle is 40 cm & $\pi = 3.14$; calculate the area of the unshaded portion of the circle.



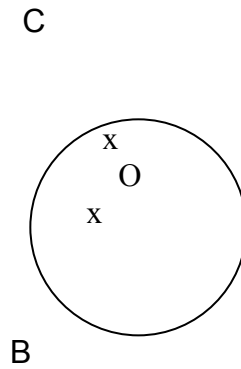
[4]

Question 3

(a) Solve the quadratic equation $2x - \frac{2}{x} = 7$ correct to one decimal place. [3]

(b) Find the mean, median & mode of the following data: [3]
9, 11, 8, 11, 16, 9, 11, 5, 3, 11, 17, 8

- (c) ABC is a right angled triangle with AB = 12 cm & AC = 13 cm. A circle, with centre O, has been inscribed inside the triangle. Calculate the value of x, the radius of the inscribed circle.



A [4]

Question 4

- (a) Ritu has a Recurring Deposit Account in a bank & deposits Rs 80 per month for 18 months. Find the rate of interest paid by the bank if the maturity value of this account is Rs 1554. [3]
- (b) Use graph paper to plot the points A(3, 5) & B(-2, -4). Take the scale as 1 cm = 1 unit on both the axes. Plot A', the image of A when reflected in the x- axis. Plot B', the image of B when reflected in the y- axis, followed by reflection in the origin. Write down the geometrical name of the figure AA'BB'. [3]
- (c) Using properties of proportion, solve for x:

$$\frac{\sqrt{x+1} + \sqrt{x-1}}{\sqrt{x+1} - \sqrt{x-1}} = \frac{4x-1}{2}$$
 [4]

SECTION B (40 MARKS) (Attempt any four questions from this Section)

Question 5

- (a) Polynomial $x^3 - ax^2 + bx - 6$ leaves remainder -8 when divided by $x - 1$ & $x - 2$ is a factor of it. Find the values of 'a' & 'b'. [3]
- (b) Draw a ABC in which AB = 6 cm, BC = 4.5 cm & AC = 5 cm. Draw & label:
 (i) the locus of the centres of all circles which touch AB & AC,
 (ii) the locus of the centres of all the circles of radius 2 cm which touch AB.
 Hence, construct the circle of radius 2 cm which touches AB & AC. [3]
- (c) The origin O, B(-6, 9) & C(12, -3) are vertices of ΔOBC . Points P & Q divides OB & OC in the ratio 1 : 2 respectively. Find the co-ordinates of points P & Q. Also, show that $PQ = \frac{1}{3} BC$. [4]

Question 6

- (a) Dinesh bought an article for Rs 374, which included a discount of 15% on the marked price & a sales tax of 10% on the reduced price. Find the reduced price of the article. [3]
- (b) Find the ratio in which C (p, 1) divides the join of A (-4, 4) and B (6, -1) and hence find the value of p. [3]
- (c) Two isosceles triangles have equal vertical angles. Show that the triangles are similar. If the ratio between the areas of these two triangles is 16 : 25, find the ratio between their corresponding altitudes. [4]

Question 7

- (a) Two dice are thrown simultaneously. Find the probability that:
 (i) both the dice show the same number,
 (ii) the total on the numbers of the dice is 9,
 (iii) the product of the numbers on the dice is 8. [3]
- (b) There is water to a height of 14 cm in a cylindrical glass jar of radius 8 cm. Inside the water there is a sphere of diameter of 12 cm completely immersed. By what height will the water go down when the sphere is removed. [3]
- (c) 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. [4]

Question 8

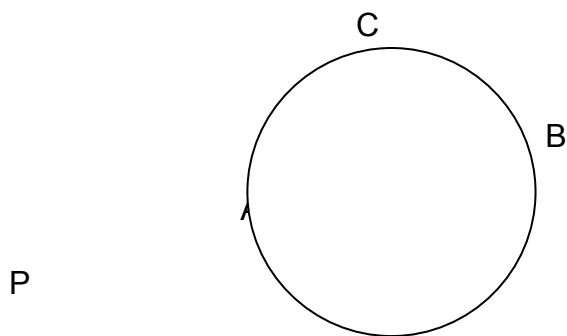
- (a) Use a ruler & compass only in this question.
 (i) Construct a quadrilateral ABCD in which AB = 5 cm, BC = 7 cm & $\angle ABC = 120^\circ$, given that AC is its only line of symmetry.
 (ii) Write down the geometrical name of the quadrilateral.
 (iii) Measure & record the length of BD in cm. [3]
- (b) If $7x - 15y = 4x + y$, find the value of $\frac{3x^2 + 2y^2}{3x^2 - 2y^2}$. [3]
- (c) The line $4x - 3y + 12 = 0$ meets x-axis at A. Write the co-ordinates of A. Determine the equation of the line through A & perpendicular to $4x - 3y + 12 = 0$. [4]

Question 9

- (a) The population of a village 2 years ago was 6250. Due to migration to cities, it decreases at the rate of 8% every year. Find the decrease in its population in the last 2 years. [3]
- (b) Construct ABC with AB = 5 cm, BC = 6 cm & $\angle ABC = 90^\circ$. Construct a circle touching the side AB at A & passing through C. [3]
- (c) Two pillars of equal heights stand on either side of a roadway, which 150 m wide. At a point in the roadway between the pillars the elevations of the tops of the pillars are 60° & 30° ; find the height of the pillars & the position of the point. [4]

Question 10

- (a) PT is a tangent to the circle at T. If $\angle ABC = 70^\circ$ & $\angle ACB = 50^\circ$; calculate: (i) $\angle CBT$ (ii) $\angle BAT$ (iii) $\angle APT$.



- (b) Without using trigonometric tables, evaluate:
 $5 \cdot \sin 50^\circ \cdot \sec 40^\circ - 3 \cdot \cos 59^\circ \cdot \operatorname{cosec} 31^\circ$ [3]

- (c) Pradeep's S.B. Account's passbook entries are as follows:

Date	Particulars	Withdrawal (Rs)	Deposit (Rs)	Balance (Rs)
Jan 9	By cash		800	800
Feb 19	To cheque	250		550
Mar 11	By cheque		600	1150
Mar 18	To cheque	220		930
Apr 9	By cash		1200	2130
Jul 29	To cheque	660		1470
Aug 9	By cheque		800	2270
Sept 18	By cash		600	2870

If interest is paid at the rate of 5% p.a. at the end of September every year, calculate the total amount he will get if the account is closed in October of the same year. [4]

Question 11

(a) Find the mean of the following distribution by using short-cut method: [5]

C. I.	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	10	6	8	12	5	9

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

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

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

From the Ogive find

- (i) the median wage of the workers
- (ii) the percentage of the workers who earn more than Rs 35 a day. [5]