

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

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.

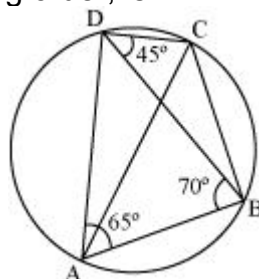
Section A (40 marks)
(All questions are compulsory)

Question 1.

- (a) Kiran purchases an article for Rs 5,400, which includes 10% rebate on the marked price and 20% sales tax on the remaining price. Find the marked price of the article. [3]
- (b) If $\frac{3x+5y}{3x-5y} = \frac{7}{3}$, then find the value of x:y? [3]
- (c) A person invests Rs 10,000 for two years at a certain rate of interest compounded annually. At the end of one year, this sum amounts to Rs 11,200. Calculate:
 (i) The rate of interest per annum
 (ii) The amount at the end of the second year [4]

Question 2.

- (a) Show that $2x + 7$ is a factor of $2x^3 + 5x^2 - 11x - 14$. Using the factor theorem, factorise the given expression completely. [3]
- (b) The median of the observations 11, 12, 14, 18, $(x + 4)$, 30, 32, 35, and 41, arranged in ascending order, is 24. Find the value of x. [3]



- (c) In the above figure, $\angle BAD = 65^\circ$, $\angle ABD = 70^\circ$ and $\angle BDC = 45^\circ$.
 Find: (i) $\angle BCD$ (ii) $\angle ADB$ Show that AC is a diameter. [4]

Question 3.

- (a) Mohan deposits Rs 80 per month in a cumulative deposit account for six years. Find the amount payable to him on maturity if the rate of interest is 6% per annum. [3]
- (b) A rectangular playground has two semicircles along its widths, which also act as diameters. If the sides of the rectangle are 120 m and 21 m, then find the area of the playground. $\left(\pi = \frac{22}{7}\right)$ [3]
- (c) Use graph paper for this question.
 Points A (2, 3), B (4, 5) and C (7, 2) are the vertices of $\triangle ABC$.
 (i) Write down the coordinates of A', B' and C' if $\triangle A'B'C'$ is the image of $\triangle ABC$, when reflected in the origin.
 (ii) Write down the coordinates of A'', B'' and C'' if $\triangle A''B''C''$ is the image of $\triangle ABC$, when reflected in the x-axis.
 (iii) Mention the special name of quadrilateral BCC''B'' and find its area. [4]

(Contd on Pg -2)

Question 4:

- (a) Without using tables, evaluate $\frac{2 \tan 53^\circ}{\cot 37^\circ} - \frac{\cot 80^\circ}{\tan 10^\circ}$. [3]
- (b) Given that $x \in \mathbf{R}$, solve the following inequality and graph the solution on a number line. $-1 \leq 3 + 4x < 23$ [3]
- (c) Find the mean of the following distribution. [4]

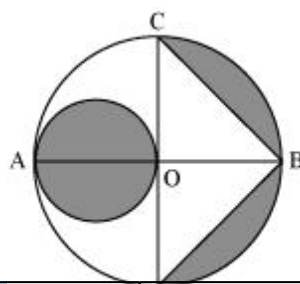
Class interval	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	10	6	8	12	5	9

Section- B(40 Marks)

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

Question 5.

- (a) In the given figure, AB is the diameter of a circle with centre O. If OA = 7cm, then find the area of the shaded region. [3]



$$\frac{\sin \theta \tan \theta}{1 - \cos \theta} = 1 + \sec \theta$$

- (b) Prove that [3]

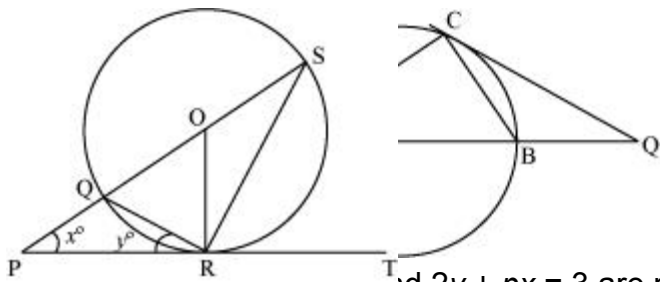
- (c) Mr. Ashok has an account in the Central Bank of India. The following entries are from his pass book.

Date	Particulars	Withdrawals Rs. P.	Deposits Rs. P.	Balance Rs. P.
01.01.05	B/F	1200.00
07.01.05	By cash	...	500.00	1700.00
17.01.05	To cheque	400.00	...	1300.00
10.02.05	By cash	...	800.00	2100.00
25.02.05	To cheque	500.00	...	1600.00
20.09.05	By cash	...	700.00	2300.00
21.11.05	To cheque	600.00	...	1700.00
05.12.05	By cash	...	300.00	2000.00

If Mr. Ashok gets Rs 83.75 as interest at the end of the year, where the interest is compounded annually, then calculate the rate of interest paid by the bank in his Savings Bank Account on 31st December, 2005.

Question 6.

- (a) In the given figure, AB is the diameter of the circle and is produced to point Q. QC is a tangent to the circle. If $\angle CAB = 34^\circ$, then find the value of
 (i) $\angle CBA$ (ii) $\angle CQA$ [3]



(b) If lines $y - 3x + 7 = 0$ and $2y + px = 3$ are perpendicular to each other, then find the value of p . [3]

(c) Let $A = \begin{bmatrix} 4 & -2 \\ 6 & -3 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 \\ 1 & -1 \end{bmatrix}$ and $C = \begin{bmatrix} -2 & 3 \\ 1 & -1 \end{bmatrix}$. Find the value of $A^2 - A + BC$. [4]

Question 7.

(a) A metallic sphere of radius 10.5 cm is melted and then recast into small cones, each of radius 3.5 cm and height 3 cm. Find the number of cones. [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) The shadow of a vertical tower on a level ground increases by 10 m when the sun's altitude changes from 45° to 30° . Find the height of the tower (correct to two decimal places). [4]

Question 8.

(a) In the given figure, PT touches a circle with centre O at R. When produced, diameter SQ meets PT at P. If $\angle SPR = x^\circ$ and $\angle QRP = y^\circ$, then show that $x^\circ + 2y^\circ = 90^\circ$. [3]

(b) The line segment joining points A (2, 3) and B (6, -5) is intercepted by the x-axis at point K. Write the ordinate of point K and find the ratio in which K divides AB. [3]

(c) Mr. Ram Gopal invested Rs 8,000 in 7%, Rs 100 shares at Rs 80. After a year, he sold these shares at Rs 75 each and invested the proceeds (including his dividend) in 18%, Rs 25 shares at Rs 41. [4]

Question 9.

(a) Solve the equation $2x - \frac{1}{x} = 7$. Write your answer correct to two decimal places. [3]

(b) A vessel of the form of an inverted cone is filled with water to the brim. Its height and diameter are 20 cm and 16.8 cm respectively. Two equal solid cones are dropped in it such that they get fully submerged in water. As a result, one-third of the water in the original cone overflows. What is the volume of each of the submerged solid cones? [3]

(c) Without using mathematical tables, find the value of x , if $\cos x = \cos 60^\circ \cos 30^\circ + \sin 60^\circ \sin 30^\circ$. [4]

Question 10.

(a) The daily wages of 160 workers in a building project are shown in the given table.

Wages in Rs	No. of workers
0-10	12
10-20	20

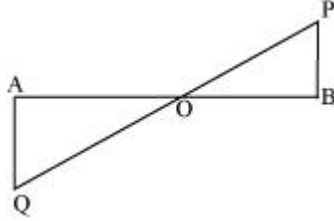
20-30	30
30-40	38
40-50	24
50-60	16
60-70	12
70-80	8

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 earn more than Rs 45 a day

[6]



- (b) In the figure given above, PB and QA are perpendiculars to line segment AB. If $PO = 6$ cm, $QO = 9$ cm and the area of $\Delta POB = 120$ cm², then find the area of ΔQOA .

[4]

Question 11.

- (a) Find the coordinates of the centroid of a triangle whose vertices are A (-1, 3), B (1, -1) and C (5, 1)
- (b) Use a ruler and a pair of compass to construct ΔABC in which $BC = 4.2$ cm, $\angle ABC = 60^\circ$ and $AB = 5$ cm. Also construct a circle of radius 2 cm such that it touches the arms of $\angle ABC$ of ΔABC .
- (c) A shopkeeper buys a certain number of books for Rs 720. If the cost per book was Rs 5 less, then the number of books that could be bought for Rs 720 would be 2 more. Taking the original cost of each book to be Rs x , write an equation in x and solve it.

[3]

[3]

[4]