PRELIMINARY EXAMINATION 2015 – 2016

Subject : Mathematics | **Date : January 8, 2015**

Std : X A | **Time: 2 hrs.30mins (plus 15mins. reading time)**

Marks: 80

General Instructions:

- All answers must be written on the separate answer booklet provided.
- This paper consists of two sections.
- Attempt all questions from section A and any four from section B.
- This paper consists of 11 questions on 8 pages.
- The intended marks for the questions or part of questions are given in brackets. [ ]

Section A [40 Marks]
Attempt all questions

Question 1

(a) Two dice are thrown simultaneously. Find the probability that : **[3]**

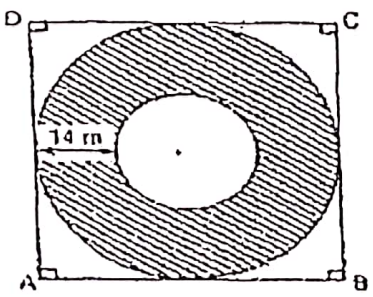
(i) both the dice show the same number.

(ii) The first die shows 6.

(iii) The sum of the numbers on the dice is 9.

(b) If $A = \begin{pmatrix} a & 0 \\ 0 & 2 \end{pmatrix}$, $B = \begin{pmatrix} 0 & -b \\ 1 & 0 \end{pmatrix}$ $M = \begin{pmatrix} 1 & -1 \\ 1 & 1 \end{pmatrix}$ and $BA = M^2$, find the values of a and b. **[3]**

(c) In the given diagram, ABCD is a square. The area of the shaded circular ring is 1144 m^2. The difference between the radii of the two circles is 14 m. Find: (i) The two radii. (ii) The area of the unshaded part of the square. **[4]**



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Question 2

(a) Solve the following inequation and represent the solution set on a number line: [3]

$$\frac{-1}{3} \leq 2\left(\frac{x}{4}+1\right)-\frac{1}{3}<\frac{5}{6}, x \in R$$

(b) A certain sum of money, placed at compound interest amounts to ₹ 6272 in 2 years and to ₹ 7024.64 in 3 years. Find the rate of interest and the sum of money. [3]

(c) If (x^2-1) is a factor of (x^3-ax^2+bx+2), find the values of a and b and hence factorize the expression completely. [4]

Question 3

(a) Evaluate without using trigonometrical table: [3]

$$3 \sin 59 \sec 31 + \cos 12 \, cosec \, 78 + \frac{\sin 31 \cos 59 + \cos 31 \sin 59}{sec^2 10 - cot^2 80}$$

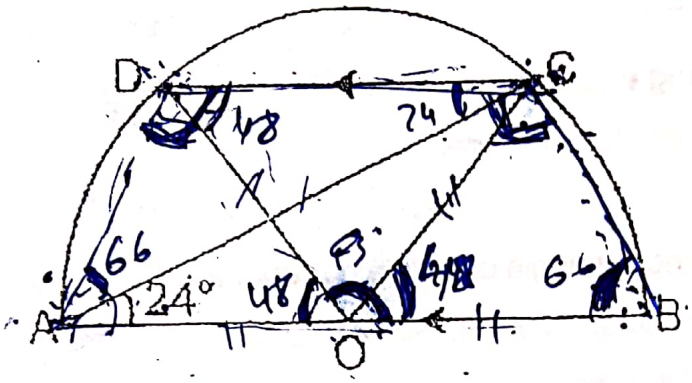
(b) If $3x - 5y = 2x + y$, find the value of $\frac{3x+5y}{3x-5y}$ [3]

(c) If the mean of the following data is 18, find R [4]

Class interval	Frequency
11 – 13	3
13 – 15	6
15 – 17	9
17 – 19	13
19 – 21	R
21 – 23	5
23 – 25	4

Question 4

(a) In the figure, AB is a diameter of the circle with centre O and CD parallel to BA. If $\angle CAB = 24°$, find the value of (i) $\angle COB$ (ii) $\angle DOC$ (iii) $\angle DAC$ (iv) $\angle ADC$ [3]



(b) A shopkeeper marks his goods 40% above the cost price and then sells them at a discount of 20% and 10%. If an article costs the shopkeeper ₹ 5000, find the sale price of the article [3]

(i) excluding sales tax (ii) including sales tax of 10%

(c) Use a graph paper for this question. Plot A (-2,0) ,C(0,8) [4]

(i) Reflect C in the line y =5 to get the image C'.

(ii) Reflect A in the line x = 0 to get the image A'.

(iii) Assign a special name to the quadrilateral ~~ACC'A'~~ ACA'C'

(iv) Write down the area of ~~ACC'A'~~. ACA'C'

Section B (Attempt **any four** questions) **(40 marks)**

Question 5

(a) $\frac{1}{\sin A+\cos A}+\frac{1}{\sin A-\cos A}=\frac{2\sin A}{2\sin^2 A-1}$ [3]

(b) Viraaj deposits a certain sum of money each month in a Recurring Deposit Account of a bank. If the rate of interest is of 8% per annum and he gets ₹ 8088 from the bank after 3 years at the time of maturity, find the value of his monthly instalment and the interest he gets from the Bank. [3]

(c) A right circular cone of radius 4 cm and height 5cm contains some water up to a height of 2.5cm. Find the radius of the surface of the water level. If some lead shots of radius 0.5cm are dropped into the cone, the water rises to the top. Find the number of lead shots. [4]

Question 6

(a) Solve the following equation by using formula and give your answer correct to three significant figures. [3]

$5x^2 - 7x - 3 = 0$

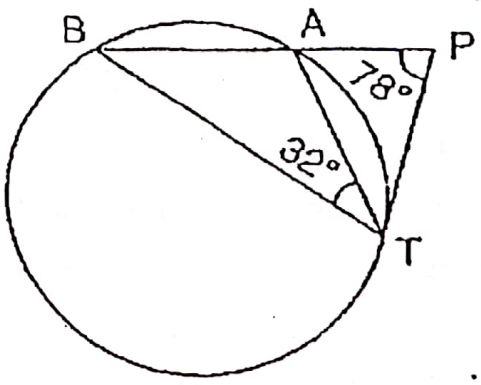
(b) A sector containing an angle of 90° is cut from a circle of radius 42 cm and folded into a cone. Find the radius of the base and the curved surface area of the cone. [3]

(c) [4]

A straight line passes through the points P (-2,3) and Q(4, -3) . It intersects the coordinate axes at the points A and B respectively. M is the midpoint of segment AB. Find (i) The equation of the line (ii) The coordinates of A and B (iii) The coordinates of M.

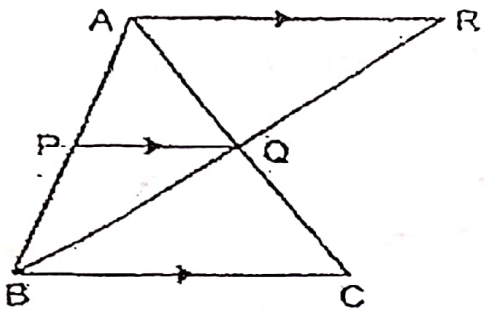
Question 7

(a) A, B and T are three points on a circle. The tangent at T meets BA produced at P. Given that ∠ATB = 32° and that the ∠APT = 78°, calculate the angle subtended by BT at the center of the circle. [3]



(b) Find the equation of the line passing through (5,-3) and parallel to the line $\frac{3x}{2} - \frac{5y}{2} + \frac{1}{3} = 0$ [3]

(c) In the figure, AR parallel to PQ parallel to BC. [4]



(i) Prove that Δ AQR ~ CQB

(ii) If AQ : QC = 2:3, find BC if PQ is 3cm.

(iii) Find the area of Δ APQ : the area of Δ ABC.

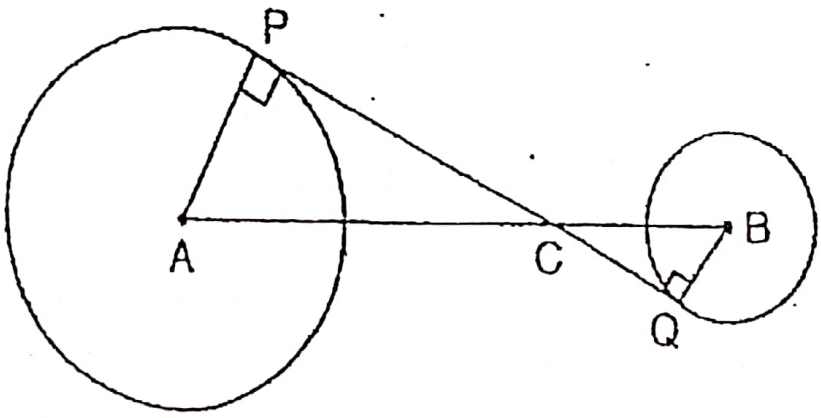
(iv) Find the area of Δ AQR : the area of Δ CQB.

Question 8

(a) Use the properties of proportion and solve: [3]

$$\frac{x^2-5x+3}{5x-3} = \frac{x^2-8x+7}{8x-7}$$

(b) In the given figure, PQ is a transverse common tangent to two circles with centres A and B and of radius 5 cm and 3 cm respectively. If PQ intersects AB at C such that QP = 16 cm, calculate AB in surd form only. [3]



(c) Salman invests a sum of money in ₹ 50 shares, paying 15% dividend quoted at 20% premium. If his annual dividend is ₹ 600, calculate [4]

(i) the number of shares he bought.

(ii) his total investment.

(iii) the rate of return on his investment.

Question 9

(a) An article is marked at ₹.4500 and the rate of VAT on it is 6%. A trader buys this article at some discount and sells it to the customer at the marked price . If the trader pays ₹ 81 as VAT to the Government, find: [3]

(i) how much percent discount does the trader get?

(ii) the total money paid by the trader including tax to buy the article.

(b) Construct an isosceles triangle ABC such that AB = 6cm and BC = AC = 4cm Bisect ∠C internally and mark a point P on this bisector such that CP = 4.5cm. Find the points Q and R which are 4.5cm from P and also 4.5cm from the line AB. Construct another circle passing through A, B and C. [3]

(c) A page from the Savings Bank Pass book of a person is given below. If he receives ₹.198 as interest on 1st January, 2007, find the rate of interest paid by the bank. Also find the amount on 1st January,2007. [4]

Date / Year	Particulars	Debit (₹)	Credit (₹)	Balance (₹)
Jan1, 2006	B/F	-	-	1,270
Jan 7,2006	By Cheque	-	2310	3,580
Mar,9,2006	To self	2,000	-	1,580
Mar,26,2006	By Cash	-	6,200	7,780
Jun,10,2006	To Cheque	4,500	-	3,280
Jul,15,2006	By Clearing	-	2,630	5,910
Oct,18,2006	To Cheque	530	-	5,380
Oct,27,2006	To self	2690	-	2,690
Nov,3,2006	By Cash	-	1,500	4,190
Dec,6,2006	To Cheque	950	-	3,240
Dec,23,2006	By Transfer	-	2,920	6,160

Question 10

(a) Without solving the quadratic equation, find the value of 'p' for which the given equation has real and equal roots. [3]

$x^2 + 2(p-1)x + (p+5) = 0$

(b) Find the co-ordinates of the center of a circle which passes through the point (4, 2) ; (2, -2) ; and (7, -7) [3]

(c) Dheer purchases a certain number of books for ₹ 960. If the cost per book was ₹ 8 less, the number of books that could be purchased for ₹ 960 would be 4 more. Write an equation, taking the original cost of each book to be ₹ x, and solve it to find the original cost of the books. [4]

Question 11

(a) From the top of a cliff 800 meters high, the angles of depressions of the top and bottom of a tower are observed to be 30° and 45° respectively. Find the height of the tower. [4]

(b) Use a graph paper for this question. Draw an ogive for the following distribution which shows a record of the weight in Kilograms of 200 students. [6]

Weight in Kg	No. of students
30 – 35	5
35 – 40	15
40 – 45	24
45 – 50	44
50 – 55	50
55 – 60	31
60 – 65	20
65 – 70	11

Use your ogive to estimate the following:

(i) the median weight .

(ii) the percentage of students weighing 55kg or more.

(iii) The upper quartile.