

**Section I**

(Attempt all questions of this section)

**Question 1**

- a. If  $x = 5 - 4\sqrt{6}$ , find:  
(i)  $\frac{1}{x}$       (ii)  $x - \frac{1}{x}$       (iii)  $x + \frac{1}{x}$  [3]
- b. Solve the given pairs of simultaneous equations graphically  $x - y + 1 = 0$ ;  $x + y = 5$  [3]
- c. Given  $\cos A = \frac{5}{13}$ , evaluate:  $\frac{\sin A - \cot A}{2 \tan A}$  [4]

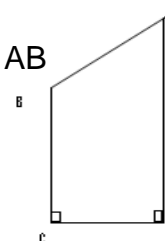
**Question 2**

- a.  $\frac{\cos 75}{\sin 15} + \frac{\sin 12}{\cos 78} - \frac{\cos 18}{\sin 72}$  [3]
- b. Solve the following equation for x:  $\frac{x-1}{2} - \frac{x+1}{2} = 5 - x$  [3]
- c. Rachna borrows ₹ 12,000 at 10% annum interest compounded half yearly. She repays ₹ 4000 at the end of every six months. Calculate the third payment she has to make at the end of 18 months in order to clear the entire loan. [4]

**Question 3**

- a. The difference between  $\frac{3}{4}$  of a line and  $\frac{2}{5}$  of the same line is 28 cm. Find the length of the line. [3]

- b. In the given figure, AD = 23 cm, BC = CD = 15cm find AB [3]



- c. At what rate of interest per annum will a sum of ₹ 62,500 earn a CI of ₹ 5,100 in one year? The interest is to be compounded half-yearly. [4]

**Question 4**

a Simplify: [3]

$$\left[ 1 - \{1 - (1 - n)^{-1}\}^{-1} \right]$$

b. If  $a = x + 1$  and  $\frac{4a - 3}{2} - \frac{3a - 1}{5} = \frac{3}{2}$ , find  $x$ . [3]

c. The difference between CI and SI on ₹ 75.00 for 2 years is ₹ 12 at the same rate of interest per annum. Find the rate of interest. [4]

**Section II**

(Attempt any four questions from this section)

**Question 5**

a. Simplify: [3]

$$\frac{3^{n+1}}{3^{n(n-1)}} \div \frac{9^{n+1}}{(3^{n+1})^{(n-1)}}$$

b  $\frac{\cos A \cot A}{1 + \sin A} = \operatorname{cosec} A - 1$  [3]

c. If  $10y = 7x - 4$  and  $12x + 18y = 1$ ; find the values of  $4x + 6y$  and  $8y - x$ . [4]

**Question 6**

a. The sum of the digits of a two digit number is 5. If the digits are reversed, the number is reduced by 27. Find the number. [3]

b. Solve for  $x$ :  $\log(x + 5) + \log(x - 5) = 4 \log 2 + 2 \log 3$ . [3]

c.  $(1 + \cot A - \operatorname{cosec} A)(1 + \tan A + \sec A) = 2$  [4]

**Question 7**

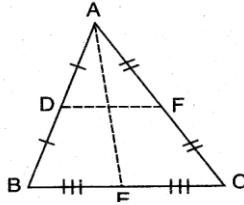
a. Evaluate:  $\log_{10} 8 + \log_{10} 25 + 2 \log_{10} 3 - \log_{10} 18$  without using tables [3]

b. Construct an equilateral triangle with altitude 4 cm [3]

c. Solve  $\frac{9}{x} - \frac{4}{y} = 8$  ;  $\frac{6}{x} + \frac{4}{y} = 20$  [4]

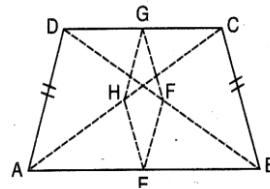
**Question 8**

- a. If  $a^x = b^y = c^z$  and  $b^2 = ac$ , prove that :  $y = \frac{2xz}{x+z}$  [3]
- b. If  $x = 2\sqrt{3} + 2\sqrt{2}$ , find: (i)  $\frac{1}{x}$  (ii)  $x + \frac{1}{x}$  (iii)  $\left(x + \frac{1}{x}\right)^2$  [3]
- c. Use the following figure to show that AE and DF bisect each other. [4]



**Question 9**

- a. Factorize:  $4(2x - 3y)^2 - 8x + 12y - 3$ . [3]
- b. If  $3x - \frac{4}{x} = 4$  and  $x \neq 0$ ; find  $27x^3 - \frac{64}{x^3}$  [3]
- c. ABCD is a quadrilateral in which  $AD = BC$ . E, F, G and H are the mid-points of AB, BD, CD and AC respectively. Prove that EFGH is a rhombus. [4]



**Question 10**

- a. If  $y = \frac{7 + 3\sqrt{5}}{7 - 3\sqrt{5}} = a + b\sqrt{5}$ ; find the values of a and b. [3]
- b. If  $m = \log 20$  and  $n = \log 25$ , find the value of x, so that:  $2 \log (x - 4) = 2m - n$ . [3]
- c. Find the area of the triangular region whose vertices are the points of intersections of the graph  $2x + y = 5$ ,  $y = x - 4$  and  $y = 5$  [4]

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