[MATRIX TYPE]

[2+2+2+2=8]

Q.1 Solve the equation.

(A)	$\left(\frac{3}{7}\right)^{2x-7} = \left(\frac{7}{3}\right)^{7x-2}$	(P)	$x = -1$
(B)	$9^x + 6^x = 2 \cdot 4^x$	(Q)	$x = 0$
(C)	$5^{x+1} - 5^{x-1} = 24$	(R)	$x = 1$
(D)	$6^x + 6^{x+1} = 2^x + 2^{x+1} + 2^{x+2}$	(S)	$x = 2$

[Ans. (A) R, (B) Q, (C) R, (D) Q]

[2+2+2+2+2+2=12]

Q.2

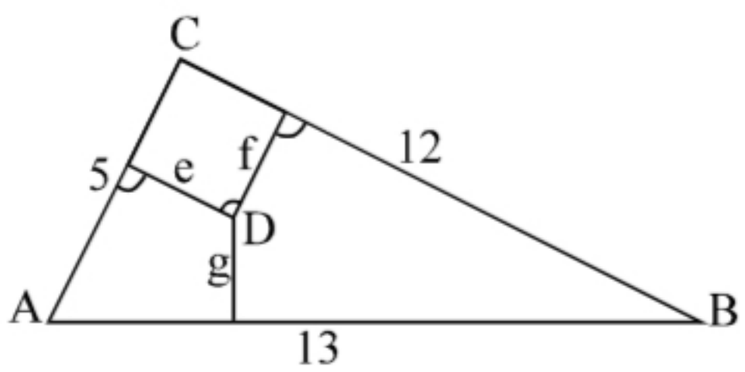
	Column-I		**Column-II**
(A)	If $a = 3\left(\sqrt{8+2\sqrt{7}} - \sqrt{8-2\sqrt{7}}\right)$, $b = \sqrt{(42)(30)+36}$, then the value of $\log_a b$ is equal to	(P)	-1
(B)	If $a = \sqrt{4+2\sqrt{3}} - \sqrt{4-2\sqrt{3}}$, $b = \sqrt{11+6\sqrt{2}} - \sqrt{11-6\sqrt{2}}$, then the value of $\log_a b$ is equal to	(Q)	1
(C)	$a = \sqrt{3+2\sqrt{2}}$, $b = \sqrt{3-2\sqrt{2}}$, then the value of $\log_a b$ is equal to	(R)	2
(D)	$a = \sqrt{7+\sqrt{7^2-1}}$, $b = \sqrt{7-\sqrt{7^2-1}}$, then the value of $\log_a b$ is equal to	(S)	$\frac{3}{2}$
(E)	The number of zeroes at the end of the product of first 20 prime numbers, is	(T)	None
(F)	The number of solutions of $2^{2x} - 3^{2y} = 55$, in which x and y are integers, is		

[Ans. (A) R; (B) S; (C) P; (D) P; (E) Q; (F) Q]

[INTEGER TYPE / SUBJECTIVE]

Q.3 The sides of a triangle ABC are as shown in the given figure. Let D be any internal point of this triangle and let e, f, and g denote the distance between the point D and the sides of the triangle. Find the sum $(5e + 12f + 13g)$. **[4]**

[Ans. 60]



Q.4 An equilateral triangle and a regular hexagon have the same perimeter, find the ratio of their areas. **[4]**

[Ans: 2 : 3]

Q.5 Establish tricotomy in each of this following pairs of numbers **[4]**

(i) $3^{\log_{27} 3}$ and $2^{\log_4 2}$ (ii) $\log_4 5$ and $\log_{1/16}(1/25)$

(iii) 4 and $\log_3 10 + \log_{10} 81$ (iv) $\log_{1/5}(1/7)$ and $\log_{1/7}(1/5)$

[Ans. (i) (Hint: >); (ii) (Hint: =); (iii) (Hint: <); (iv) (Hint: >)]

Q.6 Compute the value of $81^{\frac{1}{\log_5 3}} + 27^{\log_9 36} + 3^{\frac{4}{\log_7 9}}$ **[4]**

[Ans. 890]