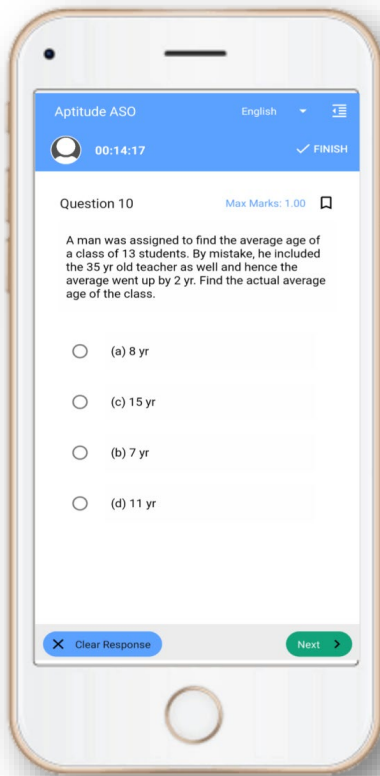


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**B - SECTION - III**  
**SCIENCE (PCM)**  
**MATHEMATICS**

81. R is a relation over the set of real numbers and it is given by  $mn \geq 0$ . Then R is :

- (A) Symmetric and transitive  
 (B) A partial order relation  
 (C) Reflexive and symmetric  
 (D) An equivalence relation

82. If the quadratic equation  $ax^2 + bx + c = 0$

has  $\frac{\sqrt{2} + 1}{\sqrt{2} - 1}$  as one root of it and  $a = 2$ ,

then what is the equation in standard form ?

- (A)  $x^2 - 6x + 1 = 0$   
 (B)  $2x^2 - x + 1 = 0$   
 (C)  $x^2 - \sqrt{2}x + \sqrt{2} = 0$   
 (D)  $\sqrt{2}x^2 - 3x + \sqrt{2} = 0$

83. Let  $A = \{x | -1 < x < 1\} = B$ . If  $f: A \rightarrow B$  is bijective then a possible definition of  $f(x)$  is :

- (A)  $|x|$   
 (B)  $x|x|$   
 (C)  $\sin \pi x$   
 (D) None of these

84. Let A and B be two sets. Then  $(A \cup B)' \cup (A' \cap B)$  is equal to :

- (A)  $A'$   
 (B) A  
 (C)  $B'$   
 (D) None of these

85. If  $x = 2 + \sqrt{3}$ , find the value of  $x^2 + \frac{1}{x^2}$ .

- (A) 12  
 (B) 14  
 (C) 16  
 (D) 18

86. The number of terms common between series  $1 + 2 + 4 + 8 + \dots$  to 100 terms and  $1 + 4 + 7 + 10 + \dots$  to 100 terms is :

- (A) 6  
 (B) 4  
 (C) 5

(D) None of these

87. Let G be a group. If H is a subgroup of G with order H and index of H in G is 7, then order of group G must be :

- (A) 154  
 (B) 18  
 (C) 77  
 (D) 1078

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88. Differentiate  $2 \log_2 x$  with respect to  $x$ .

- (A)  $2e^x$   
 (B)  $\log_2 x + 1$   
 (C)  $\log_2 x$   
 (D) 1

89. If  $a, b, c, d$  and  $p$  are distinct real numbers such that  $(a^2 + b^2 + c^2) p^2 - 2(ab + bc + cd) p + (b^2 + c^2 + d^2) \leq 0$ , then  $a, b, c, d$  are in :

- (A) A.P.  
 (B) G.P.  
 (C) H.P.  
 (D) Logarithmic series

90. Evaluate the right hand limit of the function :

$$f(x) = \begin{cases} \frac{|x-4|}{x-4}, & x \neq 4 \\ 0, & x = 4 \end{cases} \text{ at } x=4$$

- (A) -1  
 (B) 1  
 (C) 0  
 (D) does not exist

91. The equation of the plane passing through the line  $\frac{x-1}{2} = \frac{y+1}{-1} = \frac{z}{3}$  and parallel to the direction where direction numbers are 3, 4, 2 is :

- (A)  $14x - 5y - 11z = 19$   
 (B)  $3x + 4y + 2z + 1 = 0$   
 (C)  $2x - y + 3z = 3$   
 (D) None of these

92. The diagonals of a parallelogram PQRS are along the lines  $x + 3y = 4$  and  $6x - 2y = 7$ . Then PQRS must be a :

- (A) Rectangle  
 (B) Square  
 (C) Cyclic Quadrilateral  
 (D) Rhombus

93. The foot of the perpendicular on the line  $3x + y = \lambda$  drawn from the origin is C. If the line cuts the X-axis and Y-axis at A and B respectively then BC : CA is :

- (A) 1 : 3  
 (B) 3 : 1  
 (C) 1 : 9  
 (D) 9 : 1

94. Find the mean deviation from the mean for the data 6, 7, 10, 12, 13, 4, 8, 20.

- (A) 10  
(B) 3  
(C) 3.75  
(D) 8.6

95. Two dice are thrown simultaneously. Find the probability of getting a multiple of 2 on one dice and a multiple of 3 on the other dice.

- (A)  $\frac{1}{12}$   
(B)  $\frac{1}{3}$   
(C)  $\frac{11}{36}$   
(D)  $\frac{1}{4}$

96. If  $\tan^2\theta = 2\tan^2\phi + 1$ , then  $\cos 2\theta$  is equal to :

- (A)  $\sin^2\phi$   
(B)  $-\sin^2\phi$   
(C)  $\tan^2\phi$   
(D)  $-\cot^2\phi$

97. Solve :

$$\tan^2\theta + (1 - \sqrt{3})\tan\theta - \sqrt{3} = 0$$

- (A)  $\frac{\pi}{3}$   
(B)  $\frac{\pi}{4}$   
(C)  $\frac{\pi}{6}$   
(D)  $\frac{\pi}{2}$

98. The diameter of a sphere is decreased by 25%. By what percent does its surface area decrease ?

- (A) 25  
(B) 52.75  
(C) 37.25  
(D) 43.75

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99.  $\begin{vmatrix} 0 & p-q & p-r \\ q-p & 0 & q-r \\ r-p & r-q & 0 \end{vmatrix}$  is equal to :

- (A)  $p+q+r$   
(B) 0  
(C)  $p-q-r$   
(D)  $-p+q+r$

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100. There are two cones. The curved surface area of one is twice that of the other. The slant height of the later is twice that of the former. Find the ratio of their radii.

- (A) 2 : 1  
(B) 4 : 1  
(C) 3 : 2  
(D) 4 : 3