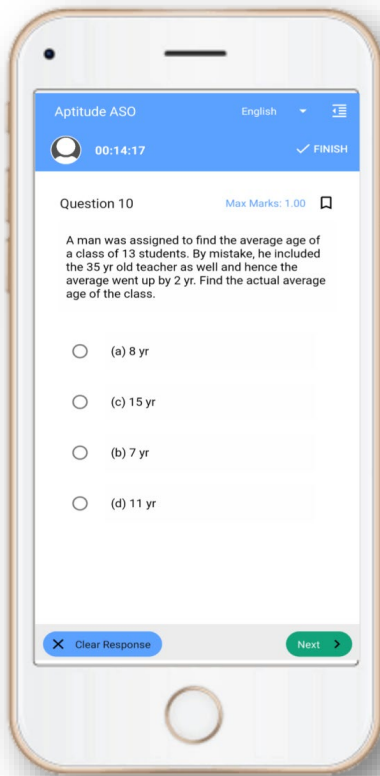


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## B - SECTION - III

## SCIENCE (PCM)

## MATHEMATICS

81. Let  $U$  be the universal set and  $A \cup B \cup C = U$ . Then  $\{(A - B) \cup (B - C) \cup (C - A)\}'$  is equal to :
- (A)  $A \cup B \cup C$   
 (B)  $A \cup (B \cap C)$   
 (C)  $A \cap B \cap C$   
 (D)  $A \cap (B \cup C)$
82. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 - k(x+1) - c = 0$ , the value of  $(\alpha+1)(\beta+1)$  is equal to :
- (A) 1  
 (B)  $k \pm c$   
 (C)  $1 - c$   
 (D)  $1 + c$
83. Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be defined as  $f(x) = x^4$ . Choose the correct option from the following :
- (A)  $f$  is one-one onto  
 (B)  $f$  is many-one onto  
 (C)  $f$  is one-one but not onto  
 (D)  $f$  is neither one-one nor onto
84. Out of four integers, any three were randomly taken at a time and added. The results were found to be 174, 193, 267 and 242. Which of the following integers is the greatest among these four ?
- (A) 118  
 (B) 127  
 (C) 99  
 (D) 123
85. Let  $R$  be the relation in the set  $N$  given by  $R = \{(a, b) : a = b - 2, b > 6\}$ , then :
- (A)  $(2, 4) \in R$   
 (B)  $(3, 8) \in R$   
 (C)  $(6, 8) \in R$   
 (D)  $(8, 7) \in R$
86. The interval in which  $y = x^2 e^{-x}$  is increasing is :
- (A)  $(-\infty, \infty)$   
 (B)  $(-2, 0)$   
 (C)  $(2, \infty)$   
 (D)  $(0, 2)$
87. The terms of a G.P. are all positive and each term of it is equal to the sum of the next two following terms. Find its common ratio.
- (A)  $\frac{1}{\sqrt{5}}$   
 (B)  $\frac{\sqrt{5}+1}{2}$   
 (C)  $\frac{1}{1+\sqrt{5}}$   
 (D)  $\frac{\sqrt{5}-1}{2}$

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88. What will be the common difference of the arithmetic progression, whose sum of first  $m$  terms is given by  $2(m^2 + 3m)$  ?

- (A) 12  
(B) 10  
(C) 9  
(D) 4

89. The total revenue in rupees received from the sale of  $x$  units of a product is given by  $R(x) = 3x^2 + 36x + 5$ . The marginal revenue, when  $x = 15$  is :

- (A) 90  
(B) 96  
(C) 116  
(D) 126

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90. A monoid is called a group if :

- (A)  $(a*a) = a = (a+c)$   
(B)  $(a*c) = (a+c)$   
(C)  $(a+c) = a$   
(D)  $(a*c) = (c*a) = e$

91. If the lines  $\frac{x+2}{4\lambda+1} = \frac{y-1}{4} = \frac{z}{-18}$  and

$$\frac{x}{-3} = \frac{y+1}{5\mu-3} = \frac{z-1}{6}$$

are parallel to each other then the value of the pair  $(\lambda, \mu)$  is :

- (A)  $\left(-2, \frac{1}{3}\right)$   
(B)  $\left(2, -\frac{1}{3}\right)$   
(C)  $\left(2, \frac{1}{3}\right)$   
(D) Cannot be found

92. A point R with  $x$  Co-ordinate 4 lies on the line segment joining the points  $P(2, -3, 4)$  and  $Q(8, 0, 10)$ . Find the Co-ordinate of the point R.

- (A)  $(2, 0, -4)$   
(B)  $(4, -2, 6)$   
(C)  $(4, 2, 6)$   
(D)  $(5, -2, 1)$

93. Two students A and B appeared in an examination. The probability that A will qualify the examination is 0.05 and that B will qualify the examination is 0.1. The probability that both will qualify the examination is 0.02. Find the probability that both A and B will not qualify the examination.

- (A) 0.11  
(B) 0.15  
(C) 0.87  
(D) 0.98

94. The variance of 20 observations is 5. If each observation is multiplied by 2, find the variance of the resulting observations.

- (A) 10  
(B) 20  
(C) 40  
(D) 5

95. A circle of radius 5 units touches the Co-ordinate axes in the first quadrant. If the circle makes one complete roll on  $x$ -axis along the positive direction of  $x$ -axis, find its equation in new position.

- (A)  $x^2 + (y - 5)^2 = 5^2$   
 (B)  $x^2 + \{y - (5 + 10\pi)\}^2 = 5^2$   
 (C)  $\{x - (5 + 10\pi)\}^2 + (y - 5)^2 = 5^2$   
 (D)  $\{x + (5 - 10\pi)\}^2 + y^2 = 5^2$

96. A cylinder is of height 31 cm and base radius 7 cm. A hemisphere of radius equal to base radius of cylinder is cutoff from one end and a cone of maximum height from remaining part is also cutoff. The curved surface area of the remaining part is :

- (A) 506 cm<sup>2</sup>  
 (B) 508 cm<sup>2</sup>  
 (C) 510 cm<sup>2</sup>  
 (D) 512 cm<sup>2</sup>

97. What is the value of  $1 - \cos^2\alpha - \cos^4\alpha$ , if  $\sin\alpha + \sin^2\alpha = 1$  ?

- (A) 0  
 (B) 1  
 (C) 2  
 (D) -1

98. If  $\alpha$  and  $\beta$  are the solutions of  $a\cos\theta + b\sin\theta = c$ , then what will be the value of  $\sin\alpha \cdot \sin\beta$  ?

- (A)  $\frac{c^2}{a^2 + b^2}$   
 (B)  $\frac{a^2 + c^2}{a^2 - b^2}$   
 (C)  $\frac{c^2 - a^2}{a^2 + b^2}$   
 (D) 1

99. The radius of a cylindrical container is 14 cm and height is 5 cm. By how many centimeters should the radius or the height be increased, so that the increase in volume becomes the same (not zero) in either case ?

- (A) 9.4 cm  
 (B) 9.8 cm  
 (C) 10.4 cm  
 (D) 11.2 cm

100. Let  $A = \begin{vmatrix} 1 & \sin\theta & 1 \\ -\sin\theta & 1 & \sin\theta \\ -1 & -\sin\theta & 1 \end{vmatrix}$ , where

$0 \leq \theta \leq 2\pi$ , then :

- (A) Det A = 0  
 (B) Det A  $\in$  [2, 4]  
 (C) Det A belongs to (1, 4)  
 (D) None of these