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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 α and β 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
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 (λ, μ) is :
(A) $(-2, \frac{1}{3})$
(B) $(2, -\frac{1}{3})$
(C) $(2, \frac{1}{3})$
(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

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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^2
 (B) 508 cm^2
 (C) 510 cm^2
 (D) 512 cm^2
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 α and β 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) $\text{Det } A = 0$
 (B) $\text{Det } A \in [2, 4]$
 (C) $\text{Det } A$ belongs to $(1, 4)$
 (D) None of these