101. The value of $\sin\left(2\sin^{-1}0.8\right)$ is

(a) 0.96

(b) 0.80

(c) 0.64

(d) 0.18

Correct: a

102. Let P = $\{P = \theta; \sin\theta - \cos\theta = \sqrt{2}\cos\theta\}$ denotes the greatest integer function is
(a) $P \subset Q$ and $Q - P = \phi$
(b) Q $\not\subset$ P
(c) P $\not\subset$ Q
(d) P = Q

Correct: d

103. The function f(x) = x -[x] where I] denotes the greatest integer function is
(a) continuous everywhere
(b) continuous at integer points only
(c) continuous at non-integer points only
(d) nowhere continuous

Correct: c

104. The value of the integral $\int_{-2}^{0} \frac{dx}{\sqrt{12-x^2-4x}}$ is
(a) $\frac{\pi}{2}$
(b) $\frac{\pi}{6}$
(c) $\frac{\pi}{3}$
(d) $-\frac{\pi}{6}$

Correct: b

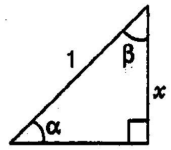
105. The range of the function f(x) = $\frac{2+x}{2-x}$, $x \neq 2$ is
(a) R
(b) R - { - 1}
(c) R - { 1 }
(d) R - { 2 }

Correct: b

106. Let R and S be any two equivalence relations on a set X. Then which of the following is incorrect statement
(a) R U S is an equivalence relation on X
(b) R^{-1} is an equivalence relation prix
(c) $R^{-1} \cap S^{-1}$ is an equivalence relation on X
(d) Δ is an equivalence relation on X, where Δ is the
diagonal relation on X.

Correct: a

107. Using the information from the figure, $\cos^{-1} x$ is equal to



(a) $\frac{\pi}{2} + \cos x$
(b) $\frac{\pi}{2} + \sin x$
(c) $\frac{\pi}{2} - \sin^{-1} x$
(d) $\frac{\pi}{2} + \sin^{-1} x$

Correct: c

108. Let f (x) be a function defined by $f(x) = \begin{cases} 4x-5, & \text{if } x \leq 2 \\ x-\lambda, & \text{if } x > 2 \end{cases}$ if $\lim_{x\to 2} f(x)$ exists
(a) -2
(b) -1
(c) 0
(d) 1

Correct: b

109. The graph $y^2 + 2xy + 50|x| = 625$ divides the plane into regions. Then, the area of bounded regions is
(a) 500 sq units
(b) 1250 sq units
(c) 2500 sq units
(d) 800 sq units

Correct: b

110. The equation of the circle whose radius is 5 and which touches the circle
$x^2 + y^2 - 2x - 4y - 20 = 0$ externally at the point (5,5) is
(a) $(x-9)^2 + (y-8)^2 = 5^2$
(b) $(x-5)^2 + (y-5)^2 = 5^2$
(c) $(x-0)^2 + (y-0)^2 = 5^2$
(d) None of the above

Correct: a

111. The variance of 20 observations in 5. If each observation is multiplied by 2, then the variance of the resulting observation is
(a) 10
(b) 20
(c) 30
(d) 40

Correct: b

112. The only integral root of the equation
$$\begin{vmatrix} 2-y & 2 & 3 \\ 2 & 5-y & 6 \\ 3 & 4 & 10-y \end{vmatrix}$$
(a) y = 3
(b) y = 2
(c) y = 1
(d) None of these

Correct: c

113. A man repays a loan of ₽ 3250 by paying ₽ 20 in the first month and then increases the payment by 15 every month. How long will it take him to clear the loan?
(a) 20 months
(b) 25 months
(c) 30 months
(d) 35 months

Correct: a

114. If the two positive numbers whose difference is 12 and whose AM exceeds the GM by 2, then the numbers are
(a) 18,6
(b) 16,4
(c) 14,2
(d) None of these

Correct: b

115. The coefficients of three consecutive terms in the expansion of $(1+x)^n$ are in the ratio 1:7:42 then the value of n is
(a) 55
(b) 54
(c) 56
(d) 66

Correct: a

116. The number of words with or without meaning which can be made using all the letters of the word AGAIN. If these words are written as in a dictionary, then the 50th word 124. If X follows a binomial distribution with will be

(a) NAAGI
(b) NAAIG
(C) NAIAG
(d) NAIGA

Correct: b

117. Let $a_1, a_2, a_3, \ldots . a_n$ be in AP. If
$\frac{1}{a_1 a_n} + \frac{1}{a_2 a_{n-1}} + \ldots + \frac{1}{a_n a_1}$
$= \frac{K}{a_1 + a_n}\left[\frac{1}{a_1} + \frac{1}{a_2} + \ldots + \frac{1}{a_n}\right]$
then K is equal to
(a) 1
(b) 2
(c) 3
(d) 5

Correct: b

118. If both roots of the equation $x^2 - 2(a-1)x + (2a+1) = 0$ are positive, where a is a real number, then
(a) $a \in (4, \infty)$
(b) $a \in (-\infty, 0] \cup [4, \infty]$
(c) $a \in (1, \infty)$
(d) a $\in [4, \infty)$

Correct: d

119. The length 'x' of a rectangle is decreasing at the rate of 6 cm/min and the width y is increasing at the rate of 4 cm/min. When x=8 cm and y=4 cm, the rate of change of the area of the rectangle is
(a) 8
(b) 16
(c) 24
(d) 32

Correct: a

120. If p and q are the order and degree of the differential equation $y\frac{dy}{dx} + x^3\left(\frac{d^2y}{dx^2}\right)^2 + xy = \cos x$
(a) p < 9
(b) p = 9
(c) p > 9
(d) None of these

Correct: a

121. The solution of the differential equation
$\frac{dy}{dx} = \frac{2xy - y^2}{2xy - x^2}$,
(a) $xy(x+y) = C$
(b) $xy(x-y) = C$
(c) $x^2y(x-y) = C$
(d) $x^3y(x-y) = C$

Correct: b

122. Let g(x) be the inverse of an invertible function f(x) which is differentiable at x = c, then g'(f(c)) equals
(a) $f'(\mathrm{C})$
(b) $\frac{1}{f'(c)}$
(c) f(c)
(d) $\frac{1}{f(c)}$

Correct: b

123. A five-digit number divisible by 3 is to be formed using the numbers 0, 1, 3, 4 and 5 without repetition. The total number of ways this can be done is

(a) 216
(b) 600
(c) 240
(d) 3125

Correct: a

124. If X follows a binomial distribution with parameters n = 100, p = ⅓, then P(X=r) is maximum, when r is equal to
(a) 32
(b) 34
(c) 33
(d) 31

Correct: c

125. y = acos(log x) + bsin(log x) is a solution of the differential equation
(a) $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}+y=0$
(b) $x\frac{d^2y}{dx^2}+\frac{dy}{dx}+y=0$
(c) $\frac{d^2y}{dx^2}+\frac{dy}{dx}+y=0$
(d) $x\frac{d^2y}{dx^2}+x^2\frac{dy}{dx}+y=0$

Correct: a

126. The shortest distance between the lines $\vec{r}=(4\hat{i}-\hat{j})+\lambda(\hat{i}+2\hat{j}-3\hat{k})$ and $\vec{r}=(\hat{i}-\hat{j}+2\hat{k})+\mu(2\hat{i}+4\hat{j}-5\hat{k})$ is
(a) $\frac{2}{\sqrt{5}}$
(b) $\frac{2}{5}$
(c) $\frac{6}{\sqrt{5}}$
(d) $\frac{1}{\sqrt{5}}$

Correct: c

127. The solution set of the in equality
$\log_{\tan(x/3)}\left(x^2-3x+2\right)\geq 2$ is
(a) $\left(\frac{1}{2},2\right)$
(b) $\left[\frac{1}{2},2\right]$)
(c) $\left[\frac{1}{2},1\right)\cup\left(2,\frac{5}{2}\right]$
(d) $\left(\frac{1}{2},\frac{5}{2}\right)$

Correct: c

128. The minimum value of $9^x + 9^{1-x}$, x ∈ R is
(a) 2
(b) 3
(c) 6
(d) 9

Correct: c

129. Area of one loop formed by $|y|=|\sin x|$ is
(a) 0
(b) 2
(c) 4
(d) 2π

Correct: c

130. The function $y=c_1\cos x+c_2\sin x$ is a solution
of the DE, where c_1 and c_2 are real numbers
(a) $\frac{d^2y}{dx^2}=y$

(b) $\frac{d^2y}{dx^2} + y = 0$
(c) $\frac{d^2y}{dx^2} + xy = 0$
(d) $\frac{d^2y}{dx^2} - xy = 0$

Correct: b

131. If $\int_0^\infty [3e^{-x}]\, dx = l$ where [.] denotes the greatest integer function, then the value of l is
(a) 0
(b) In3
(c) e^3
(d) $3e^{-1}$

Correct: b

132. $\int_1^{\sqrt{3}} \frac{dx}{1+x^2}$ equals
(a) $\frac{\pi}{3}$
(b) $\frac{2\pi}{3}$
(c) $\frac{\pi}{6}$
(d) $\frac{\pi}{12}$

Correct: d

133. $\int \frac{\sin^2 x - \cos^2 x}{\sin^2 x \cos^2 x} dx$ is equal to
(a) $\cot x - \tan x + C$
(b) $\tan x + \cot x + C$
(c) $\tan x + \csc x + C$
(d) $e^x \cos x + C$

Correct: b

134. The integral $\int e^x (1 + \tan x) \sec x$ dx equals
(a) $e^x \cot x + c$
(b) $e^x \tan x + c$
(c) $e^x \sec x + c$
(d) $e^x \cos x + c$

Correct: c

135. The area of the region bounded by the two parabolas $y = x^2$ and y=x is
(a) 1/3
(b) 2/3
(c) 1
(d) 1/6

Correct: d

136. Differentiate $y = \sin^{-1}\left(\frac{1-x^2}{1+x^2}\right)$, 0 < x < 1 with respect to
(a) $\frac{-2}{1+x^2}$
(b) $\frac{2}{1-x^2}$
(c) $\frac{1}{1+x^2}$
(d) $\frac{1}{1-x^2}$

Correct: a

137. The angle between the line $x - 2y + z = 0 = x + 2y - 2z$ and the plane 5x – 2y – 2 +17 = 0 is
(a) 30°
(b) 60°
(c) 90°
(d) 0°

Correct: d

138. If $y = e^{x+e^{x+e^{x+\cdots}}}$, then $\frac{dy}{dx}$ is equal to
(a) $\frac{y}{1-y}$
(b) $\frac{x}{1-y}$
(c) $\frac{x}{1-x}$
(d) $\frac{y}{1-x}$

Correct: a

139. If $\lim_{x\to 0} |x|^{|\cos x|} = 1$ where [.] denotes the greatest integer function, then the value of l is
(a) 1
(b) -1
(c) 0
(d) does not exist

Correct: a

140. A polygon has 44 diagonals. The number of its sides are
(a) 9
(b) 8
(c) 11
(d) 7

Correct: c

141. If $\cot^{-1}(\sqrt{\cos\alpha}) - \tan^{-1}(\sqrt{\cos\alpha}) = x$ then sin x is equal to
(a) $\tan^2(\alpha/2)$
(b) $\cot^2(\alpha/2)$
(c) $\tan\alpha$
(d) $\cot(\alpha/2)$

Correct: a

142. If a, b, c are roots of the equation $x^3 + px + q = 0$, then the value of $\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ is
(a) 1
(b) 2
(c) 0
(d) 3

Correct: c

143. If y = sin mx, then the value of the determinant $\begin{vmatrix} y & y_1 & y_2 \\ y_3 & y_4 & y_5 \\ y_6 & y_7 & y_8 \end{vmatrix}$, where $y_n = \frac{d^n y}{dx^n}$ is
(a) m^9
(b) m^2
(c) m^3
(d) None of these

Correct: d

144. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $A^{-1} = \lambda A$. Then, the value of λ is
(a) 1/17
(b) 1/18
(c) 1/19
(d) 1/21

Correct: c

145. If A = $\begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$ and $A^2 = B$, then the value of α is
(a) $\alpha = \pm 1$
(b) $\alpha = 4$
(c) not possible
(d) Both (a) and (b)

Correct: c

146. Let $0 < \alpha < \pi, 0 < \beta < \pi$ and $\cos\alpha + \cos\beta - \cos(\alpha + \beta) = \frac{3}{2}$ .Then the relation between α and β will be
(a) $\alpha = \beta$
(b) $\alpha > \beta$
(c) $\alpha < \beta$
(d) $\alpha = \frac{\beta}{3}$

Correct: a

147. If $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$, then the value of x is
(a) $\frac{\sqrt{3}}{2}$
(b) $\frac{1}{2}$
(c) $-\frac{1}{2}$
(d) $-\frac{\sqrt{3}}{2}$

Correct: a

148. If R is the set of real numbers and f:R → R is a function defined by f(x) = sin x, then $f^{-1}([-1, 1])$ is
(a) {x{ x = nt, n is an integer}
(b) {xl x = 1/2 + 2nt, n is an integer}
(c) R
(d) null set ϕ

Correct: c

149. The function f(x) =cos x is strictly decreasing on
(a) $[0, \pi]$
(b) $[0, \pi)$
(c) $(0, \pi]$
(d) $(0, \pi)$

Correct: d

150. Let R be a reflexive relation on a finite set A having n elements and let there be m ordered pairs in R, then
(a) $m \geq n$
(b) $m \leq n$
(c) m = n
(d) None of these

Correct: a