101. The area of a parallelogram whose adjacent sides are $\hat{\mathbf{i}} - 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$ and $2\hat{\mathbf{i}} + \hat{\mathbf{j}} - 4\hat{\mathbf{k}}$, is

(a) $10\sqrt{3}$ sq unit

(b) $5\sqrt{3}$ sq unit

(c) $5\sqrt{6}$ sq unit

(d) $10\sqrt{6}$ sq unit

102. If $\vec{\mathbf{a}} = \hat{\mathbf{i}} - 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$ and $\vec{\mathbf{b}} = 3\hat{\mathbf{i}} + \hat{\mathbf{j}} + 2\hat{\mathbf{k}}$, then the unit vector perpendicular to $\vec{\mathbf{a}}$ and $\vec{\mathbf{b}}$ is

(a) $\dfrac{\hat{\mathbf{i}} - \hat{\mathbf{j}} - \hat{\mathbf{k}}}{\sqrt{3}}$ (b) $\dfrac{\hat{\mathbf{i}} - \hat{\mathbf{j}} + \hat{\mathbf{k}}}{\sqrt{3}}$

(c) $\dfrac{-\hat{\mathbf{i}} + \hat{\mathbf{j}} + \hat{\mathbf{k}}}{\sqrt{3}}$ (d) $\dfrac{\hat{\mathbf{i}} + \hat{\mathbf{j}} + \hat{\mathbf{k}}}{\sqrt{3}}$

103. If the 10th term of a geometric progression is 9 and the 4th term is 4, then its 7th term is

(a) $\dfrac{9}{4}$ (b) $\dfrac{4}{9}$

(c) 36 (d) 6

104. The harmonic mean of $\dfrac{a}{1 - ab}$ and $\dfrac{a}{1 + ab}$ is

(a) $\dfrac{1}{1 - a^2b^2}$ (b) $\dfrac{a}{1 - a^2b^2}$

(c) a (d) $\dfrac{a}{\sqrt{(1 - a^2b^2)}}$

105. The general value of θ obtained from the equation $\cos 2\theta = \sin \alpha$ is

(a) $\theta = 2n\pi \pm \left(\dfrac{\pi}{2} - \alpha\right)$

(b) $\theta = \dfrac{n\pi + (-1)^n \alpha}{2}$

(c) $\theta = n\pi \pm \left(\frac{\pi}{4} - \frac{\alpha}{2}\right)$

(d) $2\theta = \frac{\pi}{2} - \alpha$

106. The principal value of $\sin^{-1}\left(\sin \frac{5\pi}{3}\right)$ is

(a) $\frac{-5\pi}{3}$ (b) $\frac{5\pi}{3}$

(c) $\frac{-\pi}{3}$ (d) $\frac{4\pi}{3}$

107. The equation of the plane passes through (2, 3, 4) and parallel to the plane $x + 2y + 4z = 5$ is

(a) $x + 2y + 4z = 10$

(b) $x + 2y + 4z = 3$

(c) $x + 2y + 4z = 24$

(d) $x + y + 2z = 2$

108. The distance of the point (2, 3, 4) from the plane $3x - 6y + 2z + 11 = 0$ is

(a) 2 (b) 9

(c) 10 (d) 1

109. For the function $f(x) = x^2 - 6x + 8$, $2 \le x \le 4$, the value of x for which $f'(x)$ vanishes has

(a) $\frac{9}{4}$ (b) $\frac{5}{2}$

(c) 3 (d) $\frac{7}{2}$

110. From Mean value theorem $f(b) - f(a) = (b - a) f'(x_1)$ $a < x_1 < b$ is $f(x) = \frac{1}{x}$, then x_1 is equal to

(a) $\frac{2ab}{a+b}$ (b) $\frac{b-a}{b+a}$

(c) $\sqrt{ab}$ (d) $\frac{a+b}{2}$

111. If $A = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 \\ 2 & 3 \end{bmatrix}$, then

(a) $AB = BA$ (b) $B^2 = B$

(c) $AB \ne BA$ (d) $A^2 = A$

112. If for real values of x, $\cos\theta = x + \frac{1}{x}$, then

(a) θ is an acute angle

(b) θ is a right angle

(c) θ is an obtuse angle

(d) no value of θ is possible

113. One of the equations of the lines passing through the point (3, – 2) and inclined at 60° to the line $\sqrt{3}x + y = 1$

(a) $x - y = \sqrt{3}$ (b) $x + 2 = 0$

(c) $x + y = 0$ (d) $y + 2 = 0$

114. The lines $a_1x + b_1y + c_1 = 0$ and $a_2x + b_2y + c_2 = 0$ are perpendicular to each other if

(a) $a_1b_1 - b_1a_2 = 0$ (b) $a_1^2b_2 + b_1^2a_2 = 0$

(c) $a_1b_1 + a_2b_2 = 0$ (d) $a_1a_2 + b_1b_2 = 0$

115. $\int_0^{\pi/2} \frac{dx}{1 + \tan x}$ is equal to

(a) π (b) $\frac{\pi}{2}$

(c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

116. $\int_0^{\pi} \cos^3 x\, dx$ is equal to

(a) π (b) 1

(c) 0 (d) – 1

117. The angle between the vectors $(2\hat{\mathbf{i}} + 6\hat{\mathbf{j}} + 3\hat{\mathbf{k}})$ and $(12\hat{\mathbf{i}} - 4\hat{\mathbf{j}} + 3\hat{\mathbf{k}})$ is

(a) $\cos^{-1}\left(\frac{1}{9}\right)$ (b) $\cos^{-1}\left(\frac{9}{11}\right)$

(c) $\cos^{-1}\left(\frac{9}{91}\right)$ (d) $\cos^{-1}\left(\frac{1}{10}\right)$

118. If the vectors $a\hat{\mathbf{i}} + 2\hat{\mathbf{j}} + 3\hat{\mathbf{k}}$ and $-\hat{\mathbf{i}} + 5\hat{\mathbf{j}} + a\hat{\mathbf{k}}$ are perpendicular to each other, then a is equal to

(a) 5 (b) – 6

(c) – 5 (d) 6

119. If $i^2 = -1$, then value of $\sum_{n=1}^{200} i^n$ is

(a) 0 (b) 50

(c) – 50 (d) 100

120. If $\frac{c+i}{c-i} = a + ib$, where a, b, c are real, then $a^2 + b^2$ is equal to

(a) 7 (b) 1

(c) c^2 (d) $-c^2$

121. The direction cosines to the normal plane $x + 2y - 3z + 9 = 0$ are

(a) $\frac{-1}{\sqrt{14}}, \frac{-2}{\sqrt{14}}, \frac{3}{\sqrt{10}}$

(b) $\frac{1}{\sqrt{10}}, \frac{2}{\sqrt{10}}, \frac{3}{\sqrt{14}}$

(c) $\frac{-1}{\sqrt{10}}, \frac{2}{\sqrt{14}}, \frac{1}{\sqrt{14}}$

(d) $\frac{1}{\sqrt{14}}, \frac{2}{\sqrt{14}}, \frac{-3}{\sqrt{14}}$

122. The equation of a plane which cuts equal intercepts of unit lengths on the axes, is

(a) $x + y + z = 0$

(b) $x + y + z = 1$

(c) $x + y - z = 1$

(d) $\frac{x}{a} + \frac{y}{b} + \frac{z}{a} = 1$

123. Using bisection method one roots of equation $x^3 - 5x + 1 = 0$ lies in

(a) $(-3, -1.5)$ (b) $(0, 1)$

(c) $(2, 3)$ (d) None of these

124. For the smallest positive root of transcedental equation $x - e^{-x} = 0$ interval is

(a) $(1, 2)$ (b) $(0, 1)$

(c) $(2, 3)$ (d) $(-1, 0)$

125. The equations of the sides of a triangle are $x + y - 5 = 0$, $x - y + 1 = 0$ and $y - 1 = 0$, then the coordinate of the circumcentre are

(a) $(2, 1)$ (b) $(1, 2)$

(c) $(2, -2)$ (d) $(1, -2)$

126. A rod of length 'l' rests against the floor and a wall of a room. If the rod begins to slide on the floor, then the locus of its middle point is

(a) a straight line (b) circle

(c) parabola (d) ellipse

127. The probability, that a leap year has 53 sundays is

(a) $\frac{2}{7}$ (b) $\frac{3}{7}$

(c) $\frac{4}{7}$ (d) $\frac{1}{7}$

128. In tossing of 10 coins the probability of getting 5 heads is

(a) $\frac{1}{2}$ (b) $\frac{63}{256}$

(c) $\frac{193}{250}$ (d) $\frac{9}{128}$

129. After second iteration of Newton-Raphson method the positive roots of equation $x^2 = 3$ is, (taking initial approximation 3/2)

(a) $\frac{7}{4}$ (b) $\frac{97}{56}$

(c) $\frac{3}{2}$ (d) $\frac{347}{200}$

130. By false positioning the second approximation of a root of equation $f(x) = 0$ is (where x_0, x_1 are initial and first approximations respectively)

(a) $x_1 - \frac{f(x_0)}{f(x_1) - f(x_0)}$

(b) $x_0 - \frac{f(x_0)}{f(x_1) - f(x_0)}$

(c) $\frac{x_0 f(x_1) - x_1 f(x_0)}{f(x_1) - f(x_0)}$

(d) $\frac{x_0 f(x_0) - x_1 f(x_1)}{f(x_1) - f(x_0)}$

131. $\begin{vmatrix} 13 & 16 & 19 \\ 14 & 17 & 20 \\ 15 & 18 & 21 \end{vmatrix}$ is equal to

(a) 57 (b) -39

(c) 96 (d) 0

132. Which one of the following statements is true ?

(a) If $|A| \neq 0$, then $|\text{adj } A| = |A|^{(n-1)}$ where $A = |a_n|_{n \times n}$

(b) If $A' = A$, then A is a square matrix

(c) Determination of a non square matrix is zero

(d) Non-singular square matrix does not have a unique inverse

133. $\int \frac{1}{x - x^3} dx$ is equal to

(a) $\frac{1}{2} \log \frac{x^2}{(1 - x^2)} + c$

(b) $\log x (1 - x^2) + c$

(c) $\log \frac{(1 - x)}{x (1 + x)} + c$

(d) $\frac{1}{2} \log \frac{(1 - x^2)}{x^2} + c$

134. $\int \left(\frac{x - 1}{x^2}\right) e^x \, dx$ is equal to

(a) $e^x + \frac{1}{x} + c$ (b) $\frac{e^x}{x} + c$

(c) $\frac{e^x}{x^2} + c$ (d) $e^x \left(\log x + \frac{1}{x}\right) + c$

135. Solution of differential equation

$$\frac{dy}{dx} + ay = e^{mx} \text{ is a}$$

(a) $(a + m) y = e^{mx} + c$

(b) $y = e^{mx} + ce^{-ax}$

(c) $(a + m) = e^{mx} + c$

(d) $(a + m) y = e^{mx} + ce^{-ax}$

136. Integrating factor of differential equation $\cos x \frac{dy}{dx} + y \sin x = 1$ is

(a) $\sec x$ (b) $\sin x$
(c) $\cos x$ (d) $\tan x$

137. Solution of differential equation $dy - \sin x \sin y \, dx = 0$ is

(a) $\cos x \tan y = c$
(b) $\cos x \sin y = c$
(c) $e^{\cos x} \tan \frac{y}{2} = c$
(d) $e^{\cos x} \tan y = c$

138. Solution of differential equation $x\,dy - y\,dx = 0$ represents

(a) rectangular hyperbola
(b) parabola whose vertex is at origin
(c) circle whose centre is at origin
(d) straight line passing through origin

139. With the help of Trapezoidal rule for numerical integration and the following table

x	0	0.25	0.50	0.75	1
$f(x)$	0	0.0625	0.2500	0.5625	1

the value of $\int_0^1 f(x)\,dx$ is

(a) 0.33334 (b) 0.34375
(c) 0.34457 (d) 0.35342

140. By the application of Simpson's one-third rule for numerical integrations, with four sub-intervals, the value of $\int_1^3 \frac{dx}{x}$ is

(a) 1.2 (b) 1.1
(c) 1.9 (d) 1.0

141. If matrix $A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$, then

(a) $A' = \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$

(b) $A^{-1} = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$

(c) $\text{adj } A = \begin{bmatrix} 1 & 1 \\ -1 & 1 \end{bmatrix}$

(d) $\lambda A = \begin{bmatrix} \lambda & -\lambda \\ 1 & 1 \end{bmatrix}$

(where λ is a non-zero scalar)

142. If for $AX = B$, $B = \begin{bmatrix} 9 \\ 52 \\ 0 \end{bmatrix}$ and

$A^{-1} = \begin{bmatrix} 3 & -\frac{1}{2} & -\frac{1}{2} \\ -4 & \frac{3}{4} & \frac{5}{4} \\ 2 & -\frac{3}{4} & -\frac{3}{4} \end{bmatrix}$, then X is equal to

(a) $\begin{bmatrix} 3 \\ \frac{3}{4} \\ -\frac{3}{4} \end{bmatrix}$ (b) $\begin{bmatrix} -\frac{1}{2} \\ -\frac{1}{2} \\ 2 \end{bmatrix}$

(c) $\begin{bmatrix} -4 \\ 2 \\ 3 \end{bmatrix}$ (d) $\begin{bmatrix} 1 \\ 3 \\ 5 \end{bmatrix}$

143. The sum of first n terms of the series $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} + \frac{15}{16} + \ldots$ is

(a) $n + 2^{-n} - 1$ (b) $2^n - n - 1$
(c) $1 - 2^{-n}$ (d) $2^n - 1$

144. The coefficient of x in the expansion of $[\sqrt{1 + x^2} - x]^{-1}$ in ascending powers of x when $|x| < 1$, is

(a) 0 (b) $-\frac{1}{2}$
(c) $\frac{1}{2}$ (d) 1

145. The angle between two lines

$$\frac{x+1}{2} = \frac{y+3}{2} = \frac{z-4}{-1}$$

and $$\frac{x-4}{1} = \frac{y+4}{2} = \frac{z+1}{2}$$ is

(a) $\cos^{-1}\left(\frac{1}{9}\right)$ (b) $\cos^{-1}\left(\frac{4}{9}\right)$
(c) $\cos^{-1}\left(\frac{2}{9}\right)$ (d) $\cos^{-1}\left(\frac{3}{9}\right)$

146. If $\vec{a} = 2\hat{i} + \hat{j} - 8\hat{k}$ and $\vec{b} = \hat{i} + 3\hat{j} - 4\hat{k}$, then the magnitude of $\vec{a} + \vec{b}$ is equal to

(a) 13 (b) $\frac{13}{3}$
(c) $\frac{3}{13}$ (d) $\frac{4}{13}$

147. The line $y = 2x + c$ is tangent to the parabola $y^2 = 4x$, then c is equal to

(a) $\frac{1}{2}$ (b) $-\frac{1}{2}$

(c) $\frac{1}{3}$ (d) 4

148. The eccentricity of the ellipse

$$4x^2 + 9y^2 + 8x + 36y + 4 = 0 \text{ is}$$

(a) $\frac{3}{5}$ (b) $\frac{\sqrt{5}}{3}$

(c) $\frac{5}{6}$ (d) $\frac{\sqrt{2}}{3}$

149. $\int \frac{\sin^2 x - \cos^2 x}{\sin^2 x \cos^2 x} dx$ is equal to

(a) $\tan x + \cot x + c$

(b) $\text{cosec } x + \sec x + c$

(c) $\tan x + \sec x + c$

(d) $\tan x + \text{cosec } x + c$

150. If sum of two numbers is 3, the maximum value of the product of first and the square of second is

(a) 4 (b) 3

(c) 2 (d) 1

151. Three lines $3x - y = 2$, $5x + ay = 3$ and $2x + y = 3$ are concurrent, then a is equal to

(a) 2 (b) 3

(c) -2 (d) -1

152. The pair of straight line joining the origin to the points of intersection of the line $y = 2\sqrt{2}\,x + c$ and the circles $x^2 + y^2 = 2$ are at right angles, if

(a) $c^2 - 9 = 0$ (b) $c^2 - 10 = 0$

(c) $c^2 - 4 = 0$ (d) $c^2 - 8 = 0$

153. The direction ratio of the diagonals of a cube which joins the origin to the opposite corner are (when the three concurrent edges of the cube are coordinate axes)

(a) 1, 2, 3 (b) 2, -2, 1

(c) 1, 1, 1 (d) $\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}$

154. The cosine of the angle between any two diagonals of a cube is

(a) $\frac{1}{3}$ (b) $\frac{1}{\sqrt{3}}$

(c) $\frac{1}{2}$ (d) $\frac{2}{3}$

155. If $f(x) = \frac{x}{x-1}$, then $\frac{f(a)}{f(a+1)}$ is equal to

(a) $f(a^2)$ (b) $f\left(\frac{1}{a}\right)$

(c) $f(-a)$ (d) $f\left[\frac{-a}{a-1}\right]$

156. If the domain of the function $f(x) = x^2 - 6x + 7$ is $(-\infty, \infty)$, then the range of function is

(a) $[-2, \infty)$ (b) $(-\infty, \infty)$

(c) $[-2, 1)$ (d) $(-\infty, -2)$

157. $\vec{\mathbf{a}} \cdot (\vec{\mathbf{a}} \times \vec{\mathbf{b}})$ is equal to

(a) 0 (b) $a^2 + ab$

(c) a^2b (d) ab

158. If $\vec{\mathbf{a}} = -3\hat{\mathbf{i}} + 7\hat{\mathbf{j}} + 5\hat{\mathbf{k}}$, $\vec{\mathbf{b}} = -3\hat{\mathbf{i}} + 3\hat{\mathbf{j}} - 3\hat{\mathbf{k}}$ and $\vec{\mathbf{c}} = 7\hat{\mathbf{i}} - 5\hat{\mathbf{j}} - 3\hat{\mathbf{k}}$ are the three coterminus edges of a parallelopiped, then its volume is

(a) 210 cu unit (b) 108 cu unit

(c) 168 cu unit (d) 272 cu unit

159. $\lim_{x \to \infty} \frac{(2x-3)(3x-4)}{(4x-5)(5x-6)}$ is equal to

(a) $\frac{1}{10}$ (b) 0

(c) $\frac{1}{5}$ (d) $\frac{3}{10}$

160. $\lim_{x \to 1} \frac{\log_e x}{x-1}$ is equal to

(a) 1 (b) 2

(c) $\frac{1}{2}$ (d) 0

161. Differential coefficient of $\sqrt{\sec \sqrt{x}}$ is

(a) $\frac{1}{4\sqrt{x}} \sec \sqrt{x} \sin \sqrt{x}$

(b) $\frac{1}{4\sqrt{x}} (\sec \sqrt{x})^{3/2} \sin \sqrt{x}$

(c) $\frac{1}{2} \sqrt{x} \cdot \sec \sqrt{x} \sin \sqrt{x}$

(d) $\frac{1}{2} \sqrt{x} (\sec \sqrt{x})^{3/2} \sin \sqrt{x}$

162. If $y = e^{1 + \log_e x}$, then the value of $\frac{dy}{dx}$ is equal to

(a) e (b) 1

(c) 0 (d) $\log_e xe$

163. The coordinate of a point P are (3, 12, 4) with respect to origin O. Then the direction cosines of OP are

(a) $\frac{3}{\sqrt{13}}, \frac{1}{\sqrt{13}}, \frac{2}{\sqrt{13}}$

(b) $\frac{3}{13}, \frac{12}{13}, \frac{4}{13}$

(c) $\frac{1}{4}, \frac{1}{3}, \frac{1}{2}$

(d) 2, 12, 4

164. The equation of the normal to the hyperbola $\frac{x^2}{16} - \frac{y^2}{9} = 1$ at the point $(8, 3\sqrt{3})$ is

(a) $\sqrt{3}x + 2y = 25$ (b) $2x + \sqrt{3}y = 25$

(c) $y + 2x = 25$ (d) $x + y = 25$

165. Differential equation for

$y = A \cos \alpha x + B \sin \alpha x$, where A and B are arbitrary constants, is

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

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

166. Order and degree of differential equation

$$\left(\frac{d^2y}{dx^2}\right) = \left[y + \left(\frac{dy}{dx}\right)^2\right]^{1/4}$$ are

(a) 4 and 2 (b) 2 and 4

(c) 1 and 2 (d) 1 and 4

167. The function which is continuous for all real values of x and differentiable at $x = 0$ is

(a) $x^{1/2}$ (b) $|x|$

(c) $\log x$ (d) $\sin x$

168. Function $f(x) = \begin{cases} x - 1, & x < 2 \\ 2x - 3, & x \geq 2 \end{cases}$ is an continuous function

(a) for $x = 2$ only

(b) for all real values of x such that $x \neq 2$

(c) for all real values of x

(d) for all integral value of x only

169. The area of the curve $x^2 + y^2 = 2ax$ is

(a) $4\pi a^2$ (b) πa^2

(c) $\frac{1}{2}\pi a^2$ (d) $2\pi a^2$

170. By graphical method, the solution of linear programming problem maximize $z = 3x_1 + 5x_2$ subject to $3x_1 + 2x_2 \leq 18$, $x_1 \leq 4$, $x_2 \leq 6$, $x_1 \geq 0$, $x_2 \geq 0$ is

(a) $x_1 = 4, x_2 = 6, z = 4.2$

(b) $x_1 = 4, x_2 = 3, z = 2.7$

(c) $x_1 = 2, x_2 = 6, z = 36$

(d) $x_1 = 2, x_2 = 0, z = 6$

171. Maximum value of $f(x) = \sin x + \cos x$ is

(a) $\sqrt{2}$ (b) 2

(c) $\frac{1}{\sqrt{2}}$ (d) 1

172. For all real values of x, increasing function $f(x)$ is

(a) x^{-1} (b) x^3

(c) x^2 (d) x^4

173. Curve $2x^2 + 7xy + 3y^2 + 8x + 14y + \lambda = 0$ will represent a pair of straight lines when λ is equal to

(a) 8 (b) 6

(c) 4 (d) 2

174. The gradient of one of the lines $x^2 + hxy + 2y^2 = 0$ is twice that of the other, then h is equal to

(a) ± 2 (b) $\pm \frac{3}{2}$

(c) ± 3 (d) ± 1

175. A coin is tossed three times in succession. If E is the event that there are at least two heads and F is the event in which first throw is a head, then $P\left(\frac{E}{F}\right)$ is equal to

(a) $\frac{3}{4}$ (b) $\frac{3}{8}$

(c) $\frac{1}{2}$ (d) $\frac{1}{8}$

176. In a box there are 2 red, 3 black and 4 white balls. Out of these three balls are drawn together. The probability of these being of same colour is

(a) $\frac{5}{84}$ (b) $\frac{1}{21}$

(c) $\frac{1}{84}$ (d) None of these

177. If 7th term of a harmonic progression is 8 and the 8th term is 7, then its 5th term is

(a) $\frac{56}{5}$ (b) 14

(c) $\frac{27}{14}$ (d) 16

178. If the sum of the first n terms of a series be $5n^2 + 2n$, then its second term is

(a) 42 (b) 17
(c) 24 (d) 7

179. If the conjugate of $(x + iy)(1 - 2i)$ is $1 + i$, then

(a) $y = \frac{3}{5}$ (b) $x - iy = \frac{1-i}{1+2i}$
(c) $x + iy = \frac{1-i}{1-2i}$ (d) $x = \frac{1}{5}$

180. If a is an imaginary cube root of unity, then for $n \in N$, the value of $a^{3n+1} + a^{3n+3} + a^{3n+5}$ is

(a) -1 (b) 0
(c) 3 (d) 1

181. The value of
$^{15}C_0^2 - {}^{15}C_1^2 + {}^{15}C_2^2 - \dots (-1)\, {}^{15}C_{15}^2$ is

(a) 0 (b) -15
(c) 15 (d) 51

182. $1 + \frac{(\log_e n)^2}{2!} + \frac{(\log_e n)^4}{4!} + \dots$ is equal to

(a) $\frac{1}{2}(n + n^{-1})$ (b) $\frac{1}{n}$
(c) n (d) $\frac{1}{2}(e^n + e^{-n})$

183. $\int a^x \, da$ is equal to

(a) $\frac{a^{x+1}}{x+1} + c$ (b) $\frac{a^{x-1}}{\log_e a + e} + c$
(c) $a^x \log_e a + c$ (d) None of these

184. Two numbers with in the bracket denote the ranks of 10 students of a class in two subjects (1, 10), (2, 9), (3, 8), (4, 7), (5, 6), (6, 5), (7, 4), (8, 3), (9, 2), (10, 1), then rank correlation coefficient is

(a) -1 (b) 0
(c) 0.5 (d) 1

185. There are 5 roads leading to a town from a village. The number of different ways in which a villager can go to the town and return backs, is

(a) 20 (b) 25
(c) 5 (d) 10

186. If $(1 + x)^n = C_0 + C_1 x + C_2 x^2 + \dots + C_n x^n$, then the value of $C_0 + 2C_1 + 3C_2 + \dots + (n+1)C_n$ will be

(a) $(n + 2)\, 2^n$ (b) $(n + 1)\, 2^{n-1}$
(c) $(n + 1)\, 2^n$ (d) $(n + 2)\, 2^{n-1}$

187. In a triangle ABC, $2 \cos A = \sin B \operatorname{cosec} C$, then

(a) $2a = bc$ (b) $a = b$
(c) $b = c$ (d) $c = a$

188. If $\tan x = \frac{b}{a}$, then the value of $a \cos 2x + b \sin 2x$ is

(a) a (b) $a - b$
(c) $a + b$ (d) b

189. In angles of a triangle are in the ratio of 2 : 3 : 7, then the sides are in the ratio of

(a) $2 : (\sqrt{3} + 1) : \sqrt{2}$
(b) $\sqrt{2} : 2 : (\sqrt{3} + 1)$
(c) $2 : \sqrt{2} : (\sqrt{3} + 1)$
(d) $\sqrt{2} : (\sqrt{3} + 1) : 2$

190. $\begin{vmatrix} 1 & 1 + ac & 1 + bc \\ 1 & 1 + ad & 1 + bc \\ 1 & 1 + ac & 1 + bc \end{vmatrix}$ is equal to

(a) $a + b + c$ (b) 1
(c) 0 (d) 3

191. The angle of elevation of the tower if the length of the shadow of a tower is $\sqrt{3}$ times the height of the pole, is

(a) 150° (b) 30°
(c) 60° (d) 45°

192. If the sides of triangle are 3, 5, 7, then

(a) triangle is rightangled
(b) one angle is obtuse
(c) all its angles are acute
(d) None of the above

193. Area bounded by lines $y = 2 + x$, $y = 2 - x$ and $x = 2$ is

(a) 16 sq unit (b) 8 sq unit
(c) 4 sq unit (d) 3 sq unit

194. Area bounded by parabola $y^2 = x$ and straight line $2y = x$ is

(a) $\frac{4}{3}$ sq unit (b) 1 sq unit
(c) $\frac{2}{3}$ sq unit (d) $\frac{1}{3}$ sq unit

195. The length of latusrectum of parabola $y^2 = 5x + 4y + 1$ is

(a) 10 (b) 5
(c) $\frac{5}{4}$ (d) $\frac{5}{2}$

196. Line $x = 7$ touches the circle $x^2 + y^2 - 4x - 6y - 12 = 0$, then the coordinates of the point of contact

(a) (7, 4) (b) (7, 3)
(c) (7, 2) (d) (7, 8)

197. If the roots of the equation,

$$(a^2 + b^2)t^2 - 2(ac + bd)t + (c^2 + d^2) = 0$$

are equal, then

(a) $ad + bc = 0$ (b) $\frac{a}{b} = \frac{c}{d}$
(c) $ab = dc$ (d) $ac = bc$

198. If the roots α, β of the equation $\frac{x^2 - bx}{ax - c} = \frac{\lambda - 1}{\lambda + 1}$ are such that $\alpha + \beta = 0$, then the value of λ is

(a) $\frac{1}{c}$ (b) 0
(c) $\frac{a-b}{a+b}$ (d) $\frac{a+b}{a-b}$

199. The equation of the tangents of the ellipse $9x^2 + 16y^2 = 144$ from the point (2, 3) are

(a) $y = 3, x + y = 5$
(b) $y = 3, x = 2$
(c) $y = 2, x = 3$
(d) $y = 3, x = 5$

200. The latusrectum of the hyperbola

$$9x^2 - 16y^2 - 18x - 32y - 151 = 0$$

(a) $\frac{9}{4}$ (b) $\frac{3}{2}$
(c) 9 (d) $\frac{9}{2}$

Answer – Key

101. c	102. c	103. d	104. c	105. c	106. c	107. c	108. d	109. c	110. c
111. c	112. d	113. d	114. d	115. d	116. c	117. c	118. a	119. a	120. b
121. d	122. b	123. a	124. b	125. a	126. b	127. a	128. b	129. b	130. c
131. d	132. a	133. a	134. b	135. d	136. a	137. c	138. d	139. b	140. b
141. c	142. d	143. a	144. d	145. b	146. a	147. a	148. b	149. a	150. a
151. c	152. a	153. c	154. a	155. a	156. a	157. a	158. c	159. d	160. a
161. b	162. a	163. b	164. b	165. b	166. b	167. d	168. c	169. b	170. c
171. a	172. b	173. a	174. c	175. a	176. a	177. a	178. b	179. c	180. b
181. a	182. a	183. a	184. a	185. a	186. d	187. d	188. a	189. b	190. c
191. b	192. b	193. c	194. a	195. b	196. b	197. b	198. c	199. a	200. d