128. If matrix $A = \begin{bmatrix} 2 & -2 \\ -2 & 2 \end{bmatrix}$ and $A^2 = pA$, then the value of p is

a. 6 *b.* –4 *c.* 4 *d.* 8

129. If $A\,(\text{adj } A) = \begin{bmatrix} -2 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -2 \end{bmatrix}$, then $|\text{adj } A|$ equals

a. –2 *b.* –4 *c.* 4 *d.* 8

130. The coefficients a, b and c of the quadratic equation, $ax^2 + bx + c = 0$ are obtained by throwing a dice three times. The probability that this equation has equal roots is

a. $\frac{1}{72}$ *b.* $\frac{5}{216}$

c. $\frac{1}{36}$ *d.* $\frac{1}{54}$

131. $8^{3\log_8 5}$ is equal to

a. $\log_8 25$ *b.* 120

c. 125 *d.* $\log_8 15$

132. The equation of normal to the curve $y = (1+x)^y + \sin^{-1}(\sin^2 x)$ at $x = 0$ is

a. $x + y = 1$ *b.* $x - y = 1$

c. $x + y = -1$ *d.* $x - y = -1$

133. If $L = \lim_{x \to 0} \dfrac{a - \sqrt{a^2 - x^2} - \frac{x^2}{4}}{x^4}$, $a > 0$. If L is finite, then

a. $a = 2$ *b.* $a = 1$

c. $a = \frac{1}{3}$ *d.* None of these

134. What will be the equation of circle whose centre is (1, 2) and touches X - axis?

a. $x^2 + y^2 - 2x - 4y + 1 = 0$

b. $x^2 - y^2 + 2x + 4y + 1 = 0$

c. $x^2 + y^2 + 2x - 4y - 1 = 0$

d. $x^2 + y^2 + 2x + 4y - 1 = 0$

135. The approximate value of $f(5.001)$, where $f(x) = x^3 - 7x^2 + 15$ is

a. –34.995 *b.* –33.995 *c.* –33.335 *d.* –35.995

136. Find the centre and radius of the circle given by the equation $2x^2 + 2y^2 + 3x + 4y + \frac{9}{8} = 0$.

a. 1 *b.* –1 *c.* 2 *d.* –2

137. Find the maximum value of $f(x) = \dfrac{1}{4x^2 + 2x + 1}$.

a. $\frac{3}{4}$ *b.* $\frac{4}{3}$

c. $\frac{1}{3}$ *d.* None of these

138. If $f(x) = \begin{cases} ax + 3, & x \le 2 \\ a^2 x - 1 & x > 2 \end{cases}$, then the values of a for which f is continuous for all x are

a. 1 and –2 *b.* 1 and 2

c. –1 and 2 *d.* –1 and –2

139. The value of $\lim_{x \to 0} \left(\dfrac{a^x + b^x + c^x}{3} \right)^{2/x}$, $(a, b, c > 0)$ is

a. $(abc)^3$ *b.* abc

c. $(abc)^{1/3}$ *d.* None of these

140. What will be the equation of the circle whose centre is (1, 2) and which passes through the point (4, 6)?

a. $x^2 + y^2 - 2x - 4y - 20 = 0$

b. $x^2 + y^2 + 2x + 4y - 20 = 0$

c. $x^2 - y^2 - 2x - 4y + 20 = 0$

d. $x^2 - y^2 + 2x - 4y - 20 = 0$

141. The line $\dfrac{x-2}{3} = \dfrac{y-3}{4} = \dfrac{z-4}{5}$ is parallel to the plane

a. $3x + 4y + 5z = 7$ *b.* $2x + 3y + 4z = 0$

c. $x + y - z = 2$ *d.* $2x + y - 2z = 0$

142. The equation of a plane passing through the line of intersection of the planes $x + 2y + 3z = 2$, $x - y + z = 3$ and at a distance $\frac{2}{\sqrt{3}}$ from the point (3, 1, –1) is

a. $5x - 11y + z = 17$ *b.* $\sqrt{2}x + y = 3\sqrt{2} - 1$

c. $x + y + z = \sqrt{3}$ *d.* $x - \sqrt{2}y = 1 - \sqrt{2}$

143. The angle between the lines $2x = 3y = -z$ and $6x = -y = -4z$ is

a. 30° *b.* 45°

c. 90° *d.* 0°

144. The point of intersection of the lines $\dfrac{x-1}{2} = \dfrac{y-2}{3} = \dfrac{z-3}{4}$ and $\dfrac{x-4}{5} = \dfrac{y-1}{2} = z$ is

a. (0, 0, 0) *b.* (1, 1, 1)

c. (–1, –1, –1) *d.* (1, 2, 3)

145. $\int \frac{2^x}{\sqrt{1-4^x}} dx$ is equal to

a. $(\log 2)\sin^{-1} 2^x + C$ b. $\frac{1}{2}\sin^{-1} 2^x + C$

c. $\frac{1}{\log 2}\sin^{-1} 2^x + C$ d. $2\log 2\sin^{-1} 2^x + C$

146. $\int_{-\pi/2}^{\pi/2} \sin x dx$

a. 2 b. 3 c. 0 d. 5

147. Integral of $\int \frac{dx}{x^2[1+x^4]^{3/4}}$.

a. $-4(x^{1/4}+1)^{1/4}+C$ b. $4(x^{1/4}+1)^{1/4}+C$

c. $4(x^4+1)^{1/4}+C$ d. None of these

148. Three of the six vertices of a regular hexagon are chosen at random. The probability that the triangle with three vertices is equilateral equals

a. $\frac{1}{2}$ b. $\frac{1}{5}$ c. $\frac{1}{10}$ d. $\frac{1}{20}$

149. Five persons A, B, C, D and E are in queue of a shop. The probability that A and E are always together, is

a. $\frac{1}{4}$ b. $\frac{2}{3}$ c. $\frac{2}{5}$ d. $\frac{3}{5}$

150. If A, B and C are mutually exclusive and exhaustive events of a random experiment such that $P(B) = \frac{3}{2} P(A)$ and $P(C) = \frac{1}{2} P(B)$, then $P(A \cup C)$ equals

a. $\frac{10}{13}$ b. $\frac{3}{13}$

c. $\frac{6}{13}$ d. $\frac{7}{13}$

151. A student answers a multiple choice question with 5 alternatives, of which exactly one is correct. The probability that he knows the correct answer is $p, 0 < p < 1$. If he does not know the correct answer, he randomly ticks one answer. Given that he has answered the question correctly, the probability that he did not tick the answer randomly, is

a. $\frac{3p}{4p+3}$ b. $\frac{5p}{3p+2}$

c. $\frac{5p}{4p+1}$ d. $\frac{4p}{3p+1}$

152. If x and y are acute angles, such that $\cos x + \cos y = \frac{3}{2}$ and $\sin x + \sin y = \frac{3}{4}$, then $\sin(x+y)$ equals

a. $\frac{2}{5}$ b. $\frac{3}{4}$

c. $\frac{3}{5}$ d. $\frac{4}{5}$

153. The expression $\frac{\tan A}{1-\cot A} + \frac{\cot A}{1-\tan A}$ can be written as

a. $\sin A \cos A + 1$

b. $\sec A \operatorname{cosec} A + 1$

c. $\tan A + \cot A$

d. $\sec A + \operatorname{cosec} A$

154. If $\sin 2x = 4\cos x$, then x is equal to

a. $\frac{n\pi}{2} \pm \frac{\pi}{4}, n \in Z$ b. no value

c. $n\pi + (-1)^n \frac{\pi}{4}, n \in Z$ d. $2n\pi \pm \frac{\pi}{2}, n \in Z$

155. If $f(x)$ satisfies the relation $2f(x) + f(1-x) = x^2$ for all real x, then $f(x)$ is

a. $\frac{x^2+2x-1}{6}$ b. $\frac{x^2+2x-1}{3}$

c. $\frac{x^2+4x-1}{3}$ d. $\frac{x^2+4x-1}{6}$

156. If $A = \{1, 2, 5, 6\}$ and $B = \{1, 2, 3\}$, then $(A \times B) \cap (B \times A)$ is equal to

a. $\{(1, 1), (2, 1), (6, 1), (3, 2)\}$

b. $\{(1, 1), (1, 2), (2, 1), (2, 2)\}$

c. $\{(1, 1), (2, 2)\}$

d. $\{(1, 1), (1, 2), (2, 5), (2, 6)\}$

157. Total number of elements in the power set of A containing 15 elements is

a. 2^{15} b. 15^2

c. 2^{15-1} d. $2^{15}-1$

158. What is the argument of the complex number $\frac{(1+i)(2+i)}{3-i}$, where $i = \sqrt{-1}$?

a. 0 b. $\frac{\pi}{4}$ c. $-\frac{\pi}{4}$ d. $\frac{\pi}{2}$

159. Evaluate $\left[i^{18} + \left(\frac{1}{i}\right)^{25}\right]^3$.

a. $2(1-i)$ b. $7(i-1)$

c. $2-7i$ d. $8i+4$

160. If $(\sqrt{3}+i)^{100} = 2^{99}(a+ib)$, then a^2+b^2 is equal to

a. $\sqrt{2}$ b. 4

c. $\sqrt{3}$ d. None of these

161. Using mathematical induction, the numbers a_n's are defined by $a_0 = 1, a_{n+1} = 3n^2 + n + a_n$, $(n \geq 0)$. Then, a_n is equal to

a. $n^3 + n^2 + 1$ *b.* $n^3 - n^2 + 1$
c. $n^3 - n^2$ *d.* $n^3 + n^2$

162. If $49^n + 16n + P$ is divisible by 64 for all $n \in N$, then the least negative integral value of P is

a. -2 *b.* -3
c. -4 *d.* -1

163. $2^{3n} - 7n - 1$ is divisible by

a. 64 *b.* 36 *c.* 49 *d.* 25

164. The solution of the differential equation

$\sec^2 x \tan y \, dx + \sec^2 y \tan x \, dy = 0$ is

a. $\tan y \cdot \tan x = C$ *b.* $\frac{\tan y}{\tan x} = C$
c. $\frac{\tan^2 x}{\tan y} = C$ *d.* None of these

165. The solution of the differential equation

$$y\frac{dy}{dx} = x\left[\frac{y^2}{x^2} + \frac{\phi\left(\frac{y^2}{x^2}\right)}{\phi'\left(\frac{y^2}{x^2}\right)}\right]$$ is

(where, C is a constant)

a. $\phi\left(\frac{y^2}{x^2}\right) = Cx$ *b.* $x\phi\left(\frac{y^2}{x^2}\right) = C$
c. $\phi\left(\frac{y^2}{x^2}\right) = Cx^2$ *d.* $x^2\phi\left(\frac{y^2}{x^2}\right) = C$

166. The solution of the differential equation

$(1 + y^2) + (x - e^{\tan^{-1} y})\frac{dy}{dx} = 0$ is

a. $2xe^{\tan^{-1} y} = e^{2\tan^{-1} y} + C$
b. $xe^{\tan^{-1} y} = \tan^{-1} y + C$
c. $xe^{2\tan^{-1} y} = e^{\tan^{-1} y} + C$
d. $(x - 2) = Ce^{-\tan^{-1} y}$

167. The value of $1 \cdot 1! + 2 \cdot 2! + 3 \cdot 3! + \cdots + n \cdot n!$ is

a. $(n + 1)!$ *b.* $(n + 1)! + 1$
c. $(n + 1)! - 1$ *d.* None of these

168. The sum of the series $(1 + 2) + (1 + 2 + 2^2) + (1 + 2 + 2^2 + 2^3) + \cdots$ upto n terms is

a. $2^{n+2} - n - 4$ *b.* $2(2^n - 1) - n$
c. $2^{n+1} - n$ *d.* $2^{n+1} - 1$

169. If a, b, c are in AP, $b - a, c - b$ and a are in GP, then $a : b : c$ is

a. $1 : 2 : 3$ *b.* $1 : 3 : 5$
c. $2 : 3 : 4$ *d.* $1 : 2 : 4$

170. The number of triangles which can be formed by using the vertices of a regular polygon of $(n + 3)$ sides is 220. Then, n is equal to

a. 8 *b.* 9
c. 10 *d.* 11

171. Out of 8 given points, 3 are collinear. How many different straight lines can be drawn by joining any two points from those 8 points?

a. 26 *b.* 28
c. 27 *d.* 25

172. How many numbers greater than 40000 can be formed from the digits 2, 4, 5, 5, 7 ?

a. 12 *b.* 24
c. 36 *d.* 48

173. If a polygon of n sides has 275 diagonals, then n is equal to

a. 25 *b.* 35
c. 20 *d.* 15

174. If two pairs of lines $x^2 - 2mxy - y^2 = 0$ and $x^2 - 2nxy - y^2 = 0$ are such that one of them represents the bisector of the angles between the other, then

a. $mn = 1$ *b.* $m + n = mn$
c. $mn = -1$ *d.* $m - n = mn$

175. The distance of the point (1, 2) from the line $x + y + 5 = 0$ measured along the line parallel to $3x - y = 7$ is equal to

a. $4\sqrt{10}$ *b.* 40
c. $\sqrt{40}$ *d.* $10\sqrt{2}$

176. The slopes of the lines, which make an angle 45° with the line $3x - y = -5$, are

a. $1, -1$ *b.* $\frac{1}{2}, -1$
c. $1, \frac{1}{2}$ *d.* $-2, \frac{1}{2}$

177. If 3 and 4 are intercepts of a line $L \equiv 0$, then the distance of $L \equiv 0$ from the origin is

a. 5 units *b.* 12 units
c. $\frac{5}{12}$ unit *d.* $\frac{12}{5}$ units

178. Number of terms in the binomial expansion of $(x + a)^{53} + (x - a)^{53}$ is

a. 25 *b.* 26
c. 27 *d.* 26.5

179. The coefficient of x^{10} in the expansion of $1+(1+x)+\ldots+(1+x)^{20}$ is

a. ${}^{19}C_9$ *b.* ${}^{20}C_{10}$

c. ${}^{21}C_{11}$ *d.* ${}^{22}C_{12}$

180. Middle term in the expansion of $\left(x^2+\frac{1}{x^2}+2\right)^n$ is

a. $\frac{n!}{(n!)^2}$ *b.* $\frac{(2n)!}{(n!)^2}$

c. $\frac{(2n-1)!}{n!}$ *d.* $\frac{(2n)!}{n!}$

ANSWERS

Mathematics

121. (b)	122. (d)	123. (b)	124. (*)	125. (b)	126. (c)	127. (d)	128. (c)	129. (c)	230. (b)
131. (c)	132. (a)	133. (a)	134. (a)	135. (a)	136. (a)	137. (b)	138. (c)	139. (d)	140. (a)
141. (d)	142. (a)	143. (c)	144. (c)	145. (c)	146. (c)	147. (d)	148. (c)	149. (c)	150. (d)
151. (c)	152. (d)	153. (b)	154. (d)	155. (b)	156. (b)	157. (a)	158. (d)	159. (a)	160. (b)
161. (b)	162. (d)	163. (c)	164. (a)	165. (c)	166. (a)	167. (c)	168. (a)	169. (a)	170. (b)
171. (a)	172. (d)	173. (a)	174. (c)	175. (c)	176. (d)	177. (d)	178. (c)	179. (c)	180. (b)

Note (*) None of the option is correct.