

(Section: Mathematics)

51) If the equation $\frac{k(x+1)^2}{2} + \frac{(y+2)^2}{3} = 1$ represents a circle, then the value of k is
a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) $\frac{3}{2}$ d) $\frac{3}{4}$

52) If $x = \log_a bc$, $y = \log_b ca$, $z = \log_c ab$ then $\frac{1}{1+x} + \frac{1}{1+y} + \frac{1}{1+z} =$
a) 1 b) 2 c) $\frac{1}{2}$ d) 3

53) The value of ${}^{47}C_4 + \sum_{r=1}^5 {}^{52-r}C_3$ is
a) ${}^{50}C_3$ b) ${}^{52}C_4$ c) ${}^{52}C_3$ d) ${}^{50}C_4$

54) The number of ways in which 18 objects can be divided in to 3 groups containing 9,6 and 3 objects respectively is
a) ${}^{18}C_9 \times {}^9C_6 \times {}^3C_3$ b) $\frac{18!}{9! \times 6! \times 3!}$ c) $\frac{18!}{9 \times 6 \times 3}$ d) none of these

55) The value of $\left(\frac{1+i}{\sqrt{2}}\right)^8 + \left(\frac{1-i}{\sqrt{2}}\right)^8$ is
a) 1 b) $2i$ c) 2 d) 4

56) The differential equation that represents the family of curves $y = A \sin(3x) + B \cos(3x)$ is
a) $y'' + 9y = 0$ b) $y'' - 9y = 0$ c) $y'' + 3y = 0$ d) $y'' - 3y = 0$

57) What is the value of the determinant for the following matrix
$$\begin{bmatrix} 0 & x-y & y-z \\ y-x & 0 & z-x \\ z-y & x-z & 0 \end{bmatrix}$$

a) 1 b) xyz c) 0 d) 2

58) The angle between the pair of lines $3x^2 - 5xy - 3y^2 = 0$ equals
a) 30° b) 45° c) 60° d) 90°

59) What is the value of a if the system given below is consistent
 $2x + y - 5 = 0$
 $x - 2y + 1 = 0$
 $2x - 14y - a = 0$
a) 1 b) 5 c) 5 d) none of these

70) If $f(x)$ and $g(x)$ are differentiable on $[0, 1]$ such that $f(0) = 2$, $g(0) = 0$, $f(1) = 6$, $g(1) = 2$, then Rolle's Mean Value theorem is applicable for which of the following functions.

- a) $f(x) - g(x)$ b) $f(x) - 2g(x)$ c) $f(x) + 3g(x)$ d) None of these

71) If $\frac{1}{2}$, $\frac{1}{3}$ and n are direction cosines of a line, then the value of n is

- a) $\frac{\sqrt{23}}{6}$ b) $\frac{23}{6}$ c) $\frac{2}{3}$ d) $\frac{3}{2}$

72) The angle of elevation of the top of a tower at a point 120 feet from its base is 45° . How much high it should be raised so that the angle of elevation from the same point may become 60°

- a) 120 b) $120(\sqrt{3}+1)$ c) $120(\sqrt{3}-1)$ d) $120(1-\sqrt{3})$

73) A natural number is chosen at random among the first 120 natural numbers. What is the probability that the number chosen is a multiple of 5 or 15.

- a) $\frac{1}{5}$ b) $\frac{1}{8}$ c) $\frac{1}{6}$ d) $\frac{1}{10}$

74) If $A(1, 2)$, $B(4, 6)$, $C(5, 7)$, $D(p, q)$ are the vertices of a parallelogram $ABCD$ then

- a) $p = 1, q = 2$ b) $p = 2, q = 1$ c) $p = 2, q = 3$ d) $p = 3, q = 1$

75) Let $f : \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by $f(x) = \max \{x, x^3\}$. Then the set of points where $f(x)$ is not differentiable is

- a) $\{-1, 1\}$ b) $\{-1, 0\}$ c) $\{0, 1\}$ d) $\{-1, 0, 1\}$
