# 2021-August Session-31-08-2021 shift 2

AI24BTECH11016-Jakkula Adishesh Balaji

1 16-30(Math)

1) Let **A** be the set of all points $(\alpha,\beta)$ such that the area of triangle formed by the points $(5,6)$ $(3,2)$ and $(\alpha,\beta)$ is 12 square units. Then the least possible length of a line segment joining the origin to a point in **A**, is
   a) $\frac{4}{\sqrt{5}}$
   b) $\frac{16}{\sqrt{5}}$
   c) $\frac{8}{\sqrt{5}}$
   d) $\frac{12}{\sqrt{12}}$
2) The number of solutions of the equation $32^{\tan^2 x} + 32^{\sec^2 x} = 81,\ 0 \le x \le \frac{\pi}{4}$ is:
   a) 3
   b) 1
   c) 0
   d) 2
3) Let $f$ be any continuous function on $[0,2]$ and twice differentiable on $(0,2)$. If $f(0) = 0,\ f(1) = 1$ and $f(2) = 2$, then
   a) $f''(x) = 0$ for all $x \in (0,2)$
   b) $f''(x) = 0$ for some $x \in (0,2)$
   c) $f'(x) = 0$ for some $x \in [0,2]$
   d) $f''(x) > 0$ for all $x \in (0,2)$
4) If $[x]$ is the greatest integer $\le x$, then $\pi^2 \int_0^2 \sin\frac{\pi x}{2}(x - [x])^{[x]}dx$ is equal to;
   a) $2(\pi - 1)$
   b) $4(\pi - 1)$
   c) $4(\pi + 1)$
   d) $2(\pi + 1)$
5) The mean and variance of 7 observations are 8 and 16 respectively. If two observations are 6 and 8, then the variance of the remaining 5 observations is:
   a) $\frac{92}{5}$
   b) $\frac{134}{5}$
   c) $\frac{536}{25}$
   d) $\frac{112}{5}$
6) If the coefficient of $a^7b^8$ in the expansion of $(a + 2b + 4ab)^{10}$ is $K.2^{16}$, then $K$ is equal to

7) Suppose the line $\frac{x-2}{\alpha} = \frac{y-2}{-5} = \frac{z+2}{2}$ lies on the plane $x + 3y - 2z + \beta = 0$. Then the value of $\alpha + \beta$ is equal to
8) The number of 4-digit numbers which are neither multiple of 7 nor multiple of 3 is
9) $\int \frac{\sin x}{\sin^3 x + \cos^3 x} dx =$ when $C$ is a constant of integration, then the value of $18\left(\alpha + \beta + \gamma^2\right)$ is
10) A tangent line **L** is drawn at the point $\left(2, 4\right)$ on the parabola $y^2 = 8x$. If the line **L** is also tangent to the circle $x^2 + y^2 = a$, then '$a$' is equal to
11) If $S = \frac{7}{5} + \frac{9}{5^2} + \frac{13}{5^3} + \frac{19}{5^4} + ....$ then $160S$ is equal to
12) The number of elements in the set

$$\left\{A = \begin{pmatrix} a & b \\ 0 & d \end{pmatrix} : a, b, d \in \{-1, 0, 1\} and\, (I - A)^3 = I - A^3\right\}$$

13) If the line $y = mx$ bisects the area enclosed by the lines $x = 0$, $y = 0$, $x = \frac{3}{2}$ and the curve $y = 1 + 4x - x^2$, then $12m$ is equal to
14) Let **B** be the centre of the circle $x^2 + y^2 - 2x + 4y + 1 = 0$. Let the tangents at two points **P** and **Q** on the circle intersect at the point **A** $\left(3, 1\right)$. Then $\frac{Area of \Delta APQ}{Area of \Delta BPQ}$ is equal to
15) Let $f(x)$ be a cubic polynomial with $f(1) = -10$, $f(-1) = 6$, and has a local minima at $x = 1$, and $f'(x)$ has a local minima at $x = -1$. Then $f(3)$ is equal to