

2023-April Session-04-12-2023-shift-1

EE24BTECH11008-ASLIN GARVASIS

- 16) If $\frac{1}{n+1} {}^nC_n + \frac{1}{n} {}^nC_{n-1} + \dots + \frac{1}{2} {}^nC_1 + {}^nC_0 = \frac{1023}{10}$ then n is equal to :
- 6
 - 9
 - 8
 - 7
- 17) Let C be the circle in the complex plane with centre $z_0 = \frac{1}{2}(1 + 3i)$ and radius $r = 1$. Let $z_1 = 1 + i$ and the complex number z_2 be outside the circle C such that $|z_1 - z_0||z_2 - z_0| = 1$. If z_0, z_1 and z_2 are collinear, then the smaller value of $|z_2|^2$ is equal to :
- $\frac{13}{2}$
 - $\frac{5}{2}$
 - $\frac{3}{2}$
 - $\frac{7}{2}$
- 18) If the point $(\alpha, \frac{7\sqrt{3}}{3})$ lies on the curve traced by the mid-points of the line segments of the lines $x \cos \theta + y \sin \theta = \gamma$, $\theta \in (0, \frac{\pi}{2})$ between the co-ordinates axes, then α is equal to :
- 7
 - 7
 - $-7\sqrt{3}$
 - $7\sqrt{3}$
- 19) Two dice A and B are rolled. Let the numbers obtained on A and B be α and β respectively. If the variance of $\alpha - \beta$ is $\frac{p}{q}$, where p and q are co-prime, then the sum of the positive divisors of p is equal to :
- 36
 - 48
 - 31
 - 72
- 20) In a triangle ABC if $\cos A + 2 \cos B + \cos C = 2$ and the lengths of the sides opposite to the angles A and C are 3 and 7 respectively, then $\cos A - \cos C$ is equal to :
- $\frac{3}{7}$
 - $\frac{9}{7}$
 - $\frac{10}{7}$
 - $\frac{5}{7}$
- 21) A fair n ($n > 1$) faces die rolled repeatedly until a number less than n appears. If the mean of the number of tosses required is $\frac{n}{9}$, then n is equal to ...
- 22) Let the digits a, b, c be in A.P. Nine-digit numbers are to be formed using each of three such that three consecutive digits are in A.P at least once. How many such numbers can be formed ?
- 23) Let $[x]$ be the greatest integer $\leq x$. Then the number of points in the interval $(-2, 1)$, where the function $f(x) = |[x]| + \sqrt{x - [x]}$ is discontinuous is ...
- 24) Let the plane $x + 3y - 2z + 6 = 0$ meet the coordinate axes at the points A, B, C . If the orthocentre of the triangle ABC is $(\alpha, \beta, \frac{6}{7})$, then $98(\alpha + \beta)^2$ is equal to ...
- 25) Let $I(x) = \int \sqrt{\frac{x+7}{x}} dx$ and $I(9) = 12 + 7 \log_e 7$. If $I(1) = \alpha + 7 \log_e (1 + 2\sqrt{2})$, then α^4 is equal to ...
- 26) Let $D_k = \begin{pmatrix} 1 & 2k & 2k-1 \\ n & n^2 + n + 2 & n^2 \\ n & n^2 + n & n^2 + n + 2 \end{pmatrix}$. If $\sum_{k=1}^n D_k = 96$, then n is equal to ...
- 27) Let the positive numbers a_1, a_2, a_3, a_4 and a_5 be in G.P. Let their mean and variance be $\frac{31}{10}$ and $\frac{m}{n}$ respectively, where m and n are co-prime. If the mean of their reciprocals is $\frac{31}{40}$ and $a_3 + a_4 + a_5 = 14$, then $m+n$ is equal to ...
- 28) The number of relations, on the set $1, 2, 3$

containing $(1, 2)$ and $(2, 3)$, which are reflexive and transitive but not symmetric, is ...

29) If $\int_{-0.15}^{0.15} |100x^2 - 1| dx = \frac{k}{3000}$, then k is equal to ...

30) Two circles in the first quadrant of radii r_1 and r_2 touch the coordinate axes. Each of them cuts off an intercept of 2 units with the line $x+y = 2$. Then $r_1^2 + r_2^2 - r_1 r_2$ is equal to ...