2021 March 18 Shift 1

EE24BTECH11005 - Arjun Pavanje

16) If $lim_{x\to 0}\frac{\left[\sin^{-1}x-\tan^{-1}x\right]}{3}$ is equal to L, then the value of $(6L+1)$ is,

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

c) $\frac{1}{6}$ d) 6

17) For all four circles M, N, O, P, the following four equations are given,

$$\text{Circle M: } x^2+y^2=1$$
$$\text{Circle N: } x^2+y^2-2x=0$$
$$\text{Circle O: } x^2+y^2-2x-2y+1=0$$
$$\text{Circle P: } x^2+y^2-2y=0$$

If the centre of circle M is joined with the centre of circle N, furthur centre of circle N is joined with centre of circle O, centre of circle O is joined with centre of circle P and lastly, the centre of circle P is joined with the centre of circle M, then these lines form the sides of a,

a) Rectangle b) Square

c) Parallelogram d) Rhombus

18) Let $\left(1+x+2x^2\right)^{20}=a_0+a_1x+a_2x^2+\cdots+a_{40}x^{40}$. Then, $a_1+a_3+a_5+\cdots+a_{37}$is equal to,

a) $2^{20}\left(2^{20}+21\right)$ b) $2^{19}\left(2^{20}+21\right)$

c) $2^{20}\left(2^{20}-21\right)$ d) $2^{19}\left(2^{20}-21\right)$

19) Let ,

$$A+2B=\begin{pmatrix}1 & 2 & 0\\ 6 & -3 & 3\\ -5 & 3 & 1\end{pmatrix}$$
$$2A-B=\begin{pmatrix}2 & -1 & 5\\ 2 & -1 & 6\\ 0 & 1 & 2\end{pmatrix}$$

If $tr\,(A)$ denotes the sum of all diagonal entries of the matrix A, then $tr\,(A)-tr\,(B)$ is,

a) 0 b) 1

c) 2 d) 3

20) The equation of one of the straight lines which pass through the point $\begin{pmatrix}1\\3\end{pmatrix}$ and make an angle $\tan^{-1}\sqrt{2}$ with the straight line $y+1=3\sqrt{2}x$ is,

a) $5\sqrt{2}x+4y-15+4\sqrt{2}=0$ b) $4\sqrt{2}x-5y-5+4\sqrt{2}=0$

c) $4\sqrt{2}x+5y-4\sqrt{2}=0$ d) $4\sqrt{2}x+5y-\left(15+4\sqrt{2}\right)=0$

21) The number of times digit 3 will be written when listing the integers from 1 to 1000 is _____

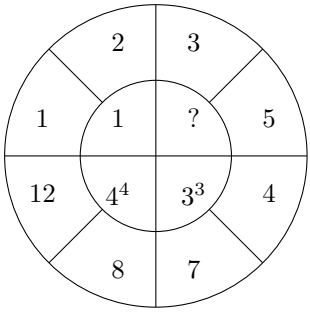
22) The equation of the planes parallel to the plane $x-2y+2z-3=0$ which are at unit distace from the point $(1,2,3)$ is $ax+by+cz+d=0$. If $(b-d)=k(c-a)$, then the positive value of k is_____

23) Let $f(x), g(x)$ be two functions satisfying $f\left(x^2\right)+g(4-x)=4x^3$ and $g(4-x)+g(x)=0$, then the value of $\int_{-4}^{4} f\left(x^2\right)dx$ is,_____

24) The mean age of 25 teachers in a school is 40 years. A teacher retires at the age of 60 years and a new teacher is appointed in his place. If the mean age of the teachers in this school now is 39 years, then the age of the newly appointed teacher is_____

25) A square $ABCD$ has all its vertices on the curve $x^2y^2=1$. The midpoints of its sides also lie on the same curve. Then, the square of the area of $ABCD$ is_____

26) The missing value in the following figure is,_____



27) The number of solutions of the equation $|\cot x|=\cot x+\left(\frac{1}{\sin x}\right)$ in the interval $[0,2\pi]$ is_____

28) Let z_1, z_2 be the roots of the equations $z_2+a_z+12=0$ and z_1, z_2 form an equilateral triangle with origin. Then, the value of $|a|$ is _____

29) Let the plane $ax + by + cz + d = 0$ bisect the line joining the points $\begin{pmatrix} 4 \\ -3 \\ 1 \end{pmatrix}, \begin{pmatrix} 2 \\ 3 \\ -5 \end{pmatrix}$ at right angles. If a, b, c, d are integers, then the minimum value of $\left(a^2 + b^2 + c^2 + d^2\right)$ is,_____

30) If $f(x) = \int \frac{[5x^8 + x^6]}{[x^2 + 1 + 2x^7]^2} dx, (x \geq 0)$, $f(0) = 0$ and $f(1) = \frac{1}{k}$, then the value of k is,_____