LEARNING CENTRE	TEST PAPER	MATHEMATICS
CODE NO.	JEE MAIN	DIRECTOR:- GAURAV SHARMA

01:-The domain of the function $f\left(x\right)=\sin^{-1}\left(\log_2\left(\frac{x^2}{2}\right)\right)$ is

(A) $\left[-2,\ 2\right]$ (B) $\left[-2,-1\right]$ (C) $\left[1,2\right]$ (D) $\left[-2,-1\right]\cup\left[1,2\right]$

02:-The coordinates of the point on the parabola $y=x^2+7x+2,$ which is nearest to the straight line $y=3x-3$ are

(A) $\left(-2,-8\right)$ (B) $\left(1,10\right)$ (C) $\left(2,20\right)$ (D) $\left(-1,-4\right)$

03:-From origin, chords are drawn to the circle $x^2+y^2-2y=0$. The locus of the middle points of these chords is

(A) $x^2+y^2-y=0$ (B) $x^2+y^2-x=0$ (C) $x^2+y^2-2x=0$ (D) $x^2+y^2-x-y=0$

04:-If $\left|z-3i\right|=3$, (where i = $\sqrt{-1}$) and arg z ∈ (0, π/2), then cot (arg (z)) – $\frac{6}{z}$ is equal to

a) 0 b) –i c) i d) none of these

05:-If $y=\left(\sin^{-1}x\right)^2+\left(\cos^{-1}x\right)^2$, then $\left(1-x^2\right)\frac{d^2y}{dx^2}-x\frac{dy}{dx}=$

A) -4 B) 4 C) 2 D) -2

06:-For each real number x such that – 1 < x < 1, let A (x) be the matrix $\left(1-\text{x}\right)^{-1}\begin{bmatrix}1 & -\text{x}\\ -\text{x} & 1\end{bmatrix}$ and $\text{z}=\frac{\text{x}+\text{y}}{1+\text{xy}}$.

Then,

(A) A(z) = A(x) + A(y) (B) A(z) = A(x) $[A(y)]^{-1}$
(C) A(z) = A(x) A(y) (D) A(z) = A(x) – A(y)

07:-If matrix A = $[a_{ij}]_{3\times3}$, matrix B = $[b_{ij}]_{3\times3}$ where a_{ij} + a_{ji} = 0 and b_{ij} – b_{ji} = 0, then A^4 . B^3 is

(A) skew-symmetric matrix (B) singular (C) symmetric (D) zero matrix

08- The Cartesian equation of the plane passing through the line of intersection of the planes $r.(2i-3j+4k)=1$ and $r.(i-j)+4=0$ and perpendicular to the plane $r.(2i-j+k)+8=0$ is

(A) $3x-4y+4z=5$ (B) $x-2y+4z=3$

(C) $5x-2y-12z+47=0$ (D) $2x+3y+4=0$

09:-Let $\vec{r}, \vec{a}, \vec{b} \& \vec{c}$ be four non-zero vector such that $\vec{r}.\vec{a} = 0, |\vec{r} \times \vec{b}| = |\vec{r}||\vec{b}|, |\vec{r} \times \vec{c}| = |\vec{r}||\vec{c}|$, then [abc] =

(A) |a| |b| |c| (B) - |a| |b| |c| (C) 0 (D) none of these

10:-If $\int \frac{\sqrt{\cos 2x}}{\sin x} dx = -\log\left| \cot x + \sqrt{\cot^2 x - 1} \right| + A + C$, then A is equal to

(a) $\frac{1}{\sqrt{2}} \log\left| \frac{\sqrt{2} + \sqrt{1 - \tan^2 x}}{\sqrt{2} - \sqrt{1 - \tan^2 x}} \right|$ **(b)** $\frac{1}{\sqrt{2}} \log\left| \frac{\sqrt{2} + \sqrt{1 - \sec^2 x}}{\sqrt{2} - \sqrt{1 - \sec^2 x}} \right|$

(c) $\frac{1}{\sqrt{2}} \log\left| \frac{\sqrt{2} + \sqrt{1 - \sin^2 x}}{\sqrt{2} - \sqrt{1 - sin^2 x}} \right|$ **(d)** *None of these*

11:-The area of the figure bounded by the straight lines $x = 0, x = 2$ and the curves $y = 2^x, y = 2x - x^2$, is

(a) $\left(\frac{4}{\log 2} + \frac{8}{3} \right) sq.units$ **(b)** $\left(\frac{4}{\log 2} - \frac{8}{3} \right) sq.units$ **(c)** $\left(\frac{8}{\log 3} - \frac{4}{3} \right) sq.units$ **(d)** $\left(\frac{3}{\log 2} - \frac{4}{3} \right) sq.units$

12:-If $f(x)$ is a function satisfying $f(x+y) = f(x) f(y)$ for all $\lambda, y \in N$ such that $f(1) = 3$ and $\sum_{x=1}^{n} f(x) = 120$, then the value of n is

(a) 4 **(b)** 5 **(c)** 6 **(d)** *None of these*

13:-A bag contains a white and b black balls. Two players A and B alternately draw a ball from the bag, replacing the ball each time after the draw. A begins the game. If the probability of A winning (that is drawing a white ball) is twice the probability of B winning (that is drawing a black ball), then the ratio $a : b$ is equal to

(a) $1:2$ **(b)** $2:1$ **(c)** $1:1$ **(d)** *Neither one – one nor onto*

14:-The value of $\int_0^1 \frac{x^4(1-x)^4}{1+x^2}\,dx$ is

(a) 0 **(b)** $\frac{2}{105}$ **(c)** $\frac{22}{7}-\pi$ **(d)** $\frac{71}{15}-\frac{3\pi}{2}$

15:-The median of a set of 11 distinct observations is 20.5. If each of the last 5 observations of the set is increased by 4, then the median of the new set

(a) *is increased by* 2 **(b)** *is decreased by* 2

(c) *is two times the original a median* **(d)** *remains the same as that of the original set*

16:-Solution of the differential equation $\frac{\sqrt{x}\,dx+\sqrt{y}\,dy}{\sqrt{x}\,dx-\sqrt{y}\,dy}=\sqrt{\frac{y^3}{x^3}}$ is given by

(a) $\frac{3}{2}\log\left(\frac{y}{x}\right)+\log\left|\frac{x^{3/2}+y^{3/2}}{x^{3/2}}\right|+\tan^{-1}\left(\frac{y}{x}\right)^{3/2}+c=0$

(b) $\frac{2}{3}\log\left(\frac{y}{x}\right)+\log\left|\frac{x^{3/2}+y^{3/2}}{x^{3/2}}\right|+\tan^{-1}\left(\frac{y}{x}\right)+c=0$

(c) $\frac{2}{3}\log\left(\frac{y}{x}\right)+\log\left|\frac{x+y}{x}\right|+\tan^{-1}\left(\frac{y^{3/2}}{x^{3/2}}\right)+c=0$

(d) *I is false, II is true*

17:-The integer $\int_{-1/2}^{1/2}\left[[x]+\log\left(\frac{1+x}{1-x}\right)\right]dx$ is equal to

(a) $-\frac{1}{2}$ **(b)** 0 **(c)** 1 **(d)** $2\log\frac{1}{2}$

18:-A function $y=f(x)$ has a second order derivative $f''(x)=6(x-1)$. If its graph passes through the point $(2,\ 1)$ and at that point the tangent to the graph is $y=3x-5$, then the function is

(a) $(y-1)^3$ **(b)** $(y+1)^3$ **(c)** $(x+1)^2$ **(d)** $(x-1)^2$

19:-The sum of n terms of the following series $1+(1+x)+\left(1+x+x^2\right)+$.......... will be

(a) $\frac{1-x^n}{1-x}$ **(b)** $\frac{x\left(1-x^n\right)}{1-x}$ **(c)** $\frac{n(1-x)-x\left(1-x^n\right)}{(1-x)^2}$ **(d)** *None of these*

20:- At a point P on the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ tangent PQ is drawn. If the point Q be at a distance $\frac{1}{p}$ from the point P, where P is distance of the tangent from the origin, then the locus of the point Q is

(a) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1+\frac{1}{a^2b^2}$ **(b)** $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1-\frac{1}{a^2b^2}$

(c) $\frac{x^2}{a^2}+\frac{y^2}{b^2}=\frac{1}{a^2b^2}$ **(d)** $\frac{x^2}{a^2}-\frac{y^2}{b^2}=\frac{1}{a^2b^2}$

21:-Let $\alpha,\beta\in R$ be such that $\lim_{x\to 0}\frac{x^2\sin(\beta x)}{\alpha x-\sin x}=1$. Then $6(\alpha+\beta)$ equals

22:-The smallest value of k, for which both the roots of the equation $x^2-8kx+16\left(k^2-k+1\right)=0$ are real, distinct and have values at least 4, is ....

23:-The positive integer value of $n>3$ satisfying the equation $\frac{1}{\sin\left(\frac{\pi}{n}\right)}=\frac{1}{\sin\left(\frac{2\pi}{n}\right)}+\frac{1}{\sin\left(\frac{3\pi}{n}\right)}$ is.....

24:-The number of values of θ in the interval $\left(-\frac{\pi}{2},\frac{\pi}{2}\right)$ such that $\theta\neq\frac{n\pi}{5}$ for $n=0,\pm 2$ and $\tan\theta=\cot 5\theta$ as well as $\sin 2\theta=\cos 4\theta$ is.......

25:-Number of ordered triplets of natural number (a, b, c) for which abc $\leq$ 11 is ………….