

FULL TEST – 4

for

JEE MAIN

Important Instructions :

1. Immediately fill in the particulars on this page of the Test Booklet with *Blue/Black Ball Point Pen*. *Use of pencil is strictly prohibited.*
2. The Answer Sheet is kept inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully.
3. The test is of **1 hour** duration.
4. The Test Booklet consists of **30** questions. The maximum marks are **120**.
5. Each question carries **4** marks.
6. Candidates will be awarded marks as stated above in instructions No. 5 for correct response of each question. $\frac{1}{4}$ (one fourth) marks will be deducted for indicating incorrect response of each question. No deduction from the total score will be made if no response is indicated for an item in the answer sheet.
7. There is only one correct response for each question. Filling up more than one response in each question will be treated as wrong response and marks for wrong response will be deducted accordingly as per instruction 6 above.
8. Use **Blue/Black Ball Point only** for writing particulars/markings responses on **Side-1** and **Side-2** of the Answer Sheet. *Use of pencil is strictly prohibited.*
9. No candidate is allowed to carry any textual material, printed or written, bits of papers, pager, mobile phone, any electronic device, etc., except the Admit Card inside the examination hall/room.
10. Rough work is to be done on the pages provided for this purpose in the Test Booklet only..
11. On completion of the test, the candidate must hand over the Answer Sheet to the Invigilator on duty in the Room/Hall. **However, the candidates are allowed to take away this Test Booklet with them.**
12. **Do not fold or make any stray marks on the Answer Sheet.**

Name of the Candidate (in Capital letters) : _____	
Roll Number : in figures	_____
: in words	_____
Examination Centre Number :	
Name of Examination Centre (in Capital letters) : _____	
Candidate's Signature : _____	Invigilator's Signature : _____



- Domain of definition of the function $f(x) = \log \sqrt{10 \cdot 3^{x-2} - 9^{x-1} - 1} + \sqrt{\cos^{-1}(1-x)}$ is
 (1) $[0, 1]$ (2) $[1, 2]$
 (3) $(0, 2)$ (4) $(0, 1)$
- The tangents of two acute angles are 3 and 2. The sine of twice their difference is :
 (1) $7/24$ (2) $7/48$
 (3) $7/50$ (4) $7/25$
- The term independent of 'x' in the expansion of $\left(9x - \frac{1}{3\sqrt{x}}\right)^{18}$, $x > 0$, is k times the corresponding binomial co-efficient. Then 'k' is :
 (1) 3 (2) $\frac{1}{3}$
 (3) $-\frac{1}{3}$ (4) 1
- There are 10 red balls of different shades & 9 green balls of identical shades. Then the number of arranging them in a row so that no two green balls are together is
 (1) $(10!) \cdot {}^{11}P_9$ (2) $(10!) \cdot {}^{11}C_9$
 (3) $10!$ (4) $10! \cdot 9!$
- If the graphs of $y = \cos x$ and $y = \tan x$ intersect at some value say $x = \theta$ in the first quadrant. Then the value of $\sin \theta$ is
 (1) $\frac{-1+\sqrt{2}}{2}$ (2) $\frac{-1+\sqrt{3}}{2}$
 (3) $\frac{-1+\sqrt{5}}{2}$ (4) $\frac{-1\pm\sqrt{5}}{2}$
- Let P be a point on the complex plane denoting the complex number z. If $(z - 2)(\bar{z} + i)$ is a real number then the locus of P is
 (1) $y = 2x + 1$ (2) $2y = 2 - x$
 (3) $y = x - 2$ (4) $y = 2x - 1$
- $\lim_{x \rightarrow 0} (e^x + x)^{\frac{1}{x}}$
 (1) e^1 (2) $e^{1/2}$
 (3) $e^{3/2}$ (4) e^2
- The value of this product of 98 numbers $\left(1 - \frac{2}{3}\right)\left(1 - \frac{2}{4}\right)\left(1 - \frac{2}{5}\right) \dots \dots \left(1 - \frac{2}{98}\right)\left(1 - \frac{2}{99}\right)\left(1 - \frac{2}{100}\right)$, is

- $\frac{1}{10}$ (2) $\frac{98}{100}$
 (3) $\frac{1}{5050}$ (4) $\frac{1}{4950}$
- Given that $\log(2) = 0.3010 \dots$, number of digits in the number 2000^{2000} is
 (1) 6601 (2) 6602
 (3) 6603 (4) 6604
- Let $\vec{a}, \vec{b}, \vec{c}$ be vectors of length 3, 4, 5 respectively. Let \vec{a} be perpendicular to $\vec{b} + \vec{c}$, \vec{b} to $\vec{c} + \vec{a}$ & \vec{c} to $\vec{a} + \vec{b}$. Then $|\vec{a} + \vec{b} + \vec{c}|$ is :
 (1) $2\sqrt{5}$ (2) $2\sqrt{2}$
 (3) $10\sqrt{5}$ (4) $5\sqrt{2}$
- A circle of radius r touches the lines given by the equation $4x^2 - 4xy + y^2 - 18x + 9y - 36 = 0$. Area of the circle in square units is
 (1) 45π (2) 75π
 (3) $45\pi/2$ (4) $45\pi/4$
- The simplest form of $1 + \frac{a}{1 - \frac{1}{1-a}}$ is
 (1) a for $a \neq 1$
 (2) a for $a \neq 0$ and $a \neq 1$
 (3) $-a$ for $a \neq 0$ and $a \neq 1$
 (4) 1 for $a \neq 1$
- Let $u(x)$ and $v(x)$ are differentiable functions such that $\frac{u(x)}{v(x)} = 7$. If $\frac{u'(x)}{v'(x)} = p$ and $\left(\frac{u(x)}{v(x)}\right)' = q$, then $\frac{p+q}{p-q}$ has the value equal to
 (1) 1 (2) 0
 (3) 7 (4) -7
- Through the focus of the parabola $y^2 = 2px$ ($p > 0$) a line is drawn which intersects the curve at $A(x_1, y_1)$ and $B(x_2, y_2)$. The ratio $\frac{y_1 y_2}{x_1 x_2}$ equals
 (1) 2 (2) -1
 (3) -4 (4) some function of p

Each of the following questions (Q 15 to Q 20) contains

Statement – 1 (Assertion) and Statement – 2 (Reason). Each question has 4 choices (a), (b), (c) and (d) out of which **ONLY ONE** is correct. Select the correct choice, **Choices are :**

- (1) **Statement – 1** is True, **Statement – 2** is True; **Statement – 2** is a correct explanation for **Statement – 1**.
- (2) **Statement – 1** is True, **Statement – 2** is True; **Statement – 2** is **NOT** a correct explanation for **Statement – 1**.
- (3) **Statement – 1** is True, **Statement – 2** is False.
- (4) **Statement – 1** is False, **Statement – 2** is True.

15. **Statements-1:** If $f(x) = x$ and $F(x) = \frac{x^2}{x}$, then

$F(x) = f(x)$ always

Statements-2: At $x = 0$, $F(x)$ is not defined.

16. **Statements-1:** $\lim_{x \rightarrow 0^+} x \sin \frac{1}{x} = 1$

Statements-2: $\lim_{y \rightarrow \infty} y \sin \frac{1}{y} = 1$

17. **Statements-1:** All continuous functions are integrable

Statements-2: If a function $y = f(x)$ is continuous on an interval $[a, b]$ then its definite integral over $[a, b]$ exists.

18. **Statement-1:** The common tangents of the circles $x^2 + y^2 + 2x = 0$ and $x^2 + y^2 - 6 = 0$ form an equilateral triangle

Statement-2: The given circles touch each other externally.

19. **Statement-1** : 2^{60} when divided by 7 leaves the remainder 1.

Statement-2 : $(1 + x)^n = 1 + n_1x$, where $n, n_1 \in \mathbb{N}$.

20. **Statement-1:** The roots of the equation $2x^2 + 3x + 2 = 0$ are always conjugate pair.

Statement-2: Imaginary roots of a quadratic equation with real coefficients always occur in conjugate pair.

21. If any tangent to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$

intercepts equal lengths k on the axes then k^2 is equal to

- (1) 9 (2) $\sqrt{41}$
 (3) 3 (4) 41

22. The solution of the differential equation

$$\frac{x dy}{x^2 + y^2} = \left(\frac{y}{x^2 + y^2} - 1 \right) dx$$

- (1) $x + \tan^{-1}\left(\frac{x}{y}\right) = C$ (2) $y + \tan^{-1}\left(\frac{y}{x}\right) = C$

(3) $y + \tan^{-1}\left(\frac{x}{y}\right) = C$ (4) $x + \tan^{-1}\left(\frac{y}{x}\right) = C$

23. A vertical tower PQ subtends the same angle of 30° at each of two places A and B, 60 m apart on the ground. If AB subtends an angle of 120° at P, the foot of the tower, the height of the tower is

- (1) 15 m (2) 10 m
 (3) 25 m (4) 20 m

24. If $A = \begin{vmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{vmatrix}$, then $\det. (\text{adj}(\text{adj} A))$ is

- (1) $(14)^1$ (2) $(14)^2$
 (3) $(14)^3$ (4) $(14)^4$

25. If the first term of a G.P. a_1, a_2, a_3, \dots is unity such that $4a_2 + 5a_3$ is least, then the common ratio of G.P. is

- (1) $-\frac{2}{5}$ (2) $-\frac{3}{5}$
 (3) $\frac{2}{5}$ (4) None of these

26. In a $\triangle ABC$, a, b, A are given and c_1, c_2 are two values of the third side c . The sum of the areas of two triangles with sides a, b, c_1 and a, b, c_2 is

- (1) $\frac{1}{2}b^2 \sin 2A$ (2) $\frac{1}{2}a^2 \sin 2A$
 (3) $b^2 \sin 2A$ (4) None of these

27. If $|k| = 5$ and $0^\circ \leq \theta \leq 360^\circ$, then the number of different solutions of $3 \cos \theta + 4 \sin \theta = k$ is

- (1) Zero (2) Two
 (3) One (4) Infinite

28. If $[]$ denotes the greatest integer less than or equal to the real number under consideration, and $-1 \leq x < 0$; $0 \leq y < 1$; $1 \leq z < 2$, then the value of the determinant

$$\begin{vmatrix} [x]+1 & [y] & [z] \\ [x] & [y]+1 & [z] \\ [x] & [y] & [z]+1 \end{vmatrix}$$
 is

- (1) $[x]$ (2) $[y]$
 (3) $[z]$ (4) None of these

29. The function $\sin x - bx + c$ will be increasing in the interval $(-\infty, \infty)$, if

- (1) $b \leq 1$ (2) $b \leq 0$
 (3) $b < -1$ (4) $b \geq 0$

30. Area bounded by the curve $y = xe^{x^2}$, x -axis and the ordinates $x = 0$, $x = a$

(1) $\frac{e^{a^2} + 1}{2}$ sq. unit (2) $\frac{e^{a^2} - 1}{2}$ sq. unit

(3) $e^{a^2} + 1$ sq. unit (4) $e^{a^2} - 1$ sq. unit

