Time : 1 Hr. **JEE ADVANCED TEST SERIES** **Exam Date:**

Max. Marks : 60

PAPER - 1
MATHEMATICS
SECTION – I
MULTIPLE CORRECT CHOICE TYPE

This section contains 6 multiple choice questions. Each question has 4 choices A, B, C and D for its answer, out of which ONE OR MORE is/are correct. (+4, –2) 6 x 4 = 24 M

1. The slope of a median drawn from the vertex A of the triangle ABC is –2 . the coordinate of vertices B and C are respectively (–1,3) and (3,5). If the area of the triangle be 5 square units, then possible distance if vertex A from the origin is / are
   A. 6 B. 4 C. $2\sqrt{2}$ D. $3\sqrt{2}$
2. PQ is a double ordinate of the parabola $y^2=4ax$. If the normal at P intersect the line passing through Q amd parallel to x–axis at G; then the locus of G is a parabola with
   A. Vertex at (4a,0) B. Focus at (5a,0)
   C. Directrix as the line x–3a=0 D. Length of the latus rectum equal to 4a
3. A circle cuts rectangular hyperbola xy=1 in the points (x_r, y_r), r =1,2,3,4 then
   A. $y_1y_2y_3y_4=1$ B. $x_1x_2x_3x_4=1$ C. $x_1x_2x_3x_4= y_1y_2y_3y_4=–1$ D. $y_1y_2y_3y_4= 0$
4. Consider the quadratic equation $(\log_{10}8)x^2–(\log_{10}5)x=2(\log_2 10)^{-1}–x$. Which of the following quantities are irrational ?
   A. Sum of the roots B. Product of the roots C. Sum of the coefficients D. Discriminant
5. The equation of the sides of the triangle having (3,–1) as a vertex and x–4y+10=0 and 6x+10y–59=0 as angle bisector and as median respectively drawn from different vertices, are
   A. 6x+7y–13=0 B. 2x+9y–65=0 C. 18x+13y–41=0 D. 6x–7y–25=0
6. If a variable tangent of the circle $x^2 + y^2 = 1$ intersects the ellipse $x^2 + 2y^2 = 4$ at points P and Q then the locus of the point of intersection of tangents at P and Q is
   A. A conic with latusrectum = 4 B. A parabola with focus as (2, 3)
   C. A conic with eccentricity $\frac{\sqrt{3}}{2}$ D. An ellipse with latus rectum = 2

SECTION – II
INTEGER ANSWER TYPE

This section contains 8 questions. The answer to each of the questions is a single-digit integer, ranging from 0 to 9. The appropriate bubbles below the respective question numbers in the ORS have to be darkened. (+3, 0) 8 x 3 = 24M

7. The minimum value of $\left[(x_1-x_2)^2+\left(12-\sqrt{1-x_1^2}-\sqrt{4x_2}\right)^2\right]^{1/2}$ for all permissible values of x_1 and x_2 is equal to $a\sqrt{b}-c$ where a, b, c $\in$N, then find the value of a+b–c
8. Let A=(–1,0),B=(3,0) and PQ be any line passing through (4,1). The range of the slope of PQ for which there are two points onPQ at which AB subtends a right angle is $(\lambda_1,\lambda_2) – \{a, b\}$ then $5(\lambda_1+\lambda_2)$ =
9. Points A and B lie on the parabola $y=2x^2+4x–2$, such that origin is the mid–point of the line segment AB. If 'l' be the length of the line segment AB, then find the unit digit of l^2.
10. If the area of the ellipse $\frac{x^2}{16}+\frac{y^2}{b^2}=1$ inscribed in a square of side length $5\sqrt{2}$ is A then $\frac{A}{2\pi}$ equals
11. Any chord of the conic $x^2+y^2+xy=1$ passing through origin is bisected at a point (p,q), then (p+q+7) equals to
12. Let y=mx+c be a common tangent to $\frac{x^2}{16}-\frac{y^2}{9}=1$ and $\frac{x^2}{4}+\frac{y^2}{3}=1$, then find the value of m^2+c^2
13. The number of ordered pairs of (x,y) satisfying the equations $\log_{(1+x)}(1–2y+y^2)+\log_{(1–y)}(1+2x+x^2)=4$ and $\log_{(1+x)}(1+2y)+\log_{(1–y)}(1+2x)=2$
14. Given that the three points where the curve $y=bx^2–2$ intersects the x–axis and y–axis form an equilateral triangle . Find the value of 2b.

SECTION – III
COMPREHENSION TYPE

This section contains 2 group of questions. Each group has 2 multiple choice questions based on a paragraph. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which ONLY ONE is correct. (+3, –1) 4 x 3 = 12M

COMPREHENSION – 1

If P is a variable point and F_1 and F_2 are two fixed points such that $|PF_1 - PF_2| = 2a$. Then the locus of the point P is a hyperbola, with points F_1 and F_2 as the two foci ($F_1F_2 > 2a$). If $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ is a hyperbola, then its conjugate hyperbola is $\frac{x^2}{a^2}-\frac{y^2}{b^2}=-1$. Let P(x, y) is a variable point such that $\left|\sqrt{(x-1)^2+(y-2)^2}-\sqrt{(x-5)^2+(y-5)^2}\right|=3$

15. If the locus of the point P represents a hyperbola of eccentricity e, then the eccentricity e' of the corresponding conjugate hyperbola is

A. 5/3 B. 4/3 C. 5/4 D. $3/\sqrt{7}$

16. Locus of intersection of two perpendicular tangents to the given hyperbola is

A. $(x-3)^2+\left(y-\frac{7}{2}\right)^2=\frac{55}{4}$ B. $(x-3)^2+\left(y-\frac{7}{2}\right)^2=\frac{25}{4}$

C. $(x-3)^2+\left(y-\frac{7}{2}\right)^2=\frac{7}{4}$ D. None of these

COMPREHENSION – 2

Consider the following lines L_1=x–y–1=0, L_2=x+y–5=0, L_3=y–4=0
Let L_1 is axis to a parabola, L_2 is tangent at the vertex to this parabola and L_3 is another tangent to this parabola at some point P.
Let 'C' be the circle circumscribing the triangle formed by tangent and normal at point P and axis of parabola.

17. The equation of the circle 'C' is

A. $x^2+y^2-2x-31=0$ B. $x^2+y^2-2y-31=0$ C. $x^2+y^2-2x-2y-31=0$ D. $x^2+y^2+2x+2y+31=0$

18. The given parabola is equal to which of the following parabola ?

A. $y^2=16\sqrt{2}x$ B. $x^2=-4\sqrt{2}y$ C. $y^2=-\sqrt{2}x$ D. $y^2=8\sqrt{2}x$

THE–END