Resonance
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TARGET : JEE (Advanced) 2015

Course : VIJETA & VIJAY (ADP & ADR) Date : 21-04-2015

MATHEMATICS DPP DAILY PRACTICE PROBLEMS

DPP NO. 05

TEST INFORMATION

DATE : 22.04.2015 **PART TEST-02 (PT-02)**

Syllabus : Application of Derivatives, Sequence & Series, Binomial Theorem

REVISION DPP OF STRAIGHT LINE AND CIRCLE

Total Marks : 147 **Max. Time : 113.5 min.**

Single choice Objective (–1 negative marking) Q. 1 to 11	**(3 marks 2.5 min.)**	**[33, 27.5]**
Multiple choice objective (–1 negative marking) Q. 12 to 38	**(4 marks, 3 min.)**	**[108, 81]**
Comprehension (–1 negative marking) Q.39 to 40	**(3 marks 2.5 min.)**	**[6, 5]**

1. From a point 'P' on the line $2x + y + 4 = 0$, which is nearest to the circle $x^2 + y^2 - 12y + 35 = 0$, tangents are drawn to given circle. The area of quadrilateral formed by these pair of tangents and pair of radii, is

(A) 8 (B) $\sqrt{110}$ (C) $\sqrt{19}$ (D) 19

2. The lines $5x + 12y - 10 = 0$ and $5x - 12y - 40 = 0$ touch a circle of radius 3 units. If the centre of circle lies in the first quadrant, then the coordinates of centre is

(A) (5, 3) (B) (5, 1) (C) (5, 2) (D) (5, 6)

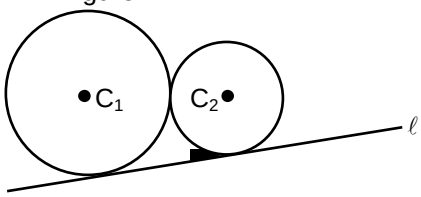
3. Let $A \equiv (-2, 0)$ and $B \equiv (2, 0)$, then the number of integral values of a, $a \in [-10, 10]$ for which line segment AB subtends an acute angle at point C(a, a + 1) is

(A) 15 (B) 17 (C) 19 (D) 21

4. If the circles $x^2 + y^2 + (3 + \sin\beta)x + 2\cos\alpha \cdot y = 0$ and $x^2 + y^2 + 2\cos\alpha \cdot x + 2cy = 0$ touch each other, then the maximum value of 'c' is

(A) $\frac{1}{2}$ (B) 1 (C) $\frac{3}{2}$ (D) 2

5. Two circles C_1 and C_2 of radii $\frac{3}{2}$ and $\frac{1}{2}$ respectively touch each other externally and 'ℓ' is their common tangent as shown in figure.



Then the perimeter of shaded region is :

(A) $\frac{5\pi}{6} + \sqrt{3}$ (B) $\frac{2\pi}{3} + \sqrt{3}$ (C) $\pi - \sqrt{3}$ (D) $\pi + \sqrt{3}$

6. Vertices of a variable triangle are (3, 4), $(5\cos\theta, 5\sin\theta)$ and $(5\sin\theta, -5\cos\theta)$. Then locus of its orthocenter is

(A) $(x + y - 1)^2 + (x - y - 7)^2 = 100$ (B) $(x + y - 7)^2 + (x - y - 1)^2 = 100$

(C) $(x + y - 7)^2 + (x + y - 1)^2 = 100$ (D) $(x + y - 7)^2 + (x - y + 1)^2 = 100$

7. If $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ be the images of point P(x, y) about lines $L_1 = ax + by + c = 0$ and $L_2 = bx - ay + c' = 0$ respectively then the line joining points P_1 and P_2 always passes through

(A) Point of intersection of $L_1 = 0$ and $L_2 = 0$ (B) Point $\left(\frac{x+x_1}{2}, \frac{y+y_1}{2}\right)$

(C) Point $\left(\frac{x_1-x_2}{2}, \frac{y_1-y_2}{2}\right)$ (D) Information provided is incomplete

8. The base of a triangle passes through a fixed point (f, g) and its sides are bisected at right angles by the lines $y^2 - 8xy - 9x^2 = 0$. The locus of vertex of triangle is
(A) straight line (B) circle (C) parabola (D) ellipse

9. If $\frac{a}{\sqrt{bc}} - 2 = \sqrt{\frac{b}{c}} + \sqrt{\frac{c}{b}}$ where a, b, c > 0, then the family of lines $\sqrt{a}x + \sqrt{b}y + \sqrt{c} = 0$ always passes through the fixed point
(A) (1, 1) (B) (1, –1) (C) (–1, 2) (D) (–1, 1)

10. A line of fixed length 2 units moves so that its one end is on the positive x-axis and other end on that part of the line x + y = 0 which lies in the second quadrant. The locus of the mid-point of the line is given by
(A) $x^2 + 5y^2 + 4xy - 1 = 0$ (B) $x^2 + 5y^2 + 4xy + 1 = 0$
(C) $x^2 + 5y^2 - 4xy - 1 = 0$ (D) $4x^2 + 5y^2 + 4xy + 1 = 0$

11. A point P moves such that it is at a constant distance c from the origin. If Q is the image of P in the line mirror y = x and R is the image of Q in the line mirror y = –x then locus of R is
(A) $y^2 = x^2$ (B) $x^2 + y^2 = 2c^2$ (C) $xy = c^2$ (D) $x^2 + y^2 = c^2$

12. If a circle passes through the points of intersection of the coordinate axes with the lines $\lambda x - y + 1 = 0$ and $x - 2y + 3 = 0$, then the value of λ is

(A) 1 (B) 2 (C) 3 (D) $\frac{1}{3}$

13. If $4a^2 + b^2 + 2c^2 + 4ab - 6ac - 3bc = 0$, then the family of lines ax + by + c = 0 may be concurrent at point(s)

(A) $\left(-1, -\frac{1}{2}\right)$ (B) (–1, –1) (C) (–2, –1) (D) (–1, 2)

14. Three vertices of a parallelogram are (1, 1), (2, 4) and (3, 5), then the fourth vertex of the parallelogram can be :
(A) (4, 8) (B) (5, 8) (C) (0, 0) (D) (2, 2)

15. The value(s) of t for which the lines 2x + 3y = 5, $t^2x + ty - 6 = 0$ and 3x – 2y – 1 = 0 are concurrent, can be
(A) 2 (B) –3 (C) –2 (D) 3

16. One diagonal of a square is the portion of the line $\sqrt{3}x + y = 2\sqrt{3}$ intercepted by the axes. Then an extremity of the other diagonal is :
(A) $(1+\sqrt{3}, \sqrt{3}-1)$ (B) $(1+\sqrt{3}, \sqrt{3}+1)$ (C) $(1-\sqrt{3}, \sqrt{3}-1)$ (D) $(1-\sqrt{3}, \sqrt{3}+1)$

17. The equation of the sides of the triangle having (3, –1) as a vertex and x – 4y + 10 = 0 and 6x + 10y = 59 as angle bisector and as median respectively drawn from different vertices, are :
(A) 6x + 5y – 13 = 0 (B) 2x + 9y – 65 = 0 (C) 18x + 13y – 41 = 0 (D) 6x – 7y – 25 = 0

18. C_1 and C_2 are two circles of radii a and b (a < b) touching both the coordinate axes and have their centres in the first quadrant. Then which of the following is true?

(A) If C_1, C_2 touch each other then $\frac{b}{a} = 3 + 2\sqrt{2}$

(B) If C_1, C_2 are orthogonal then $\frac{b}{a} = 2 + \sqrt{3}$

(C) If C_1, C_2 intersect in such a way that their common chord has maximum length, then $\frac{b}{a} = 3$.

(D) If C_2 passes through the centre of C_1, then $\frac{b}{a} = 2 + \sqrt{2}$.

19. If $g : R \to N \cup \{0\}$ and g(x) = n, where 'x' represents the area of triangle joining the two fixed points P(5, 0), Q(8, 4) and a variable point R such that $\angle PRQ = \frac{\pi}{2}$ and 'n' represents the number of such triangles, then
(A) g(5) = 4 (B) g(7) = 0 (C) g(6.25) = 2 (D) g (6.25) = 1

20. The line y = x is tangent at (0, 0) to a circle of radius 1. The centre of circle may be :

(A) $\left(\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$ (B) $\left(-\frac{1}{2}, \frac{1}{2}\right)$ (C) $\left(\frac{1}{2}, -\frac{1}{2}\right)$ (D) $\left(-\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}\right)$

21. If $(x-2)^2 + (y-2)^2 = 1$, then which of the following is true ?

(A) maximum value of x + y is $4 + \sqrt{2}$ (B) maximum value of x – y is $\sqrt{2}$

(C) maximum value of xy is $\frac{9+4\sqrt{2}}{2}$ (D) minimum value of x + y is $4 - \sqrt{2}$

22. The slope of median drawn from the vertex 'A' of triangle ABC is –2. Coordinates of vertices B and C are (–1,3) & (3, 5) respectively. If the area of triangle is 5 square units, then the distance of vertex A from the origin is

(A) 6 (B) 4 (C) $2\sqrt{2}$ (D) $3\sqrt{2}$

23. A(1, 2) and B(7, 10) are two fixed points. If P(x, y) is a point such that $\angle APB = 60°$ and the area of triangle APB is maximum, then

(A) point P lies on the line 3x + 4y = 36

(B) point P is on the circle passing through given points and having radius 10

(C) point P is on the circle passing through given points and having radius $\frac{10}{\sqrt{3}}$

(D) area of $\Delta PAB = \frac{75}{\sqrt{3}}$ sq. units

24. z_1, z_2, z_3 are three non collinear complex numbers such that $z = \frac{\ell z_1 + m z_2 + n z_3}{\ell + m + n}$ lies inside the triangle formed by z_1, z_2, z_3. If ℓ, m, n are roots of equation $x^3 + 3x^2 + px + q = 0$, then which of the following is **INCORRECT** ?

(A) p > 0, q > 0 (B) p < 0, q < 0 (C) p > 0, q < 0 (D) p < 0, q > 0

25. Equation of incircle of equilateral triangle ABC where B ≡ (2, 0), C ≡ (4, 0), is

(A) $x^2 + y^2 - 6x + \frac{2y}{\sqrt{3}} + 9 = 0$ (B) $x^2 + y^2 + 6x - \frac{2y}{\sqrt{3}} + 9 = 0$

(C) $x^2 + y^2 + 6x + \frac{2y}{\sqrt{3}} + 9 = 0$ (D) $x^2 + y^2 - 6x - \frac{2y}{\sqrt{3}} + 9 = 0$

26. Equation of circle touching the circle $x^2 + y^2 - 15x + 5y = 0$ at (1, 2) and having radius $\sqrt{\frac{5}{2}}$ is

(A) $5x^2 + 5y^2 - 23x + 11y + 20 = 0$ (B) $5x^2 + 5y^2 - 23x - 11y + 20 = 0$

(C) $5x^2 + 5y^2 + 3x - 29y + 30 = 0$ (D) $5x^2 + 5y^2 + 3x + 29y + 30 = 0$

27. The equation of circle which is touched by line y = x, has its centre on the x-axis and cuts off a chord of length 2 units along the line $\sqrt{3}y - x = 0$ is

(A) $x^2 + y^2 - 4x + 2 = 0$ (B) $x^2 + y^2 - 4x + 6 = 0$ (C) $x^2 + y^2 - 6x + 2 = 0$ (D) $x^2 + y^2 + 4x + 2 = 0$

28. Let C be a circle with two diameters intersecting at an angle of 30°. A circle S having radius unity, touches both the diameters and also the circle C, then the radius of circle 'C' can be

(A) $1 + \sqrt{6} + \sqrt{2}$ (B) $1 + \sqrt{6} - \sqrt{2}$ (C) $\sqrt{6} + \sqrt{2} - 1$ (D) $\sqrt{6} - \sqrt{2} - 1$

29. If from (α, β), two tangents are drawn to circle $x^2 + y^2 = 4$ so that slopes of tangents are in the ratio 1 : 2 and $f(x) = \alpha^2 x^2 + 12x - \frac{\beta^2}{4}$, then

(A) $f(x) > 0 \ \forall x \in R$ (B) Locus of (α^2, β^2) is a hyperbola

(C) least positive integral value of α is 1 (D) eccentricity of locus of (α^2, β^2) is $\sqrt{2}$

30. Equation of the chord of the circle $x^2 + y^2 - 3x - 4y - 4 = 0$ which passes through origin such that the origin divides it in the ratio 4 : 1 is

(A) y = 0 (B) 24x + 7y = 0 (C) 7x + 24y = 0 (D) 7x – 24y = 0

31. If the circle $x^2 + y^2 - 2x - 2y + 1 = 0$ is inscribed in a triangle whose two sides are coordinate axes and one side has negative slope cutting intercepts a and b on x and y axis respectively, then

(A) $\frac{1}{a} + \frac{1}{b} - 1 = \sqrt{\frac{1}{a^2} + \frac{1}{b^2}}$ (B) $\frac{1}{a} + \frac{1}{b} - 1 = -\sqrt{\frac{1}{a^2} + \frac{1}{b^2}}$

(C) $\frac{1}{a} + \frac{1}{b} > 1$ (D) $\frac{1}{a} + \frac{1}{b} < 1$

32. The lines $x + y = 1$, $(m - 1)x + (m^2 - 7)y - 5 = 0$ and $(m - 2)x + (2m - 5)y = 0$
(A) are concurrent for $m = 3$ (B) form a triangle for $m = 2$
(C) are concurrent for no value of m (D) are parallel for $m = 3$

33. If m_1, m_2 are roots of equation $x^2 - ax - a - 1 = 0$, then the area of the triangle formed by the three straight lines $y = m_1x$, $y = m_2x$ and $y = a$ $(a \neq -1)$ is

(A) $\frac{a^2(a+2)}{2(a+1)}$ if $a > -1$ (B) $\frac{-a^2(a+2)}{2(a+1)}$ if $a < -1$

(C) $\frac{-a^2(a+2)}{2(a+1)}$ if $-2 < a < -1$ (D) $\frac{a^2(a+2)}{2(a+1)}$ if $a < -2$

34. If one of the lines in $2x^2 + axy + 3y^2 = 0$ coincide with one of those given by $4x^2 + bxy - 6y^2 = 0$ and the other lines represented by them be perpendicular then which of the following may be true ?
(A) $a + b = 7$ (B) $a + b = -6$ (C) $a - b = -3$ (D) $a - b = 3$

35. The diagonals of a rhombus ABCD intersect in (1, 2) and its two sides are parallel to the lines $x - y + 2 = 0$ and $7x - y + 3 = 0$. If the vertex A is (0, k) then the value of k is/are
(A) 2/5 (B) 3/5 (C) 5/2 (D) 0

36. The point $(\alpha, \alpha + 1)$ lies inside the triangle ABC whose vertices are A(0, 3), B(–2, 0) and C(6, 1) if

(A) $\alpha = -1$ (B) $\alpha = \frac{-1}{2}$ (C) $\alpha = \frac{1}{2}$ (D) $\frac{-6}{7} < \alpha < \frac{3}{2}$

37. The straight line $ax + by + c = 0$ where $abc \neq 0$ will pass through the first quadrant if :
(A) $ac > 0$ and $bc > 0$ (B) $c > 0$ and $bc < 0$
(C) $bc > 0$ and/or $ac > 0$ (D) $ac < 0$ and/or $bc < 0$

38. The equation of a circle in which the chord joining the points (1, 2) and (2, –1) subtends an angle of $\pi/4$ at any point on the circumference is
(A) $x^2 + y^2 = 5$ (B) $x^2 + y^2 - 6x - 2y + 5 = 0$
(C) $x^2 + y^2 + 6x + 2y - 15 = 0$ (D) $x^2 + y^2 + 7x - 2y + 14 = 0$

Comprehension (For Q. No. 39 to 40)

Let C : $x^2 + y^2 - 4x - 6y - 3 = 0$ is a circle and S is a family of circles passing through two fixed points A(3, 7) and B(6, 5).

39. The chords in which the circle C cuts the member of the family S are concurrent at point
(A) (2, 3) (B) $\left(2, \frac{23}{3}\right)$ (C) $\left(3, \frac{23}{2}\right)$ (D) (3, 2)

40. Equation of member of the family S that bisects the circumference of circle C is
(A) $x^2 + y^2 - 5x - 1 = 0$ (B) $x^2 + y^2 - 5x + 6y - 1 = 0$
(C) $x^2 + y^2 - 5x - 6y - 1 = 0$ (D) $x^2 + y^2 + 5x - 6y - 1 = 0$

DPP # 4

REVISION DPP OF SEQUENCE & SERIES AND BINOMIAL THEOREM

1.	(B)	**2.**	(A)	**3.**	(B)	**4.**	(C)	**5.**	(A)	**6.**	(C)	**7.**	(C)
8.	(C)	**9.**	(C)	**10.**	(D)	**11.**	(D)	**12.**	(D)	**13.**	(B)	**14.**	(B,D)
15.	(A,B,C)	**16.**	(A,B,D)	**17.**	(A,C)	**18.**	(A,B,C)	**19.**	(B,C)	**20.**	(A,D)	**21.**	(C,D)
22.	(A,B,D)	**23.**	(B,C)	**24.**	(A,C)	**25.**	(A,C)	**26.**	(A,D)	**27.**	(A,B,D)	**28.**	(B,D)
29.	(A,B,D)	**30.**	(A,B,C)	**31.**	(A,B,C,D)			**32.**	(A,C,D)	**33.**	(A,C)	**34.**	(A,C)
35.	(A)	**36.**	(B)	**37.**	(C)	**38.**	2	**39.**	4	**40.**			1