MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 1

Total Marks : 19

Max. Time : 20 min.

Topic : Straight Lines

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3,4,5	**(3 marks, 3 min.)**	**[15, 15]**
Subjective Questions (no negative marking) Q.6	**(4 marks, 5 min.)**	**[4, 5]**

1. If A & B are the points (– 3, 4) and (2, 1), then the co–ordinates of the point C on AB produced such that AC = 2 BC are :

(A) (2, 4) (B) (3, 7) (C) (7, –2) (D) $\left(-\frac{1}{2}, \frac{5}{2}\right)$

2. If in triangle ABC , A ≡ (1, 10) , circumcentre ≡ $\left(-\frac{1}{3}, \frac{2}{3}\right)$ and orthocentre ≡ $\left(\frac{11}{3}, \frac{4}{3}\right)$ then the co-ordinates of mid-point of side opposite to A is :

(A) (1, – 11/3) (B) (1, 5) (C) (1, – 3) (D) (1, 6)

3. Harmonic conjugate of the point (5, 13) with respect to (2, –5) and (3, 1) is

(A) $\left(1, \frac{13}{5}\right)$ (B) $\left(\frac{13}{5}, 1\right)$ (C) $\left(\frac{13}{5}, -\frac{7}{5}\right)$ (D) $\left(-\frac{7}{5}, \frac{13}{5}\right)$

4. An equilateral triangle has each of its sides of length 6 cm. If (x_1, y_1) ; (x_2, y_2) & (x_3, y_3) are its vertices, then the value of the determinant $\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}^2$ is equal to :

(A) 192 (B) 243 (C) 486 (D) 972

5. ABC is a triangle. The coordinates of whose vertices are (–2, 4), (10, –2) and (–2, –8). G is the centroid of triangle ABC, then area of the triangle GBC is equal to

(A) 26 (B) 36 (C) 24 (D) 39

6. One end of a thin straight elastic string is fixed at A (4 , – 1) and the other end B is at (1 , 2) in the unstretched condition . If the string is stretched to triple its length to the point C , then find the co–ordinates of this point .

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 2

Total Marks : 28

Max. Time : 28 min.

Topics : Straight Lines, Solutions of Triangles

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3	**(3 marks, 3 min.)**	**[9, 9]**
Multiple choice objective (no negative marking) Q.4	**(5 marks, 4 min.)**	**[5, 4]**
True or False (no negative marking) Q.5	**(2 marks, 2 min.)**	**[2, 2]**
Subjective Questions (no negative marking) Q.7	**(4 marks, 5 min.)**	**[4, 5]**
Match the Following (no negative marking) Q.6	**(8 marks, 8 min.)**	**[8, 8]**

1. Equation of line inclined at an angle of 45º with positive x-axis and dividing the line joining the points (3, –1) and (8, 9) in the ratio 2 : 3 internally, is

(A) $x - y - 2 = 0$ (B) $3x - 3y + 1 = 0$

(C) $\sqrt{3}x - \sqrt{3}y + 2 = 0$ (D) None of these

2. The straight line $2x + 5y - 1 = 0$ and $4ax - 5y + 2 = 0$ are mutually perpendicular, then the value of 'a' will be

(A) $\frac{25}{8}$ (B) $-\frac{1}{2}$ (C) $-\frac{25}{8}$ (D) $\frac{1}{2}$

3. A line passes through (2, 2) and is perpendicular to the line $3x + y = 3$. Its y – intercept is:

(A) 1/3 (B) 2/3 (C) 1 (D) 4/3

4. The vertices of a triangle are $A(x_1, x_1 \tan\alpha)$, $B(x_2, x_2 \tan\beta)$ and $C(x_3, x_3 \tan\gamma)$. If the circumcentre of triangle ABC coincides with the origin and H(a, b) be the orthocentre, then $\frac{a}{b}$ =

(A) $\frac{x_1 + x_2 + x_3}{x_1\tan\alpha + x_2\tan\beta + x_3\tan\gamma}$ (B) $\frac{x_1\cos\alpha + x_2\cos\beta + x_3\cos\gamma}{x_1\sin\alpha + x_2\sin\beta + x_3\sin\gamma}$

(C) $\frac{\tan\alpha + \tan\beta + \tan\gamma}{\tan\alpha.\tan\beta.\tan\gamma}$ (D) $\frac{\cos\alpha + \cos\beta + \cos\gamma}{\sin\alpha + \sin\beta + \sin\gamma}$

5. The circumcentre, orthocentre, incentre and centroid of the triangle formed by the points A(1, 2) , B(4, 6) , C(– 2, – 1) are collinear . **[True or False]**

6. Find the equations to the straight lines which pass through the point (1, –2) and cut off equal distances from the two axes.

7. Match entry of column-I with **one or more than one** entries of column-II.

	Column-I		**Column-II**
(A)	Four lines $x + 3y - 10 = 0$, $x + 3y - 20 = 0$, $3x - y + 5 = 0$ and $3x - y - 5 = 0$ form a figure which is	(p)	a quadrilateral which is neither a parallelogram nor a trapezium
(B)	The point A(1, 2), B(2, –3), C(–1, –5) and D(–2, 4) in order are vertices of	(q)	a parallelogram
(C)	The lines $7x + 3y - 33 = 0$, $3x - 7y + 19 = 0$, $3x - 7y - 10 = 0$ and $7x + 3y - 4 = 0$ form a figure which is	(r)	a rectangle of area 10 sq.units
(D)	Four lines $4y - 3x - 7 = 0$, $3y - 4x + 7 = 0$, $4y - 3x - 21 = 0$, $3y - 4x + 14 = 0$ form a figure which is	(s)	a square

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 3

Total Marks : 27

Max. Time : 28 min.

Topic : Straight Lines

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3,4,5	**(3 marks, 3 min.)**	**[15, 15]**
Subjective Questions (no negative marking) Q.6	**(4 marks, 5 min.)**	**[4, 5]**
Match the Following (no negative marking) Q.7	**(8 marks, 8 min.)**	**[8, 8]**

1. B & C are fixed points having co–ordinates (3, 0) and (– 3, 0) respectively . If the vertical angle BAC is 90º, then the locus of the centroid of the Δ ABC has the equation :

(A) $x^2 + y^2 = 1$ (B) $x^2 + y^2 = 9$ (C) $9(x^2 + y^2) = 1$ (D) $9(x^2 + y^2) = 4$

2. The coordinates of the midpoints of the sides of a triangle ABC are D(2, 1), E(5, 3) and F(3, 7). Equation of median of the triangle ABC passing through F is

(A) 10x + y – 37 = 0 (B) x + y – 10 = 0 (C) x – 10y + 67 = 0 (D) none of these

3. The co–ordinates of the orthocentre of the triangle bounded by the lines, 4x – 7y + 10 = 0; x + y = 5 and 7x + 4y = 15 is :

(A) (2, 1) (B) (– 1, 2) (C) (1, 2) (D) (1, – 2)

4. The family of straight lines 3(a + 1) x – 4 (a – 1) y + 3 (a + 1) = 0 for different values of 'a' passes through a fixed point whose coordinates are

(A) (1, 0) (B) (–1, 0) (C) (–1, –1) (D) none of these

5. The co–ordinates of a point P on the line 2x – y + 5 = 0 such that $|PA - PB|$ is maximum, where A is (4, – 2) and B is (2, – 4) will be :

(A) (11, 27) (B) (– 11, – 17) (C) (– 11, 17) (D) (0, 5)

6. Given vertices A(1, 1), B(4, –2) and C(5, 5) of a triangle, find the equation of the perpendicular dropped from C to the interior bisector of the angle A.

7. **Match the column**

	Column – I		**Column – II**
(A)	Area of the region enclosed by $2\|x\| + 3\|y\| \le 6$ is	(p)	12
(B)	OPQR is a square and M, N are the mid points of the sides PQ and QR respectively. If the ratio of the areas of the square and the triangle OMN is $\lambda : 6$, then λ is equal to	(q)	2
(C)	If slope of the straight line through the point (1, 2), whose distance from the point (3, 1) has the greatest value, is $\frac{m}{6}$, then m is equal to	(r)	4
(D)	Area of ΔABC is 20 sq. units where points A, B and C are (4, 6), (10, 14) and (x, y) respectively. If AC is perpendicular to BC, then number of positions of C is	(s)	16

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 4

Total Marks : 22

Max. Time : 20 min.

Topic : Straight Lines

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5,6	(3 marks, 3 min.)	[9, 9]
Multiple choice objective (no negative marking) Q.7	(5 marks, 4 min.)	[5, 4]

COMPREHENSION (Q.No. 1 to 3)

Consider the family of lines passing through the point of intersection of lines

L_1 : $3x + 4y + 7 = 0$

L_2 : $4x - 3y + 1 = 0$

1. A member of family which bisects the angle between them and is closer to origin, is

(A) $x - 7y - 6 = 0$ (B) $7x + y + 8 = 0$ (C) $7x - y + 6 = 0$ (D) $7x + y + 4 = 0$

2. A member of family with gradient -2 has y-intercept equal to

(A) 2 (B) -3 (C) 1 (D) -2

3. A member of this family whose slope is not defined is

(A) $y + 1 = 0$ (B) $x = 1$ (C) $3x = 4$ (D) $x + 1 = 0$

4. Chords of the curve $4x^2 + y^2 - x + 4y = 0$ which subtend a right angle at the origin pass through a fixed point whose co-ordinates are :

(A) $\left(\frac{1}{5}, -\frac{4}{5}\right)$ (B) $\left(-\frac{1}{5}, \frac{4}{5}\right)$ (C) $\left(\frac{1}{5}, \frac{4}{5}\right)$ (D) $\left(-\frac{1}{5}, -\frac{4}{5}\right)$

5. The image of the pair of lines represented by $ax^2 + 2h\,xy + by^2 = 0$ by the line mirror $y = 0$ is :

(A) $ax^2 - 2h\,xy - by^2 = 0$ (B) $bx^2 - 2h\,xy + ay^2 = 0$

(C) $bx^2 + 2h\,xy + ay^2 = 0$ (D) $ax^2 - 2h\,xy + by^2 = 0$

6. The value of k so that the equation $12x^2 - 10xy + 2y^2 + 11x - 5y + k = 0$ represents a pair of lines is

(A) -2 (B) 2 (C) 7 (D) -7

7. The sides AB, BC and CA of a triangle ABC are given by the equation $3x + 4y - 6 = 0$, $12x - 5y - 3 = 0$ and $x + y + 2 = 0$ respectively. Find the equation of bisector of internal angle B.

MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 5

Total Marks : 19

Max. Time : 20 min.

Topics : Fundamentals of Mathematics, Straight Lines

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5	(3 marks, 3 min.)	[6, 6]
Subjective Questions (no negative marking) Q.6	(4 marks, 5 min.)	[4, 5]

COMPREHENSION (Q.No. 1 to 3)

If $a < b < c < d$, then

1. $|x-a| + |x-b| + |x-c| + |x-d| = p$ has
- (i) two solutions if $p > c + d - a - b$
- (ii) infinite solutions if $p = c + d - a - b$
- (iii) no solution if $p < c + d - a - b$

2. $|x-a| + |x-b| + |x-c| = q$ has
- (i) two solutions if $q > c - a$
- (ii) one solution if $q = c - a$ and
- (iii) no solution if $q < c - a$

1. Number of solutions of the equation $|x-1| + |x-2| + |x-3| + |x-4| = 7$ is

(A) 0 (B) 1 (C) 2 (D) infinite

2. Let ℓ be the number of solutions obtained in above question, then number of solutions of the equation $|x-2| + |x-3| + |x-4| = \ell$ is

(A) 0 (B) 1 (C) 2 (D) infinite

3. Let k be the number of solution obtained in Q.No. 2, then number of solution of $|x+1| + |x| + |x-1| = k$ is

(A) 0 (B) 1 (C) 2 (D) infinite

4. If the lines $2x + y - 3 = 0$, $5x + ky - 3 = 0$ and $3x - y - 2 = 0$ are concurrent, then 'k' is equal to

(A) -2 (B) 3 (C) -3 (D) 2

5. A light ray coming along the line $3x + 4y = 5$ gets reflected from the line $ax + by = 1$ and goes along the line $5x - 12y = 10$, then

(A) $a = \frac{64}{115}$, $b = \frac{112}{5}$ (B) $a = \frac{14}{15}$, $b = \frac{-8}{115}$

(C) $a = \frac{64}{115}$, $b = \frac{-8}{115}$ (D) $a = \frac{14}{15}$, $b = \frac{112}{15}$

6. If the lines $L_1 : 2x - 3y - 6 = 0$, $L_2 : x + y - 4 = 0$ and $L_3 : x + 2 = 0$ taken pair wise in order constitute the angles A, B and C respectively of ΔABC, then find the equation whose roots are tan A, tan B and tan C

MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 6

Total Marks : 20

Max. Time : 19 min.

Topics : Fundamentals of Mathematics, Straight Lines

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5	(3 marks, 3 min.)	[6, 6]
Multiple choice objective (no negative marking) Q.6	(5 marks, 4 min.)	[5, 4]

COMPREHENSION (Q.No. 1 to 3)

Let $||x-a|-b| = k$. Then

(i) $k = 0, b > 0 \Rightarrow$ equation has two solutions

(ii) $b > k > 0 \Rightarrow$ equation has four solutions

(iii) $b = k > 0 \Rightarrow$ equation has three solutions

(iv) $0 < b < k \Rightarrow$ equation has two solutions

1. If number of solutions of $||x+1|-2| = 1$ is m, then m =

(A) 1 (B) 2 (C) 3 (D) 4

2. If number of solutions of $||x-2|-3| = m$ is ℓ, then ℓ =
(where m is obtained in Q.No. 1)

(A) 1 (B) 2 (C) 3 (D) 4

3. Number of solutions of $||x-2|-5| = \ell + 3$ is
(where ℓ is obtained in Q.No. 2)

(A) 1 (B) 2 (C) 3 (D) 4

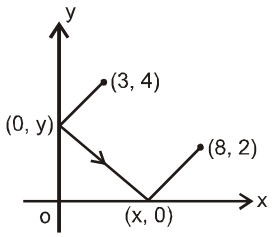
4. Given the family of lines, $a(3x + 4y + 6) + b(x + y + 2) = 0$. The line of the family situated at the greatest distance from the point P (2, 3) has equation :

(A) $4x + 3y + 8 = 0$ (B) $5x + 3y + 10 = 0$ (C) $15x + 8y + 30 = 0$ (D) none

5. Suppose a ray of light leaves the point (3, 4) reflects from the y-axis and moves towards the x-axis, then reflects from the x-axis, and finally arrives at the point (8, 2), then the value of x, is

(A) $x = 4\frac{1}{2}$ (B) $x = 4\frac{1}{3}$

(C) $x = 4\frac{2}{3}$ (D) $5\frac{1}{3}$



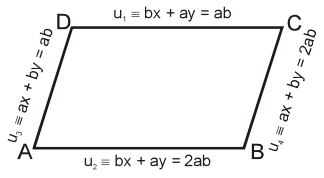
6. In a parallelogram as shown in the figure ($a \neq b$) :

(A) equation of the diagonal AC is
$(a + b)x + (a + b)y = 3ab$

(B) equation of the diagonal BD is $u_1 u_4 - u_2 u_3 = 0$

(C) co-ordinates of the points of intersection of the two diagonals are $\left(\frac{3ab}{2(a+b)}, \frac{3ab}{2(a+b)}\right)$

(D) the angle between the two diagonals is $\pi/3$.



MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 7

Total Marks : 26

Max. Time : 26 min.

Topics : Circle, Straight Lines, Pair of Straight Lines

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2,3,4,5,6	**(3 marks, 3 min.)**	**[18, 18]**
Match the Following (no negative marking) Q.7	**(8 marks, 8 min.)**	**[8, 8]**

1. If one end of a diameter of the circle $x^2 + y^2 - 4x - 6y + 11 = 0$ is (3 , 4) then the co–ordinates of the other end are :
(A) (1 , 2) (B) (2 , 1) (C) (–1 , 2) (D) none of these

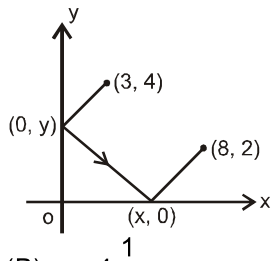
2. A circle is concentric with circle $x^2 + y^2 - 2x + 4y - 20 = 0$. If perimeter of the semicircle is 36 then the equation of the circle is : [use $\pi = 22/7$]
(A) $x^2 + y^2 - 2x + 4y - 44 = 0$ (B) $(x - 1)^2 + (y + 2)^2 = (126/11)^2$
(C) $x^2 + y^2 - 2x + 4y - 43 = 0$ (D) $x^2 + y^2 - 2x + 4y - 49 = 0$

3. Given two circles $x^2 + y^2 - 6x - 2y + 5 = 0$ & $x^2 + y^2 + 6x + 22y + 5 = 0$. The tangent at (2 , –1) to the first circle :
(A) passes outside the second circle
(B) touches the second circle
(C) intersects the second circle in 2 real points
(D) passes through the centre of the second circle .

4. The radius of the circle inscribed in the triangle formed by the line $3x + 4y = 24$ & the co–ordinate axes is :
(A) 2 units (B) 3/2 units (C) 5/2 units (D) none of these

5. The equation of the circle of radius 5 in the first quadrant which touches the x-axis and the line $3x - 4y = 0$ is :
(A) $x^2 + y^2 - 24x - y - 25 = 0$ (B) $x^2 + y^2 - 30x - 10y + 225 = 0$
(C) $x^2 + y^2 - 16x - 18y + 64 = 0$ (D) $x^2 + y^2 - 20x - 12y + 144 = 0$

6. Suppose a ray of light leaves the point (3, 4) reflects from the y-axis and moves towards the x-axis, then reflects from the x-axis, and finally arrives at the point (8, 2), then the value of x, is



(A) $x = 4\frac{1}{2}$ (B) $x = 4\frac{1}{3}$ (C) $x = 4\frac{2}{3}$ (D) $5\frac{1}{3}$

7. Consider the general equation of second degree $ax^2 + by^2 + 2hxy + 2gx + 2fy + c = 0$. If this equation represents a pair of straight lines, map the two columns in the most accurate sense.

Match the column

Column – I		**Column – II**	
(A)	If (x_1, y_1) is the point of intersection of the two lines, then $(ax_1 + hy_1)(hx_1 + by_1) =$	(p)	$\frac{c}{\sqrt{(a-b)^2 + 4h^2}}$
(B)	$af^2 + bg^2 + ch^2 =$	(q)	ab
(C)	The lines are parallel if $h^2 =$	(r)	fg
(D)	Product of perpendiculars from the origin	(s)	abc + 2fgh

MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 8

Total Marks : 27

Max. Time : 28 min.

Topics : Circle, Straight Lines

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1,2,3,4	(3 marks, 3 min.)	[12, 12]
Assertion and Reason (no negative marking) Q.5	(3 marks, 3 min.)	[3, 3]
Subjective Questions (no negative marking) Q.6	(4 marks, 5 min.)	[4, 5]
Match the Following (no negative marking) Q.7	(8 marks, 8 min.)	[8, 8]

1. The equation of the image of the circle $x^2 + y^2 + 16x - 24y + 183 = 0$ in the line mirror $4x + 7y + 13 = 0$ is:

(A) $x^2 + y^2 + 32x - 4y + 235 = 0$ (B) $x^2 + y^2 + 32x + 4y - 235 = 0$

(C) $x^2 + y^2 + 32x - 4y - 235 = 0$ (D) $x^2 + y^2 + 32x + 4y + 235 = 0$

2. Find the maximum and minimum distance of the point $(2, -7)$ from the circle $x^2 + y^2 - 14x - 10y - 151 = 0$.

(A) {28, 2} (B) {2, 28} (C) {2, 13} (D) {15, 13}

3. The line $2x + 3y = 12$ meets the x-axis at A and the y-axis at B. The line through (5, 5) perpendicular to AB meets the x-axis, y-axis & the line AB at C, D, E respectively. If O is the origin, then the area of the region OCEB is :

(A) $\frac{20}{3}$ sq. units (B) $\frac{23}{3}$ sq. units (C) $\frac{26}{3}$ sq. units (D) $\frac{5\sqrt{52}}{9}$ sq. units

4. The algebraic sum of perpendicular distances from A (x_1, y_1), B (x_2, y_2) and C (x_3, y_3) to a variable line is zero, then all the such lines will always pass through

(A) the orthocentre of ΔABC (B) the centroid of ΔABC

(C) the circumcentre of ΔABC (D) the incentre of ΔABC

5. **Statement-1 :** Perpendicular from origin O to the line joining the points A $(c\cos\alpha, c\sin\alpha)$ and B $(c\cos\beta, c\sin\beta)$ divides it in the ratio 1 : 1

Statement-2 : Perpendicular from opposite vertex to the base of an isosceles triangle bisects it.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.

(B) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is True

6. The sides of a rhombus are parallel to $y = 2x + 3$ and $2y = x + 5$. The diagonals of the rhombus intersect at (1, 2). If one vertex of the rhombus lies on the y-axis and possible values of the ordinates of this vertex are a & b, then find the value of (a + b).

7. **Match the column**

Match reflection of line $x + y + 1 = 0$, respect to the line given in the column-I, with lines in column-II.

Column - I		**Column - II**	
(A)	$2x + y + 1 = 0$	(p)	$x + 7y - 11 = 0$
(B)	$x - 2y + 1 = 0$	(q)	$7x + y + 1 = 0$
(C)	$x + 2y - 1 = 0$	(r)	$7x + y - 11 = 0$
(D)	$2x + y - 1 = 0$	(s)	$7x + y + 7 = 0$

MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 9

Total Marks : 27

Max. Time : 28 min.

Topic : Straight Lines

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1,2,3	(3 marks, 3 min.)	[6, 6]
Multiple choice objective (no negative marking) Q.4	(5 marks, 4 min.)	[5, 4]
Subjective Questions (no negative marking) Q.5,6	(4 marks, 5 min.)	[8, 10]
Match the Following (no negative marking) Q.7	(8 marks, 8 min.)	[8, 8]

1. A is a point on either of two rays $y + \sqrt{3}\,|x| = 2$ at a distance of $\frac{4}{\sqrt{3}}$ units from their point of intersection. The co–ordinates of the foot of perpendicular from A on the bisector of the angle between them are

(A) $\left(-\frac{2}{\sqrt{3}}, 2\right)$ (B) (0, 0) (C) $\left(\frac{2}{\sqrt{3}}, 2\right)$ (D) (0, 4)

2. The base BC of a Δ ABC is bisected at the point (p, q) & the equation to the side AB & AC are $px + qy = 1$ & $qx + py = 1$. The equation of the median through A is :

(A) $(p - 2q)x + (q - 2p)y + 1 = 0$

(B) $(p + q)(x + y) - 2 = 0$

(C) $(2pq - 1)(px + qy - 1) = (p^2 + q^2 - 1)(qx + py - 1)$

(D) none of these

3. If the line $y = x$ cuts the curve $x^3 + 3y^3 - 30xy + 72x - 55 = 0$ in points A, B and C, then the value of $\frac{4\sqrt{2}}{55}$ OA.OB.OC (where O is the origin), is

(A) 55 (B) $\frac{1}{4\sqrt{2}}$ (C) 2 (D) 4

4. The equation of lines passing through point of intersection of lines $3x - y - 20 = 0$ and $x - 2y - 5 = 0$, which are at a distance of 5 units from origin, is/are :

(A) $4x + 3y = 25$ (B) $3x - 4y = 25$ (C) $4x - 3y = 25$ (D) $3x + 4y = 25$

5. A circle with centre in the first quadrant is tangent to $y = x + 10$, $y = x - 6$, and the y-axis. Let (h, k) be the centre of the circle. If the value of $(h + k) = a + b\sqrt{a}$ where $(a, b \in Q)$, find the value of $a + b$.

6. If the variable line $3x - 4y + k = 0$ lies between the circles $x^2 + y^2 - 2x - 2y + 1 = 0$ and $x^2 + y^2 - 16x - 2y + 61 = 0$ without intersecting or touching either circle, then the range of k is (a, b) where $a, b \in I$. Find the value of $(b - a)$

7. **Match the column**

Column – I		Column – II	
(A)	Minimum possible number of positive roots of $x^2 - (1 + b)x + b - 2 = 0$ is $(b \in R)$	(p)	2
(B)	In a Δ ABC, co-ordinates of orthocentre, centroid and vertex A are (3, 2), (3, 1) and (1, 2) respectively. Then x-coordinate of vertex B is	(q)	0
(C)	If $\log_x \log_3 \log_x(2x^2) = 0$, then x =	(r)	1
(D)	If there are three non concurrent and non parallel lines, then number of points which are equidistant from all the three lines are	(s)	4

MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 10

Total Marks : 32

Max. Time : 32 min.

Topics : Circle, Straight Lines, Pair of Straight Lines

Type of Questions		**M.M., Min.**
Single choice Objective (no negative marking) Q.1,2	**(3 marks, 3 min.)**	**[6, 6]**
Multiple choice objective (no negative marking) Q.3,4	**(5 marks, 4 min.)**	**[10, 8]**
Subjective Questions (no negative marking) Q.5,6	**(4 marks, 5 min.)**	**[8, 10]**
Match the Following (no negative marking) Q.7	**(8 marks, 8 min.)**	**[8, 8]**

1. A variable line cuts the lines $x^2 - (a + b)x + ab = 0$ in such a way that intercept between the lines subtends a right angle at origin. The locus of the foot of the perpendicular from origin on the variable line is:

(A) $x^2 + y^2 - (a + b)x + ab = 0$ (B) $x^2 + y^2 + (a + b)x - ab = 0$

(C) $x^2 + y^2 + (a + b)x + ab = 0$ (D) $x^2 + y^2 - (a + b)x - ab = 0$

2. If the equation $2x^2 + 3xy + by^2 - 11x + 13y + c = 0$ represents two perpendicular straight lines, then

(A) $b = -2$ (B) $b = 2$ (C) $c = 2$ (D) $c = -2$

3. Point(s) on the line $x = 3$ from which the tangents drawn to the circle $x^2 + y^2 = 8$ are at right angles is/are

(A) $(3, -\sqrt{7})$ (B) $(3, \sqrt{23})$ (C) $(3, \sqrt{7})$ (D) $(3, -\sqrt{23})$

4. The possible radius of a circle whose centre is at origin and which touches the circle $x^2 + y^2 - 6x - 8y + 21 = 0$, is

(A) 2 (B) 3 (C) 5 (D) 7

5. The centre of a square is at the origin and one vertex is A(2, 1). Find the co-ordinates of other vertices of the square.

6. Plot the straight lines on the co-ordinate axes.

(i) $y = x$ (ii) $y = -x$ (iii) $y = x + 1$

7.

Column - I		**Column-II**	
(A)	If the distance between the lines $(x + 7y)^2 + \sqrt{2}(x + 7y) - 42 = 0$ is r, then $(5r^2 - 10)$ equals to	(p)	1
(B)	If the sum of the distance of a point from two perpendicular lines in a plane is 1, then its locus is $\|x\| + \|y\| = k$, where k is equal to	(q)	3
(C)	If $6x + 6y + m = 0$ is acute angle bisector of lines $x + 2y + 4 = 0$ & $4x + 2y - 1 = 0$, then m is equal to	(r)	2
(D)	Area of the triangle formed by the lines $y^2 - 9xy + 18x^2 = 0$ and $y = 6$ is	(s)	7

MATHEMATICS

DPP
DAILY PRACTICE PROBLEMS

DPP No. 11

Total Marks : 22

Max. Time : 23 min.

Topic : Circle

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Single choice Objective (no negative marking) Q.4,5,6	(3 marks, 3 min.)	[9, 9]
Subjective Questions (no negative marking) Q.7	(4 marks, 5 min.)	[4, 5]

COMPREHENSION (For Q.No. 1 to 3)

Let (p, q) and (r, s) be any two points on the circle $x^2 + y^2 = 1$.

1. The value of $(3p - 4p^3)^2 + (3q - 4q^3)^2$ is equal to

(A) 0 (B) 1 (C) $\frac{1}{2}$ (D) $\frac{7}{2}$

2. The range of ps + qr is -

(A) [0, 1] (B) [–1, 0] (C) [–1, 1] (D) $[-\sqrt{2}, \sqrt{2}]$

3. If (p, q) is at a distance of θ from (1, 0) along circumfrence in anticlockwise direction and (r, s) is at a distance of 2θ from (p, q) along circumfrence in anticlockwise direction, then expression $sp^3 + rq^3$ is equal to

(A) $\frac{3}{4}\sin 4\theta$ (B) $\frac{3}{4}\sin 2\theta$ (C) $\sin 2\theta$ (D) $\sin 3\theta$

4. A circle S of radius 'a' is the director circle of another circle S_1. S_1 is the director circle of circle S_2 and so on. If the sum of the radii of all these circles is 2, then the value of 'a' is –

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

5. Centre of a circle of radius $4\sqrt{5}$ lies on the line y = x and satisfies the inequality 3x + 6y > 10. If the line x + 2y = 3 is a tangent to the circle, then the equation of the circle is

(A) $\left(x+\frac{23}{3}\right)^2 + \left(y+\frac{23}{3}\right)^2 = 80$ (B) $\left(x+\frac{17}{3}\right)^2 + \left(y+\frac{17}{3}\right)^2 = 80$

(C) $\left(x-\frac{17}{3}\right)^2 + \left(y-\frac{17}{3}\right)^2 = 80$ (D) $\left(x-\frac{23}{3}\right)^2 + \left(y-\frac{23}{3}\right)^2 = 80$

6. If two chords of the circle $x^2 + y^2 - ax - by = 0$, drawn from the point P(a, b) is divided by the x-axis in the ratio 2 : 1 in the direction from the point P to the other end of the chord, then

(A) $a^2 > 3b^2$ (B) $a^2 < 3b^2$ (C) $a^2 > 4b^2$ (D) $a^2 < 4b^2$

7. Find the equation of the circle having the lines $x^2 + 2xy + 3x + 6y = 0$ as its normals and having size just sufficient to contain the circle $x(x - 4) + y(y - 3) = 0$.

MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 12

Total Marks : 25

Max. Time : 29 min.

Topics : Circle, Straight Lines

Type of Questions		M.M., Min.
Comprehension (no negative marking) Q.1 to Q.3	(3 marks, 3 min.)	[9, 9]
Subjective Questions (no negative marking) Q.4,5,6,7	(4 marks, 5 min.)	[16, 20]

COMPREHENSION (For Q.No. 1 to 3)

Let $f(x) \equiv x^2 + px + q = 0$ have real roots α, β and $g(x) \equiv x^2 + rx + s = 0$ have real roots γ, δ

1. The area of the quadrilateral formed by points $(\gamma, 0)$, $(\alpha, 0)$, $(0, \beta)$, $(0, \delta)$ taken in order is

(A) $\frac{|q-s|}{2}$ (B) $\frac{|q+s|}{2}$ (C) $\frac{|r+p|}{2}$ (D) $\frac{|p-r|}{2}$

2. The centre of the circle passing through the points of intersection of pairs of lines $f(x) = 0$ and $g(y) = 0$ is

(A) $\left(\frac{p}{2}, \frac{r}{2}\right)$ (B) $\left(\frac{q}{2}, \frac{s}{2}\right)$ (C) $\left(-\frac{q}{2}, -\frac{s}{2}\right)$ (D) $\left(-\frac{p}{2}, -\frac{r}{2}\right)$

3. Equation of the director circle of the circle $f(x) + g(y) = 0$ is

(A) $f(x) + g(y) = p^2 + r^2 - q - s$ (B) $f(x) + g(y) = q^2 + s^2$

(C) $f(x) + g(y) = \frac{p^2+r^2}{4} - q - s$ (D) $f(x) + g(y) = p + r - \frac{(q^2+s^2)}{4}$

4. Two circles touch the x-axis and the line $y = mx$ $(m>0)$. They meet at (9, 6) and at another point and the product of their radii is 68. Find 'm'.

5. Show that the common tangents to the circles $x^2 + y^2 - 6x = 0$ and $x^2 + y^2 + 2x = 0$ form an equilateral triangle.

6. The circle $x^2 + y^2 - 4x - 4y + 4 = 0$ is inscribed in a triangle which has two of its sides along the co-ordinate axes. The locus of the circumcentre of the triangle is $x + y - xy + k\sqrt{x^2+y^2} = 0$, find k.

7. Let A, B, C be real numbers such that

(1) (sin A, cos B) lies on a unit circle centred at origin.

(2) tan C and cot C are defined.

If the minimum value of $(\tan C - \sin A)^2 + (\cot C - \cos B)^2$ is $a + b\sqrt{2}$, where $a, b \in I$, find the value of $a^3 + b^3$.