

# 01. CIRCLES

## LONG ANSWER QUESTIONS (7 MARKS)

01. Find the equation of circle passing through the points  $A(1,2)$ ,  $B(3,-4)$ ,  $C(5,-6)$ . TS 16, 18
02. Find the equation of circle passing through the points  $(2,1)$ ,  $(5,5)$ ,  $(-6,7)$ . AP 18
03. Find the equation and center of the circle passing through the points  $(3,4)$ ,  $(3,2)$  and  $(1,4)$ .  
May 12, 13; AP May 16, Mar 18; TS Mar 16, May 22
04. Find the value of 'c' if the points  $(2,0)$ ,  $(0,1)$ ,  $(4,5)$  and  $(0,c)$  are concyclic.  
Mar 07, May 07, 11; AP Mar 15, May 15, Mar 17; Mar 19; TS Mar 15, 17
05. Show that the points  $(9,1)$ ,  $(7,9)$ ,  $(-2,12)$ ,  $(6,10)$  are concyclic and find the equation of the circle which they lie. May 08; TS Mar 19
06. Find the equation of the circle passing through  $(4,1)$ ,  $(6,5)$  and having the centre on the line  $4x + y - 16 = 0$ . TS 18, AP 16, 20
07. Find the equation of a circle which passes through  $(2,-3)$  and  $(-4,5)$  and having the centre on  $4x + 3y + 1 = 0$ . June 05, May 06; TS May 17, Mar 20
08. Find the equation of a circle which passes through the points  $(4,1)$ ,  $(6,5)$  and having centre of  $4x + 3y - 24 = 0$ . Mar 08, 12, 14; AP Mar 16, 20, May 22, Aug 22; TS Mar 18
09. Find the equation of the circle whose center lies on x-axis and passing through the points  $(-2,3)$  and  $(4,5)$ . May 09, Mar 10; AP Mar 15; TS Mar 15
10. Show that the circles  $x^2 + y^2 - 4x - 6y - 12 = 0$  and  $x^2 + y^2 + 6x + 18y + 26 = 0$  touch each other also find point of contact and common tangent at this point of contact.  
Apr 93, Instant 96, 99, May 02, 05, 08, Mar 13; AP Mar 17
11. Show that the circles  $x^2 + y^2 - 6x - 2y + 1 = 0$ ,  $x^2 + y^2 + 2x - 8y + 13 = 0$  touch each other. Find the point of contact and the equation of common tangent at their point of contact.  
May 06, Mar 09, 10, 11; AP Mar 16, May 16
12. Show that  $x^2 + y^2 - 6x - 9y + 13 = 0$ ,  $x^2 + y^2 - 2x - 16y = 0$  touch each other. Find the point of contact and the equation of common tangent at their point of contact. Mar 95, TS Mar 18
13. Find the equation of the pair of direct common tangents to the circles  $x^2 + y^2 + 22x - 4y - 100 = 0$  and  $x^2 + y^2 - 22x + 4y + 100 = 0$ . Mar 07; AP Mar 18; TS Mar 15, May 15; B.P.
14. Find the equations of transverse common tangents of the circles  $x^2 + y^2 - 4x - 10y + 28 = 0$ ,  $x^2 + y^2 + 4x + 6y + 4 = 0$ . May 05, Mar 06, May 08, Mar 14; AP Mar 19; TS Mar 17
15. Show that four common tangents can be drawn for the circles given by  $x^2 + y^2 - 14x + 6y + 33 = 0$ ,  $x^2 + y^2 + 30x - 2y + 1 = 0$  and find the internal and external center of similitudes. TS Mar 19
16. Find all common tangents to the circles  $x^2 + y^2 - 2x - 6y + 6 = 0$ ,  $x^2 + y^2 = 1$ .
17. Find the equation of the circle which touches the circle  $x^2 + y^2 - 2x - 4y - 20 = 0$  externally at  $(5,5)$  with radius 5. Mar 01; AP May 22; TS May 16, May 22

## SHORT ANSWER QUESTIONS (4 MARKS)

18. Show that  $x + y + 1 = 0$  touches the circle  $x^2 + y^2 - 3x + 7y + 14 = 0$  and find the point of contact.  
May 09; AP May 17
19. Find the length of the chord intercepted by the circle  $x^2 + y^2 - 8x - 2y - 8 = 0$  on the line  $x + y + 1 = 0$ .  
TS Mar 16
20. Find the length of the chord intercepted by the circle  $x^2 + y^2 - x + 3y - 22 = 0$  on the line  $y = x - 3$ .  
May 11, Mar 13; AP May 16, Mar 18; TS Mar 20, May 22
21. Find the equation of circle with centre  $(-2, 3)$  having a chord of length 2 units on the line  $3x + 4y + 4 = 0$ .  
Mar 11, AP May 18
22. Find the mid point of the chord intercepted by  $x^2 + y^2 - 2x - 10y + 1 = 0$  on the line  $x - 2y + 7 = 0$ .  
May 14
23. If the chord of contact of a point 'P' with respect to the circle  $x^2 + y^2 = a^2$  cut the circle at A and B such that  $\angle AOB = 90^\circ$ , then show that 'P' lies on the circle  $x^2 + y^2 = 2a^2$ .
24. Show that the tangent at  $(-1, 2)$  of the circle  $x^2 + y^2 - 4x - 8y + 7 = 0$  touches the circle  $x^2 + y^2 + 4x + 6y = 0$  and find the point of contact.  
May 10; Board Paper
25. Find the equation of the tangent to  $x^2 + y^2 - 2x + 4y = 0$  at  $(3, -1)$ . Also find the equation of tangent parallel to it.
26. Find the area of the triangle formed with coordinate axes and the tangent drawn a point  $(x_1, y_1)$  on the circle  $x^2 + y^2 = a^2$ .  
Apr 93, 98, 00; AP Mar 20, May 22
27. Find the equation of the tangents to the circle  $x^2 + y^2 - 4x + 6y - 12 = 0$  and parallel to the line  $x + y - 8 = 0$ .  
AP 22
28. Find the equation of tangent and normal at  $(3, 2)$  on the circle  $x^2 + y^2 - x - 3y - 4 = 0$ .  
AP Mar 19
29. Find the area of the triangle formed by the normal at  $(3, -4)$  to the circle  $x^2 + y^2 - 22x - 4y + 25 = 0$  with the coordinate axis.  
TS Mar 18
30. If a point P is moving such that the lengths of the tangents drawn from P to the circles  $x^2 + y^2 - 4x - 6y - 12 = 0$  and  $x^2 + y^2 + 6x + 18y + 26 = 0$  are in the ratio 2 : 3, then find the equation of locus of P.  
Mar 09, May 13; AP Mar 19; TS Mar 17
31. Find the pole of the line  $x + y + 2 = 0$  w.r.t the circle  $x^2 + y^2 - 4x + 6y - 12 = 0$ .  
May 15; AP Mar 17
32. Find the pole of  $3x + 4y - 45 = 0$  with respect to the circle  $x^2 + y^2 - 6x - 8y + 5 = 0$ .  
May 98; AP Mar 16, Aug 22; TS May 22
33. Find the equation of the polar of  $(2, 3)$  with respect to the circle  $x^2 + y^2 + 6x + 8y - 96 = 0$ .  
May 96
34. If the polar of points on the circle  $x^2 + y^2 = a^2$  with respect to  $x^2 + y^2 = b^2$  touches the circle  $x^2 + y^2 = c^2$ , then show that a, b, c are in G.P.
35. Find the pair of tangents drawn from  $(1, 3)$  to the circle  $x^2 + y^2 - 2x + 4y - 11 = 0$  and also find the angle between them.

36. Find the condition that the tangents drawn from  $(0,0)$  to  $S \equiv x^2 + y^2 + 2gx + 2fy + c = 0$  be perpendicular to each other .
37. Find the value of 'k', if  $kx + 3y - 1 = 0$ ,  $2x + y + 5 = 0$  are conjugate lines with respect to circle  $x^2 + y^2 - 2x - 4y - 4 = 0$ . TS May 2015
38. If two circles  $x^2 + y^2 + 2gx + 2fy = 0$  and  $x^2 + y^2 + 2g'x + 2f'y = 0$  touch each other, then show that  $f'g = g'f$ . AP Mar 20, May 22; TS Mar 16
39. Find the angle between the tangents drawn from  $(3,2)$  to the circle  $x^2 + y^2 - 6x + 4y - 2 = 0$ . Mar 02, 12; TS May 22

### VERY SHORT ANSWER QUESTIONS (2 MARKS)

40. Find the equation of the circle passing through  $(-2,3)$  having the centre at  $(0,0)$ . TS May 15
41. Find the equation of the circle whose centre is  $(-1,2)$  and which passes through  $(5,6)$ . TS Mar 18
42. Find the centre and the radius of the circle  $\sqrt{1+m^2}(x^2 + y^2) - 2cx - 2mcy = 0$ . May 10
43. Find the value of 'a', if  $2x^2 + ay^2 - 3x + 2y - 1 = 0$  represents a circle and also find its radius. Mar 13; AP Mar 15
44. If  $x^2 + y^2 - 4x + 6y + c = 0$  represents a circle with a radius 6, then find value of 'c'. Mar 09; AP Mar 16; TS May 18, May 22
45. If the circle  $x^2 + y^2 - 4x + 6y + a = 0$  has radius 4, then find 'a'.
46. Find the value of a, b, if  $ax^2 + bxy + 3y^2 - 5x + 2y - 3 = 0$  represents a circle. Also find the centre and radius of circle. Board Paper
47. If  $x^2 + y^2 + 2gx + 2fy = 0$  represents a circle with centre  $(-4,-3)$ , then find 'g', 'f' and the radius of the circle.
48. Find the values of 'g', 'f' if  $x^2 + y^2 + 2gx + 2fy - 12 = 0$  represents the circle with center  $(2,3)$  and also find radius. May 11, AP Mar 19
49. Find the other end of the diameter of the circle  $x^2 + y^2 - 8x - 8y + 27 = 0$  if one end of it is  $(2,3)$ . May 12, Mar 13; AP Mar 20, May 22
50. Find the equation of the circle which is concentric with  $x^2 + y^2 - 6x - 4y - 12 = 0$  and passing through  $(-2,14)$ . Mar 14, May 14, TS May 17
51. Find the equation of the circle passing through the point  $(2,3)$  and concentric with  $x^2 + y^2 + 8x + 12y + 15 = 0$
52. Find the equation of the circle with  $(4,2)$ ,  $(1,5)$  as ends of a diameter.
53. Obtain the parametric equation of the circle  $4(x^2 + y^2) = 9$ . TS Mar 17
54. Write the parametric equations of the circle  $2x^2 + 2y^2 = 7$ . TS Mar 19
55. Obtain the parametric equation of the circle  $(x-3)^2 + (y-4)^2 = 8^2$ .

Mar 11; AP Mar 16, 18

56. Obtain the parametric equations of the circle  $x^2 + y^2 - 6x + 4y - 12 = 0$ .

Mar 06, 10, AP Mar 15

57. Find the Parametric equations of the circle  $x^2 + y^2 + 6x + 8y - 96 = 0$

58. Find the lengths of the intercepts made by the circle  $x^2 + y^2 + 8x - 12y - 9 = 0$  on co-ordinate axes.

May 94, 01

59. Find the length of the chord formed by  $x^2 + y^2 = a^2$  on the line  $x \cos \alpha + y \sin \alpha = p$ .

TS Mar 16

60. Find the length of the tangent from (1,3) to the circle  $x^2 + y^2 - 2x + 4y - 11 = 0$ .

61. If the length of the tangent from (2,5) to the circle  $x^2 + y^2 - 5x + 4y + k = 0$  is  $\sqrt{37}$ , then find the value of 'k'.

May 06; AP May 17; TS Mar 18, May 22

62. Show that the line  $3x - 4y - 25 = 0$  touches the circle  $x^2 + y^2 = 25$ .

63. Find the point of contact of the tangent  $x - 2y - 5 = 0$  and the circle  $x^2 + y^2 = 5$ .

64. Find the power of the point P(-1,1) with respect to the circle  $x^2 + y^2 - 6x + 4y - 12 = 0$ . TS 16

65. Find the pole of  $ax + by + c = 0$  with respect to  $x^2 + y^2 = r^2$ .

Mar 93; AP May 16

66. Find the equation of the polar of (1,-2) with respect to  $x^2 + y^2 - 10x - 10y + 25 = 0$ . TS 15

67. Find the value of 'k' if the points (1,3) and (2,k) are conjugate with respect to the circle  $x^2 + y^2 = 35$ .

AP Mar 17, 19; TS Mar 17, 19, May 22

68. Find the value of 'k' if the points (4,2) and (k,-3) are conjugate with respect to the circle  $x^2 + y^2 - 5x + 8y + 6 = 0$ .

May 14; AP Mar 19; TS Mar 17

## 02. SYSTEM OF CIRCLES

### SHORT ANSWER QUESTIONS (4 MARKS)

01. Find the equation of the circle passing through the points of intersection of the circles  $x^2 + y^2 - 8x - 6y + 21 = 0$ ,  $x^2 + y^2 - 2x - 15 = 0$  and (1,2). AP Mar 19, Aug 22; TS Mar 17

02. Find the equation of circle passing through (0,0) and cuts the circles  $x^2 + y^2 - 4x + 6y + 10 = 0$ ,  $x^2 + y^2 + 12y + 6 = 0$  orthogonally.

June 05, AP Mar 19

03. Find the equation of the circle which passes through (1,1) and cuts orthogonally each of the circles  $x^2 + y^2 - 8x - 2y + 16 = 0$  and  $x^2 + y^2 - 4x - 4y - 1 = 0$ .

04. Find the equations of the circle which passes through the point (0,-3) and intersects the circles given by the equations  $x^2 + y^2 - 6x + 3y + 5 = 0$  and  $x^2 + y^2 - x - 7y = 0$  orthogonally.

May 13, TS May 15

05. Find the equation of the circle which cuts orthogonally the circle  $x^2 + y^2 - 4x + 2y - 7 = 0$  and having the centre at (2,3).

TS Mar 19

06. Find the equation of the circle which passes through the points (2,0), (0,2) and orthogonal to the circle  $2x^2 + 2y^2 + 5x - 6y + 4 = 0$ .

07. Find the equation of the circle which cuts the circles  $x^2 + y^2 - 4x - 6y + 11 = 0$  and  $x^2 + y^2 - 10x - 4y + 21 = 0$  orthogonally and has the diameter along the straight line  $2x + 3y = 7$ .  
May 07; AP Mar 16
08. Find the radical centre of the circles  $x^2 + y^2 + 4x - 7 = 0$ ,  $2x^2 + 2y^2 + 3x + 5y - 9 = 0$  and  $x^2 + y^2 + y = 0$ .  
Mar 14; TS Mar 16
09. Find the radical centre of the three circles  $x^2 + y^2 - 4x - 6y + 5 = 0$ ,  $x^2 + y^2 - 2x - 4y - 1 = 0$ ,  $x^2 + y^2 - 6x - 2y = 0$ .  
AP Mar 18
10. Find the equation and length of the common chord of two circles  $S = x^2 + y^2 + 3x + 5y + 4 = 0$  and  $S' = x^2 + y^2 + 5x + 3y + 4 = 0$ .  
AP May 15, AP & TS Mar 17
11. Find the equation and length of the common chord of the circles  $x^2 + y^2 + 2x + 2y + 1 = 0$ ,  $x^2 + y^2 + 4x + 3y + 2 = 0$ .  
Mar 80, May 14
12. If the straight line  $2x + 3y = 1$  intersects the circle  $x^2 + y^2 = 4$  at the points A and B, then find the equation of the circle having  $\overline{AB}$  as a diameter.  
AP Mar 15, 16, 17
13. If  $x + y = 3$  is the equation of the chord AB of the circle  $x^2 + y^2 - 2x + 4y - 8 = 0$ , find the equation of the circle having  $\overline{AB}$  as diameter.

### VERY SHORT ANSWER QUESTIONS (2 MARKS)

14. Show that the circles given by the equations  $x^2 + y^2 - 2x - 2y - 7 = 0$ ,  $3x^2 + 3y^2 - 8x + 29y = 0$ , intersect each other orthogonally.  
AP May 22
15. Show that the circles given by the equations  $x^2 + y^2 - 2lx + g = 0$ ,  $x^2 + y^2 + 2my - g = 0$  intersect each other orthogonally.  
AP Mar 16
16. Find 'k' if the pair of circles  $x^2 + y^2 - 5x - 14y - 34 = 0$ ,  $x^2 + y^2 + 2x + 4y + k = 0$  are orthogonal.  
AP 17
17. Find 'k' if the pair of circles  $x^2 + y^2 + 4x + 8 = 0$ ,  $x^2 + y^2 - 16y + k = 0$  are orthogonal.  
AP 19, TS 19
18. Find the equation of the radical axis of the circles  $2x^2 + 2y^2 + 3x + 6y - 5 = 0$ ,  $3x^2 + 3y^2 - 7x + 8y - 11 = 0$ .  
AP 15
19. Find the equation of the radical axis of  $x^2 + y^2 + 4x + 6y - 7 = 0$ ,  $4(x^2 + y^2) + 8x + 12y - 9 = 0$ .  
AP 15
20. Find the equation of the common chord of  $(x - a)^2 + (y - b)^2 = c^2$ ,  $(x - b)^2 + (y - a)^2 = c^2$ .  
Mar 14; TS Mar 16, 20
21. Show that the angle between the circles  $x^2 + y^2 = a^2$  and  $x^2 + y^2 = ax + ay$  is  $\frac{3\pi}{4}$ .  
AP Mar 19; TS Mar 15, 17, 18
22. If the angle between the circles  $x^2 + y^2 - 12x - 6y + 41 = 0$  and  $x^2 + y^2 + kx + 6y - 59 = 0$  is  $45^\circ$ , then find 'k'.  
TS 15, 17; AP 19
23. Find the angle between the circles  $x^2 + y^2 - 12x - 6y + 41 = 0$ ,  $x^2 + y^2 + 4x + 6y - 59 = 0$ .

# 03. PARABOLA

## LONG ANSWER QUESTIONS (7 MARKS)

01. Derive the standard form of parabola. AP Mar 15, 17, 19; TS Mar 16, 18, 20, May 22
02. Find the focus, vertex, equation of the directrix, axes and the length of the latusrectum to the parabola  $y^2 - x + 4y + 5 = 0$ . May 92, 01, Mar 05
03. Find the equation of the parabola passing through the points  $A(-1,2)$ ,  $B(1,-1)$  and  $C(2,1)$  and having its axis parallel to the x-axis.
04. Find the equation of the parabola, whose axis is parallel to the x-axis and which passes through the points  $A(-2,1)$ ,  $B(1,2)$  and  $C(-1,3)$ . Mar 02; AP Mar 16; TS Mar 17
05. Find the equation of the parabola whose axis is parallel to y-axis and which passes through the points  $(4,5)$ ,  $(-2,11)$  and  $(-4,21)$ . May 02, 12
06. Prove that the area of the triangle inscribed in the parabola  $y^2 = 4ax$  is  $\frac{1}{8a} |(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)|$  sq. units., where  $y_1, y_2, y_3$  are the ordinates of its vertices. B.P.
07. Show that the equation of the common tangents to the circle  $x^2 + y^2 = 2a^2$  and the parabola  $y^2 = 8ax$  are  $y = \pm(x + 2a)$ . May 98, 99, 02, Mar 06, 09, 10; TS May 16
08. Show that the common tangent to the parabola  $y^2 = 4ax$  and  $x^2 = 4by$  is  $a^{1/3}x + b^{1/3}y + a^{2/3}b^{2/3} = 0$ .
09. Prove that the area of the triangle formed by the tangents at  $(x_1, y_1)$ ,  $(x_2, y_2)$  and  $(x_3, y_3)$  to the parabola  $y^2 = 4ax$  ( $a > 0$ ) is  $\frac{1}{16a} |(y_1 - y_2)(y_2 - y_3)(y_3 - y_1)|$  square units. AP Mar 18; TS Mar 15
10. From an external point 'P' tangents are drawn to the parabola  $y^2 = 4ax$  and these tangents make angles  $\theta_1, \theta_2$  with its axis, such that  $\cot \theta_1 + \cot \theta_2$  is constant 'd'. Then show that all such P lie on a horizontal line. TS Mar 19

## VERY SHORT ANSWER QUESTIONS (2 MARKS)

11. Find the vertex, focus, equation of the directrix and axis of the parabola  $y^2 = 16x$ .
12. Find the vertex, focus, equation of the directrix and axis of the parabola  $x^2 = -4y$ .
13. Find the vertex and focus for  $x^2 - 6x - 6y + 6 = 0$ .
14. Find the coordinates of the points on the parabola  $y^2 = 2x$  whose focal distance is  $5/2$ . Mar 07, 09, May 09; AP Mar 15
15. Find the points on the parabola  $y^2 = 8x$  whose focal distance is 10 units. Mar 08, 11, 14; AP Mar 16, 17, 19; TS Mar 17
16. If  $\left(\frac{1}{2}, 2\right)$  is one extremity of a focal chord of the parabola  $y^2 = 8x$ . Find the coordinates of the other extremity. May 06, 10, May 14; AP Mar 18; TS May 16

17. Prove that the point on the parabola  $y^2 = 4ax$ , ( $a > 0$ ) nearest to the focus is its vertex.
18. Find the equation of parabola whose focus  $S(1, -7)$  vertex  $A(1, -2)$ .  
May 12; AP & TS Mar 15; B.P.
19. Find the equation of parabola whose vertex is  $(3, -2)$  and focus is  $(3, 1)$ .  
May 07; AP Mar 17, 20, May 22; TS Mar 18, May 22
20. Show that the line  $2x - y + 2 = 0$  is a tangent to the parabola  $y^2 = 16x$ . Find the point of contact also.
21. Find the value of 'k', if the line  $2y = 5x + k$  is a tangent to the parabola  $y^2 = 6x$ .  
AP Mar 18; TS Mar 16, 18
22. Find the equation of the tangent to the parabola  $x^2 - 4x - 8y + 12 = 0$  at  $\left(4, \frac{3}{2}\right)$ . AP Mar 19
23. Find the equation of the tangent to the parabola  $y^2 = 16x$  inclined at an angle  $60^\circ$  with its axis and also find the point of contact.  
May, 99, Mar 04; AP Mar 16
24. Find the equations of tangents to the parabola  $y^2 = 16x$  which are parallel and perpendicular respectively to the line  $2x - y + 5 = 0$ , also find the coordinates of their points of contact.
25. Find the equation of normal to the parabola  $y^2 = 4x$  which is parallel to  $y - 2x + 5 = 0$ .  
TS Mar 19
26. Find the equations of the tangent and normal to the parabola  $y^2 = 6x$  at the positive end of the latusrectum.

## 04. ELLIPSE

### SHORT ANSWER QUESTIONS (4 MARKS)

01. Find the eccentricity, coordinates of foci, length of the latusrectum and equation of directrices of the ellipse  $9x^2 + 16y^2 - 36x + 32y - 92 = 0$ .  
AP & TS Mar 15, TS Mar 18
02. Find the eccentricity, coordinates of centre, foci, length of major axis, minor axis, latusrectum, coordinates of centre and equations of directrices of the ellipse  $4x^2 + y^2 - 8x + 2y + 1 = 0$ .  
Mar 10, 11
03. Find the eccentricity, coordinates of foci of the ellipse  $3x^2 + y^2 - 6x - 2y - 5 = 0$ . AP15
04. Find the length of major axis, minor axis, latusrectum, eccentricity, coordinates of centres, foci and the equations of directrices of the ellipse  $9x^2 + 16y^2 = 144$ .  
Mar 10, 11, 14, TS Mar 16, 20, AP & TS Mar 17
05. Find the equation of ellipse in the standard form, if passes through the points  $(-2, 2)$  and  $(3, -1)$ .  
TS 17, 22
06. Find the equation of the ellipse in the standard form whose distance between foci is 2 and length of latus rectum is  $15/2$ .  
AP Mar 18; TS Mar 15, May 22
07. Find the equation of the ellipse referred to its major and minor axes as coordinate axes  $x, y$  respectively, with latus rectum of length 4 and distance between foci  $4\sqrt{2}$ .  
TS Mar 18, AP Mar 19
08. Find the equation of the ellipse in the standard form such that distance between foci is 8 and distance between directrices is 32.  
AP Mar 17



09. Find the equation of the ellipse whose focus in  $(1, -1)$ ,  $e = 2/3$  and directrix is  $x + y + 2 = 0$ .  
Mar 05, May 08, AP Mar 16, TS Mar 19
10. Find the equation of the ellipse whose focus is  $(1, 2)$ , eccentricity is  $2/3$  & directrix is  $2x + 3y + 6 = 0$ .
11. 'S' and 'T' are the foci of an ellipse and 'B' is one end of the minor axis. If STB is an equilateral triangle, then find the eccentricity of the ellipse.  
AP Mar 20, May 22
12. If 'P' is a point on the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  whose foci S and S', then show that  $SP + S'P = 2a$  (constant).  
Mar 13, AP Aug 22
13. If the line  $y = mx + c$  touches the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ , then prove that  $c^2 = a^2m^2 + b^2$  ( $a > b$ ).  
June 02, 06
14. Find the condition for the line  $\ell x + my + n = 0$  to be a tangent to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .  
AP Mar 15
15. Find the condition for the line  $x \cos \alpha + y \sin \alpha = p$  to be a tangent to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .  
Mar 14, AP Mar 20, May 22
16. Find the value of 'k' if  $4x + y + k = 0$  is a tangent to the ellipse  $x^2 + 3y^2 = 3$ .  
AP Mar 15, Mar 16
17. Find the equation of tangent to the ellipse  $2x^2 + y^2 = 8$  which is parallel and perpendicular to  $x - 2y - 4 = 0$ .  
June 05, Mar 06, 08, May 08, AP Mar 17, 19
18. Find the equations of the tangents to the ellipse  $2x^2 + y^2 = 8$  which are  
(i) parallel to  $x - 2y - 4 = 0$  (ii) perpendicular to  $x + y + 2 = 0$   
(iii) make an angle  $45^\circ$  with x-axis.  
AP Mar 17, 19; TS Mar 17
19. Find the equations of the tangents to  $9x^2 + 16y^2 = 144$ , which make equal intercepts on the coordinate axes.  
AP Mar 15; TS Mar 15
20. If a tangent to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  ( $a > b$ ) meets its major axis and minor axis at 'M' and 'N' respectively, then prove that  $\frac{a^2}{(CM)^2} + \frac{b^2}{(CN)^2} = 1$  where 'C' is the centre of the ellipse.  
AP Mar 18; TS Mar 18
21. Find the condition for the line  $\ell x + my + n = 0$  to be a normal to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ .  
AP Mar 15
22. If the normal at one end of latus rectum of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  passes through one end of minor axis, then show that  $e^4 + e^2 = 1$ . [where 'e' is the eccentricity of the ellipse] TS Mar 17
23. Find the equation of tangent and normal to the ellipse  $x^2 + 8y^2 - 33 = 0$  at  $(-1, 2)$ .  
AP Mar 16, 20
24. Find the equations of tangent and normal to the ellipse  $9x^2 + 16y^2 = 144$  at the end of latusrectum in the first quadrant.  
Mar 09



25. Show that the points of intersection of the perpendicular tangents to the ellipse lies on the circle (Director circle). Mar 03, May 11, AP Mar 16
26. Show that the locus of the feet of the perpendiculars drawn from either of the foci is any tangent to the ellipse is the auxiliary circle. AP 17, 19

## 05. HYPERBOLA

### SHORT ANSWER QUESTIONS (4 MARKS)

01. Find the eccentricity, foci equations of the directrices, length of the latusrectum of the hyperbola  $9x^2 - 16y^2 + 72x - 32y - 16 = 0$ . Mar 02, 05, 08, May 08
02. Find the centre, eccentricity, foci, length of latus rectum and equations of the directrices of the hyperbola  $4(y + 3)^2 - 9(x - 2)^2 = 1$ . AP 19
03. Find the centre, eccentricity, foci, length of latusrectum and equations of the directrices of the  $16y^2 - 9x^2 = 144$ . AP Mar 17, 18, May 22
04. Find the eccentricity, foci, length of latusrectum and equations of the directrices of the hyperbola  $x^2 - 4y^2 = 4$ . May 11; AP Mar 16, 18, 20, May 22; TS Mar 19
05. If the line  $\ell x + my + n = 0$  is a tangent to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ , then show that  $a^2\ell^2 - b^2m^2 = n^2$ . May 07
06. Find the equation of the tangents to the hyperbola  $x^2 - 4y^2 = 4$  which are i) parallel, ii) perpendicular to the line  $x + 2y = 0$ . May 06, 13, 14; Mar 11, 14; AP Mar 19; TS Mar 15
07. Find the equations of the Tangents to the Hyperbola  $3x^2 - 4y^2 = 12$  which are (i) parallel and (ii) perpendicular to the line  $y = x - 7$ . May 07, 09; AP Mar, May 15; AP May 16; May 17, Aug 22; TS Mar 15, 18, 20; Board Paper
08. Tangents to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  make angles  $\theta_1$  and  $\theta_2$  with transverse axis of a hyperbola. Show that the point of intersection of these tangents lies on the curve  $2xy = k(x^2 - a^2)$ , when  $\tan \theta_1 + \tan \theta_2 = k$ . AP Mar 18; TS Mar 16
09. Prove that the point of intersection of two perpendicular tangents to the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  lies on the circle  $x^2 + y^2 = a^2 - b^2$ . TS Mar 16, 17
10. Show that angle between the asymptotes of the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  is  $2 \tan^{-1} \left( \frac{b}{a} \right)$  (or)  $2 \sec^{-1}(e)$ . May 12; TS Mar 18; Board Paper

### VERY SHORT ANSWER QUESTIONS (2 MARKS)

11. Find the eccentricity and length of latusrectum of the hyperbola  $x^2 - 4y^2 = 4$ . Mar 08; AP Mar 16, 18, 20; TS Mar 19
12. Find the length of the latus rectum of the hyperbola  $x^2 - 3y^2 = 144$ . May 03; Mar 07
13. Find the equation of the hyperbola whose foci are  $(\pm 5, 0)$  and the transverse axis of length 8. May 11; AP Mar 18; TS Mar 16, May 22

14. Find the equation to the hyperbola whose foci are  $(4,2)$  and  $(8,2)$  and eccentricity is 2. Mar 09
15. Find the equations of the tangents to the hyperbola  $3x^2 - 4y^2 = 12$  which are parallel to the line  $y = x - 7$ . May 07, 09; AP Mar 15, 17; TS Mar 15, 18, 20
16. If  $3x - 4y + k = 0$  is a tangent to  $x^2 - 4y^2 = 5$ , find the value of 'k'. AP May 22
17. Find the equation of the normal at  $\theta = \frac{\pi}{3}$  to the hyperbola  $3x^2 - 4y^2 = 12$ .
18. If  $e, e_1$  be the eccentricities of a hyperbola and its conjugate hyperbola, then  $\frac{1}{e^2} + \frac{1}{e_1^2} = 1$ . Mar 11; TS Mar 17, 18
19. If the eccentricity of a hyperbola is  $5/4$ , then find the eccentricity of its conjugate hyperbola. June 05; AP Mar 15, 17, 19; TS Mar 13, 15, 19, May 22
20. Define rectangular hyperbola and find its eccentricity. Mar 14; AP Mar 15
21. If the angle between the asymptotes is  $30^\circ$ , then find its eccentricity. AP Mar 17; TS Mar 20
22. Find the product of lengths of the perpendiculars from any point on the hyperbola  $\frac{x^2}{16} - \frac{y^2}{9} = 1$  to its asymptotes. TS 16, 19

## 06. INDEFINITE INTEGRATION

### LONG ANSWER QUESTIONS (7 MARKS)

01. Evaluate  $\int \frac{x+1}{x^2+3x+12} dx$ . Mar 10; AP May 16; AP Mar 17
02. Evaluate  $\int \frac{x+3}{(x-1)(x^2+1)} dx$ . May 07
03. Evaluate  $\int \frac{dx}{3x^2+x+1}$ .
04. Find  $\int \frac{dx}{5-2x^2+4x}$ .
05. Evaluate  $\int \frac{dx}{4\cos x + 3\sin x}$ . Mar 06; TS Mar 18
06. Evaluate  $\int \frac{1}{1+\sin x + \cos x} dx$ . May 96, 98, Mar 01; AP May 22; TS Mar 15
07. Evaluate  $\int \frac{dx}{3\cos x + 4\sin x + 6}$ . Apr 01, Mar 03, 13; AP May 15
08. Evaluate  $\int \frac{9\cos x - \sin x}{4\sin x + 5\cos x} dx$ . Mar 95, 08; TS Mar 17; Board Paper
09. Evaluate  $\int \frac{2\cos x + 3\sin x}{4\cos x + 5\sin x} dx$ . Mar 96, 01, May 08; AP Mar 15, 18, Aug 22; TS May 16

10. Evaluate  $\int \frac{2 \sin x + 3 \cos x + 4}{3 \sin x + 4 \cos x + 5} dx$ . Mar 11, 14; AP & TS Mar 16
11. Evaluate  $\int \frac{\cos x + 3 \sin x + 7}{\cos x + \sin x + 1} dx$ . May 06; AP Mar 19
12. Evaluate  $\int \frac{2x+5}{\sqrt{x^2-2x+10}} dx$ . Mar 06; AP Mar 2017; TS Mar 2015
13. Evaluate  $\int \sqrt{\frac{5-x}{x-2}} dx$  on  $(2, 5)$ . Mar 02, 04, AP Mar 19; TS Mar 17
14. Evaluate  $\int \frac{x+1}{\sqrt{x^2-x+1}} dx$ .
15. Evaluate  $\int (6x+5)\sqrt{6-2x^2+x} dx$ . May 06, Mar 09; AP Mar 18
16. Evaluate  $\int (3x-2)\sqrt{2x^2-x+1} dx$ . May 03; TS May 15
17. Evaluate  $\int \frac{1}{(1+x)\sqrt{3+2x-x^2}} dx$ . Mar 01, 05, May 14; TS Mar 20; Board Paper
18. Evaluate  $\int \frac{dx}{(x+1)\sqrt{2x^2+3x+1}}$ . TS Mar 18
19. Evaluate  $\int x \sin^{-1} x dx$  on  $(-1, 1)$ .
20. Find the reduction formula for  $\int \sin^n x dx$  ( $n \geq 2$ ) and hence find  $\int \sin^4 x dx$ ,  $\int \sin^5 x dx$ .  
May 09, 10, Mar 13, 14; AP Mar 15, 17, 19, Aug 22; TS Mar 18, 20
21. Find the reduction formula of  $\int \tan^n x dx$  for an integer  $n \geq 2$ . And deduce the value of,  
 $\int \tan^6 x dx$ . AP Mar 15, 16, 18; TS Mar 17
22. Obtain reduction formula for  $I_n = \int \cot^n x dx$ , 'n' being a positive integer  $n \geq 2$  and hence deduce the value of  $\int \cot^4 x dx$ . May 11; AP Mar 16; TS Mar 19
23. Obtain reduction formula for  $I_n = \int \sec^n x dx$ , 'n' being a positive integer  $n \geq 2$  and hence deduce that the value  $\int \sec^5 x dx$ . Mar 04; AP Mar 17; TS May 15
24. If  $I_n = \int \cos^n x dx$ , then show that  $I_n = \frac{1}{n} \cos^{n-1} x \cdot \sin x + \frac{n-1}{n} I_{n-2}$  and hence deduce  $\int \cos^4 x dx$ . TS Mar 16, 17, AP Mar 18, May 22
25. Obtain the reduction formula for  $I_n = \int \operatorname{cosec}^n x dx$ , 'n' being a positive integer,  $n \geq 2$  and deduce that the value of  $\int \operatorname{cosec}^5 x dx$ . May 14; TS Mar 16; AP Mar 19

### VERY SHORT ANSWER QUESTIONS (2 MARKS)

26. Evaluate  $\int \left(x + \frac{1}{x}\right)^3 dx$ . Mar 12

27. Evaluate  $\int \frac{(a^x - b^x)^2}{a^x b^x} dx$ . TS May 22
28. Evaluate  $\int \frac{x^8}{1+x^{18}} dx$ . Mar 09; AP Mar 16, Aug 22
29. Evaluate  $\int \sec^2 x \operatorname{cosec}^2 x dx$ . Mar 07, May 07, 09; AP Mar 17; TS Mar 16, May 18
30. Evaluate  $\int \sqrt{1 - \cos 2x} dx$ . May 06, Mar 09
31. Evaluate  $\int \frac{1 + \cos^2 x}{1 - \cos 2x} dx$ . Mar 13; TS Mar 19
32. Evaluate  $\int \frac{1}{1 + \cos x} dx$  on  $I \subset \mathbb{R} - \{(2n+1)\pi : n \in \mathbb{Z}\}$ . May 99; TS Mar 15
33. Evaluate  $\int \frac{1}{\cosh x + \sinh x} dx$ . AP Mar 16, 19; TS Mar 17
34. Evaluate  $\int \left( \frac{1}{\sqrt{1-x^2}} + \frac{2}{\sqrt{1+x^2}} \right) dx$  on  $(-1, 1)$ . May 11
35. Evaluate  $\int \left( \frac{1}{1-x^2} + \frac{1}{1+x^2} \right) dx$ . TS Mar 16, May 22
36. Evaluate  $\int \cos^3 x \sin x dx$ . TS Mar 18
37. Evaluate  $\int \frac{\sin(\tan^{-1} x)}{1+x^2} dx, x \in \mathbb{R}$ . May 13; AP Mar 15, 18
38. Evaluate  $\int \frac{\sin^4 x}{\cos^6 x} dx$ . Model paper
39. Evaluate  $\int \frac{1}{\sqrt{\sin^{-1} x} \sqrt{1-x^2}} dx$ . AP May 15
40. Evaluate  $\int \cos \sqrt{x} dx$ .
41.  $\int \frac{1}{4+5 \sin x} dx =$
42. Evaluate  $\int \frac{dx}{5+4 \cos 2x}$ . Mar 05, 10, 11; May 13
43. Evaluate  $\int \frac{1}{(x+1)(x+2)} dx$ . May 11, Mar 12, 14; AP Mar 15
44. Evaluate  $\int \frac{dx}{x^2 + x + 1}$ .
45. Evaluate  $\int \frac{dx}{1+e^x}$
46. Evaluate  $\int \frac{x e^x}{(x+1)^2} dx$ . May 94, 98; Mar 05; May 14

47. Evaluate  $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$  on  $I \subset \mathbb{R} \mid \{x \in \mathbb{R} : \cos(xe^x) = 0\}$ .

Mar 04, 10; May 10; AP Mar 19; TS May 16; TS Mar 17

48. Evaluate  $\int \frac{e^x(1+x)}{(2+x)^2} dx$ .

May 09

49. Evaluate  $\int e^x \sin(e^x) dx$ .

AP Mar 17

50. Evaluate  $\int \frac{1}{x \log x} dx$ .

May 94, 99

51. Evaluate  $\int \frac{\log(1+x)}{1+x} dx$  on  $(-1, \infty)$ .

TS Mar 15

52. Evaluate  $\int \frac{1}{x \log x [\log(\log x)]} dx$ .

Mar 11; TS Mar 19

53. Find  $\int \frac{(\log x)^2}{x} dx$ .

54. Evaluate  $\int \frac{\cot(\log x)}{x} dx$ .

Mar 05

55. Evaluate  $\int \frac{\sin(\log x)}{x} dx$ .

56. Evaluate  $\int e^x \left( \frac{1+x \log x}{x} \right) dx$ .

May 08, Mar 13; AP Mar 15, 18

57. Evaluate  $\int e^x (\tan x + \log \sec x) dx$ .

May 07, Mar 08; TS Mar 15, 18

58. Evaluate  $\int e^x (1 + \tan^2 x + \tan x) dx$ .

Mar 06

59. Evaluate  $\int e^x (\sin x + \cos x) dx$ .

AP Mar 17

60. Evaluate  $\int e^x (\sec x + \sec x \cdot \tan x) dx$ .

May 92; Mar 98, 00; AP Mar 16

61. Evaluate  $\int \frac{\log x}{x^2} dx$ .

62. Evaluate  $\int e^x \sin x dx$ .

AP Mar 15

## 07. DEFINITE INTEGRATION

### LONG ANSWER QUESTIONS (7 MARKS)

01. Show that  $\int_0^1 \frac{\log(1+x)}{1+x^2} dx = \frac{\pi}{8} \log 2$ .

Model paper; TS Mar 17, 19, 20

02. Prove that  $\int_a^b \sqrt{(x-a)(b-x)} dx = \frac{\pi}{8} (b-a)^2$ .

TS Mar 18

03. Evaluate  $\int_0^{\pi/4} \log(1 + \tan \theta) d\theta$ .

TS May 22

04. Show that  $\int_0^{\pi/4} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx = \frac{1}{20} \log 3$ .

05. Show that  $\int_0^{\pi/2} \frac{\sin^2 x}{\sin x + \cos x} dx = \frac{1}{\sqrt{2}} \log(\sqrt{2} + 1)$ .

06. Evaluate  $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$ .

Mar 14; AP Mar 16, 18

07. Evaluate  $\int_0^{\pi} \frac{x \sin^3 x}{1 + \cos^2 x} dx$ .

TS Mar 15

08. Evaluate  $\int_0^{\pi} \frac{x}{1 + \sin x} dx$ .

May 11

09. Show that  $\int_0^{\pi/2} \frac{x}{\sin x + \cos x} dx = \frac{\pi}{2\sqrt{2}} \log(\sqrt{2} + 1)$ .

AP Mar 18, 20, May 22, Aug 22; TS Mar 17

### SHORT ANSWER QUESTIONS (4 MARKS)

10. Evaluate  $\int_0^4 (16 - x^2)^{5/2} dx$ .

AP 19

11. Evaluate  $\int_0^{\pi/2} \frac{dx}{4 + 5 \cos x}$ .

AP Mar 15, 16, TS Mar 18

12. Evaluate  $\int_0^{\pi/2} \frac{a \sin x + b \cos x}{\sin x + \cos x} dx$ .

AP Mar 17

13. Evaluate  $\int_0^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$ .

Mar 08, 14, May 09; AP Mar 17, 19

14. Evaluate  $\int_{\pi/6}^{\pi/3} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$ .

15. Evaluate  $\int_0^{\pi/2} \frac{\cos^{5/2} x}{\sin^{5/2} x + \cos^{5/2} x} dx$ .

AP Aug 22

16. Evaluate  $\int_0^{\pi} x \sin^7 x \cdot \cos^6 x dx$ .

TS 19

17. Evaluate  $\lim_{n \rightarrow \infty} \left[ \left(1 + \frac{1}{n}\right) + \left(1 + \frac{2}{n}\right) \dots \left(1 + \frac{n}{n}\right) \right]^{1/n}$ .

18. Evaluate  $\lim_{n \rightarrow \infty} \left( \frac{\sqrt{n+1} + \sqrt{n+2} + \dots + \sqrt{n+n}}{n\sqrt{n}} \right)$ .
19. Find the area bounded by  $y^2 = 4x$  and  $x^2 = 4y$ . AP May 22
20. Find area bounded by the curves  $y = x^2$ ,  $y = x^3$ .
21. Find the area bounded between the curves  $y^2 = 4ax$ ,  $x^2 = 4by$  ( $a > 0, b > 0$ ). AP Mar 19
22. Find the area of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ . Also deduce the area of the circle  $x^2 + y^2 = a^2$ . AP Mar 17

### VERY SHORT ANSWER QUESTIONS (2 MARKS)

23. Evaluate  $\int_0^2 |1-x| dx$ . Mar 09, May 11, AP Mar 15, 19, Aug 22, TS Mar 16, 18, May 22
24. Evaluate  $\int_0^4 |2-x| dx$ . June 05; AP Mar 17
25. Evaluate  $\int_2^3 \frac{2x}{1+x^2} dx$ . May 07, 10, Mar 11; AP Mar 17; TS Mar 16, 20
26. Evaluate  $\int_1^5 \frac{dx}{\sqrt{2x-1}}$ .
27. Evaluate  $\int_0^1 \frac{dx}{\sqrt{3-2x}}$ . AP 19
28. Evaluate  $\int_0^\pi \sqrt{2(1+\cos\theta)} d\theta$ . Mar 05; AP Mar 16, 18
29. Evaluate  $\int_0^4 \frac{x^2}{1+x} dx$ . TS 15
30. Evaluate  $\int_0^1 \left( \frac{x^2}{1+x^2} \right) dx$ . May 07, 10, Mar 11; TS Mar 18
31. Evaluate  $\int_0^a \frac{dx}{x^2+a^2}$ . AP 15, TS 19
32. Evaluate  $\int_0^3 \frac{xdx}{\sqrt{x^2+16}}$ . TS 17
33. Evaluate  $\int_0^a \sqrt{a^2-x^2} dx$ . TS Mar 16
34. Find  $\int_0^{\pi/2} \sin^4 x dx$ . May 02, 06



35. Find  $\int_0^{\pi/2} \sin^7 x \, dx$ . AP Mar 17
36. Evaluate  $\int_0^{\pi/4} \sec^4 \theta \, d\theta$ . Mar 95, May 14
37. Evaluate  $\int_{-\pi/2}^{\pi/2} \sin^2 x \cdot \cos^4 x \, dx$ . May 09, Mar 13; AP Mar 18, 20, May 22
38. Evaluate  $\int_0^{\pi/2} \sin^5 x \cdot \cos^4 x \, dx$ . AP Mar 15
39. Evaluate  $\int_0^{\pi} \sin^3 x \cdot \cos^3 x \, dx$ . TS 15
40. Evaluate  $\int_0^{\pi/2} \sin^6 x \cdot \cos^4 x \, dx$ . AP Mar 16, 19
41. Evaluate  $\int_0^{2\pi} \sin^2 x \cdot \cos^4 x \, dx$ . Mar 14; AP Mar 19; TS Mar 15
42. Evaluate  $\int_{-\pi/2}^{\pi/2} \sin^2 \theta \cos^7 \theta \, d\theta$ .
43. Find  $\int_0^{2\pi} \sin^4 x \cdot \cos^6 x \, dx$ . Mar 01; TS Mar 19
44. Find the area bounded by the parabola  $y = x^2$ , the x-axis and the lines  $x = -1$ ,  $x = 2$ . Mar 09
45. Find the area bounded by  $y = x^3 + 3$ , x-axis,  $x = -1$  and  $x = 2$ .  
Mar 05, 08, 12, June 10; AP Mar 15; TS Mar 16, 17

## 08. DIFFERENTIAL EQUATIONS

### LONG ANSWER QUESTIONS (7 MARKS)

01. Solve  $(x^2 - y^2)dx - (xy)dy = 0$ . May 06, 09, 11
02. Solve  $(x^2 + y^2)dx = (2xy)dy$ . Mar 10; AP Mar 16, 17, 20, May 22
03. Solve  $\frac{dy}{dx} = \frac{y^2 - 2xy}{x^2 - xy}$ . AP Mar 19
04. Solve  $(x^2y - 2xy^2)dx = (x^3 - 2x^2y)dy$ . AP 18
05. Solve  $(y^2 - 2xy)dx + (2xy - x^2)dy = 0$ .
06. Solve the differential equation  $(x^3 - 3xy^2)dx + (3x^2y - y^3)dy = 0$ . May 14
07. Give the solution of  $x \sin^2\left(\frac{y}{x}\right)dx = ydx - xdy$  which passes through the point  $\left(1, \frac{\pi}{4}\right)$ . Mar 14

08. Find the equation of a curve whose gradient is  $\frac{dy}{dx} = \frac{y}{x} - \cos^2 \frac{y}{x}$ , when  $x > 0$ ,  $y > 0$  and which passes through the point  $\left(1, \frac{\pi}{4}\right)$ .

09. Solve  $\frac{dy}{dx} = \frac{x - y + 3}{2x - 2y + 5}$ .

10. Solve  $(2x + y + 1)dx + (4x + 2y - 1)dy = 0$ .

TS Mar 15

### SHORT ANSWER QUESTIONS (4 MARKS)

11. Solve  $(xy^2 + x)dx + (yx^2 + y)dy = 0$ .

Apr 01, Mar 07; AP Mar 15; TS Mar 20

12. Solve  $\frac{dy}{dx} - x \tan(y - x) = 1$ .

Mar 02; TS Mar 15

13. Solve  $\frac{dy}{dx} + y \tan x = \sin x$ .

Mar 08, 12; TS Mar 16

14. Solve  $\frac{dy}{dx} + y \sec x = \tan x$ .

June 2010

15. Solve  $\frac{dy}{dx} + y \tan x = \cos^3 x$ .

May 11; AP Mar 17, 19, TS Mar 18

16. Solve  $x \log x \frac{dy}{dx} + y = 2 \log x$ .

May 14, AP May 22

17. Solve  $\frac{dy}{dx} + \frac{2y}{x} = 2x^2$ .

AP 20

18. Solve  $\cos x \frac{dy}{dx} + y \sin x = \sec^2 x$ .

Mar 14; TS Mar 19

19. Solve  $(1 + x^2) \frac{dy}{dx} + y = e^{\tan^{-1} x}$ .

May 07, Mar 10, May 13; AP Mar 16, 18; TS Mar 15

20. Solve  $(x + y + 1) \frac{dy}{dx} = 1$ .

June 05, Mar 13; TS Mar 17

21. Solve  $(1 + y^2)dx = (\tan^{-1} y - x)dy$ .

May 09, AP Mar 15, May 15; TS May 15, Mar 18; B.P.

### VERY SHORT ANSWER QUESTIONS (2 MARKS)

22. Find the order and degree of  $\left[ \frac{d^2 y}{dx^2} + \left( \frac{dy}{dx} \right)^3 \right]^{6/5} = 6y$ .

Mar 09, 13; May 11; AP Mar 16; AP & TS May 15; Board Paper

23. Find the order and degree of  $\frac{d^2 y}{dx^2} = \left[ 1 + \left( \frac{dy}{dx} \right)^2 \right]^{5/3}$ .

Mar 10, May 13; TS Mar 18, May 22

24. Find the order and degree of  $x^{1/2} \left( \frac{d^2 y}{dx^2} \right)^{1/3} + x \frac{dy}{dx} + y = 0$ .

AP Mar 18; TS Mar 15

25. Form the differential equation corresponding to  $y = cx - 2c^2$ , where 'c' is a parameter.  
May 09, Mar 12; AP Mar 19
26. Find the D.E corresponding to  $y = a \cos(nx + b)$  where a, b are parameters. TS 18, AP 17
27. Form the differential equation corresponding to  $y = A \cos 3x + B \sin 3x$  where A and B are parameters.  
May 10, 14; AP Mar 15; TS Mar 16, 20
28. Form the differential equation of the family of circles with their centres at the origin and also find its order.  
Mar 11; TS Mar 17
29. Find the general solution of  $\frac{dy}{dx} = e^{x+y}$ .  
AP Aug 22; TS Mar 18
30. Find the general solution of  $x + y \frac{dy}{dx} = 0$ .
31. Find the general solution of  $\frac{dy}{dx} = \frac{2y}{x}$ .
32. Solve  $\frac{dy}{dx} + 1 = e^{x+y}$ . TS Mar 18
33. Solve  $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ .
34. Solve  $\sqrt{1-x^2} dy + \sqrt{1-y^2} dx = 0$ .
35. Find the I.F of the differential equation  $x \frac{dy}{dx} - y = 2x^2 \sec^2 2x$  by transforming into linear form.
36. Find the I.F of the differential equation  $(\cos x) \frac{dy}{dx} + y \sin x = \tan x$  by transforming into linear form.

\*\*\* THE END\*\*\*