# **BOARD MODEL PAPER - 1**

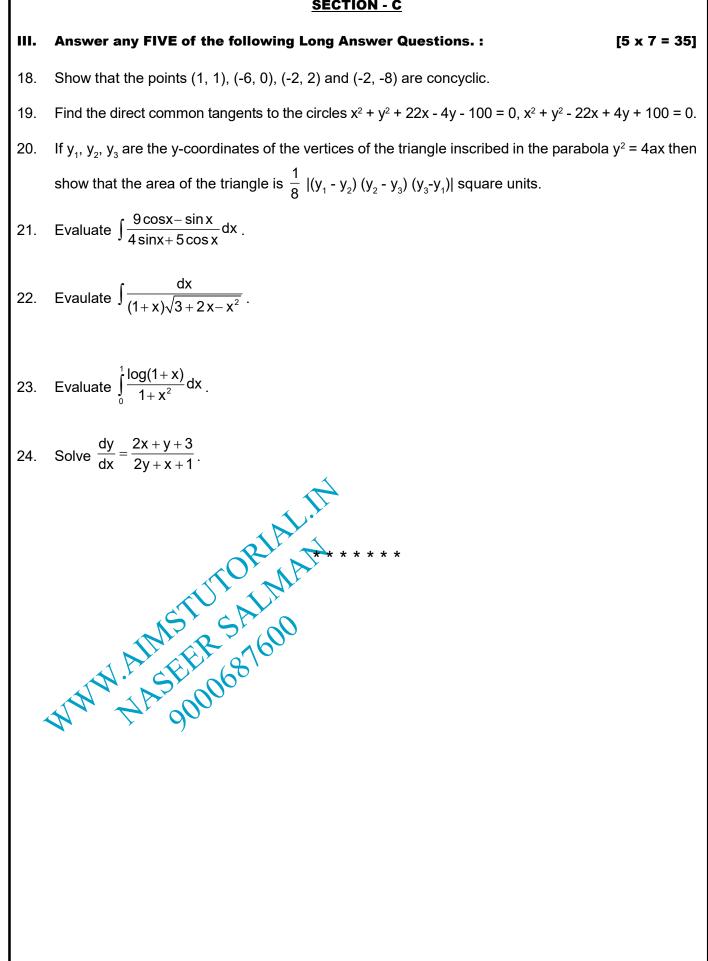
# MATHS - 2B

(Board of Intermediate Education Model Paper)

### **SECTION - A**

Answer ALL the following Very Short Answer Questions:  $[10 \times 2 = 20]$ I. 1. Find the power of the point P(-1, 1) with respect to the circle  $x^2 + y^2 - 6x + 4y - 12 = 0$ . 2. State the necessary and sufficient condition for lx + my + n = 0 to be normal to the circle  $x^{2} + y^{2} + 2gx + 2fy + c = 0.$ Find the angle between the circles  $x^2 + y^2 - 12x - 6y + 41 = 0$  and  $x^2 + y^2 + 4x + 6y - 59 = 0$ . 3. Find the equation of the parabola whose focus is (1, -7) and vertex is (1, -2). 4. Find the angle between the asymptotes of the hyperbola  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ . 5. Evaluate  $\int \frac{1}{(x+3)\sqrt{x+2}} dx$ . 6. Evaluate  $\int \frac{\sin^4 x}{\cos^6 x} dx$ . 7. Evaluate  $\int_{1}^{1} \frac{x^2}{x^2+1} dx$ . 8. Evaluate  $\int_{0}^{\pi/2} \frac{\sin x^2 x - \cos^2 x}{\sin x^3 x + \cos^3 x} dx$ 9. ential equation  $\left[\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3\right]^{\frac{1}{5}} = 6y$ . Find the order and degree to the 10. **SECTION - B** he following Short Answer Questions: П. Answer any [5 x 4 = 20] Find the pole of the line  $3x + 4y^{-45} = 0$  w.r.t the circle  $x^2 + y^2 - 6x - 8y + 5 = 0$ . 11. equation of the circle passing through the points of intersection of the circles x = 6y + 21 = 0,  $x^2 + y^2 - 2x - 15 = 0$  and (1, 2). 12. Find the length of major axis, minor axis, latusrectum, eccentricity of the ellipse of  $9x^2 + 16y^2 = 144$ . 13. Show that the point of intersection of the perpendicular to an ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  (a > b) lies on a circle. 14. Find the equation of the tangents to the hyperbola  $3x^2 - 4y^2 = 12$  which are 15. (i) Parallel to (ii) Perpendicular to the line y = x - 7. Find the reduction formula for  $\int \sin^n x \, dx$ . 16. Solve :  $(1 + y_2) dx = (\tan^{-1}y - x) dy$ 17.





## MATHS - 2B

### (Board of Intermediate Education Model Paper)

#### **SECTION - A**

[10 x 2 = 20]

- I. Answer ALL the following Very Short Answer Questions:
- Find the Parametric equations of the circle x<sup>2</sup> + y<sup>2</sup> + 6x + 8y 96 = 0.
  Find the equation of normal at P(3, -4) on the circle x<sup>2</sup> + y<sup>2</sup> + x + y 24 = 0.
- 3. Find k if the paris of circles are  $x^2 + y^2 6x 8y + 12 = 0$ ,  $x^2 + y^2 4x + 6y + k = 0$  are orthogonal.
- 4. Find the coordinates of the point on the parabola  $y^2 = 2x$  whose focal distance is 5/2.
- 5. If e, e<sub>1</sub> are the eccentricities of a hyperbola and its conjugate hyperbola, then prove that  $\frac{1}{e^2} + \frac{1}{e^2} = 1$ .
- 6. Evaluate  $\int \sqrt{x} \log x \, dx \, \operatorname{on}(0,\infty)$ .
- 7. Evaluate  $\int e^{x} \left( \frac{1 + x \log x}{x} \right) dx$ .
- 8. Evalute  $\int_{1}^{5} \frac{\mathrm{d}x}{\sqrt{2x-1}} \mathrm{d}x$ .
- 9. Evaluate  $\int_{0}^{a} \sqrt{a^2 x^2} \, dx$ .
- 10. Find the order and degree of the D.E  $x^{1/2} \left(\frac{d^2y}{dx^2}\right)^{1/3} + x \frac{dy}{dx} + y = 0.$

## SECTION - B

II. Answer any FIVE of the following Short Answer Questions:

[5 x 4 = 20]

- 11. Find the euqation of a circle which passes through (4, 1), (6, 5) and having the centre on 4x + 3y 24 = 0.
- 12. If the two circles  $x^2 + y^2 + 2gx + 2y = 0$ ,  $x^2 + y^2 + 2g'x + 2f'y = 0$  touch each other, then show that f'g = fg'.
- 13. Find the equations of the tangent and normal tothe ellipse  $9x^2 + 16y^2 = 144$  at the end of latusrect in the first quadrant.
- 14. Prove that the condition for the line y = mx + c to be a tangent to the ellipse  $\frac{x^2}{2^2} + \frac{y^2}{b^2} = 1$  is  $c^2 = a^2m^2 + b^2$ .
- 15. Find the centre, eccentricity, foci, length of latus rectuom and equations of the directrices of the Hyperbola  $16y^2 9x^2 = 144$ .

16. Evaluate 
$$\int_{-3}^{+3} (9-x^2)^{3/2} dx$$
.

17. Solve  $\frac{dy}{dx} + \frac{y^2 + y + 1}{x^2 + x + 1} = 0$ .

#### III. Answer any FIVE of the following Long Answer Questions. :

#### [5 x 7 = 35]

- 18. Find the equation of the circle passing through the three points (1, 2), (3, -4), (5, -6).
- 19. Show that the circles  $x^2 + y^2 6x 2y + 1 = 0$  and  $x^2 + y^2 + 2x 8y + 13 = 0$  touch each other. Find the point of contact and the equation of the common tangent at their point of contact.
- 20. Find the equation of the parabola whose axis is parallel to the y-axis and passing through the points (4, 5), (-2, 11), (-4, 21).
- 21. Evaluate  $\int \frac{3\sin x + \cos x + y}{\sin x + \cos x + 1} dx$ .
- 22. Evaluate  $\int \frac{x^3 2x + 3}{x^2 + x 2} dx$ .

23. Let AOB be the positive quadrant of the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  with OA = a, OB = b. Then show that the

area bounded between the chord AB and the arc AB of the ellipse is  $\frac{(\pi - 2)ab}{4}$ .

24. Solve  $(x^2y - 2xy^2) dx = (x^3 - 3x^2y) dy$ .

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### MATHS - 2B

(Board of Intermediate Education Model Paper)

#### SECTION - A

## I. Answer ALL the following Very Short Answer Questions:

- 1. Find the equation of the circle passing through the point (-2, 14) and concentric with  $x^2 + y^2 6x 4y 12 = 0$ .
- 2. Find a if  $2x^2 + ay^2 3x + 2y 1 = 0$  represents a circle and also find its radius.
- 3. Find the angle between the circles given by the equations  $x^2 + y^2 + 6x 10y 135 = 0$ ,  $x^2 + y^2 4x + 14y 166 = 0$ .
- 4. Find the equation of the tangent and normal at the positive end of L.R on the parabola  $y^2 = 6x$ .
- 5. If the eccentricity of a hyperbola is 5/4, then find the eccentricity of its conjugate hyperbola.
- 6. Evaluate  $\int \frac{1}{1+\sin 2x} dx$ .
- 7. Evaluate  $\int e^{x}(1 + \tan^{2} x + \tan x) dx$ .
- 8. Evaluate  $\int_{0}^{\pi/2} \frac{\sin^2 x \cos^2 x}{\sin^3 x + \cos^3 x} dx.$
- 9. Find the area enclosed by the curves  $y = x^2 + 1$ , y = 2x 2, x = -1, x = 2.
- 10. Find the general solution of  $\frac{dy}{dx} = \frac{2y}{x}$ .

#### SECTION - B

### II. Answer any FIVE of the following Short Answer Questions:

11. Find the length of the chord intercepted by the circle  $x^2 + y^2 - 8x - 2y - 8 = 0$  on the line x + 1 + 1 = 0.

- 12. If the straight line 2x + 3y = 1 intersects the circle  $x^2 + y^2 = 4$  at the points A and B, find the equation of the circle having AB as diameter.
- 13. Find the equations of the tangents to  $9x^2 + 16y^2 = 144$ , which make equal intercepts on the coordinate axes.

14. If PN is the ordinate of a point P on the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  and the tangent at P meets the x-axis at T then show that (CN)(CT) = a<sup>2</sup> where C is the centre of the ellipse.

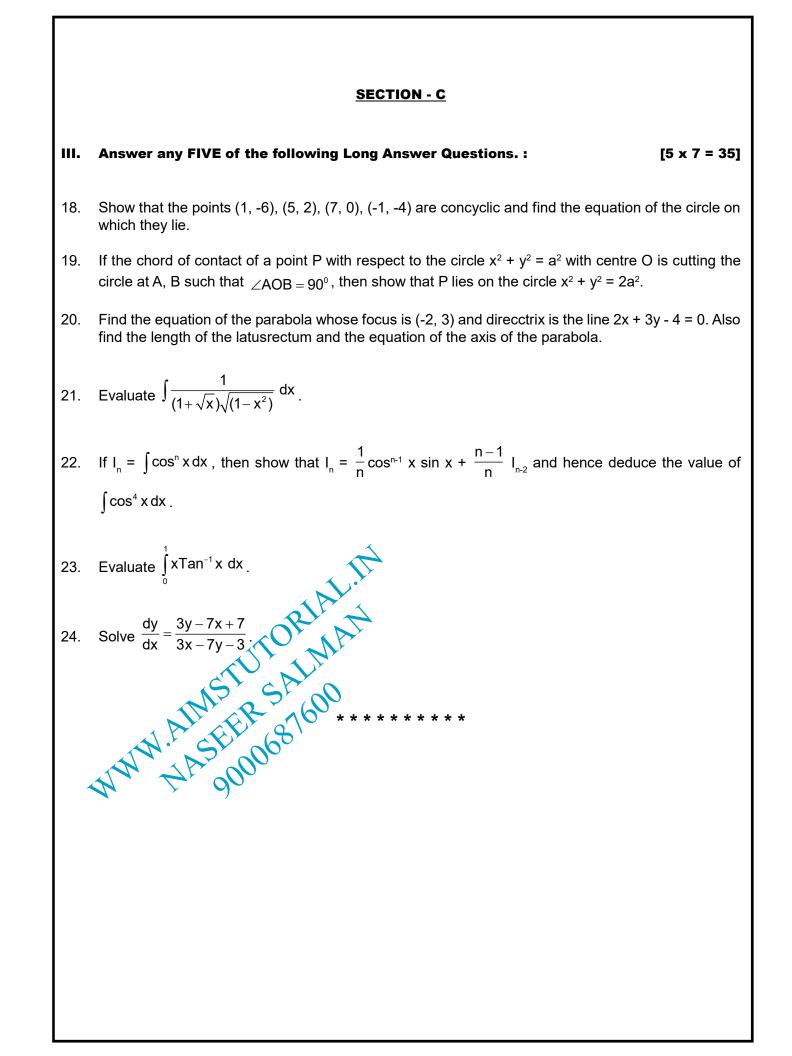
15. Find the equation of the tangents to the hyperbola  $x^2 - 4y^2 = 4$  which are i) parallel to and ii) perpendicular to the line x + 2y = 0.

16. Evaluate 
$$\int_{0}^{a} x(a^{2} - x^{2})^{7/2} dx$$

17. Solve  $\frac{dy}{dx}$ -y tan x = e<sup>x</sup> sec x.

[5 x 4 = 20]

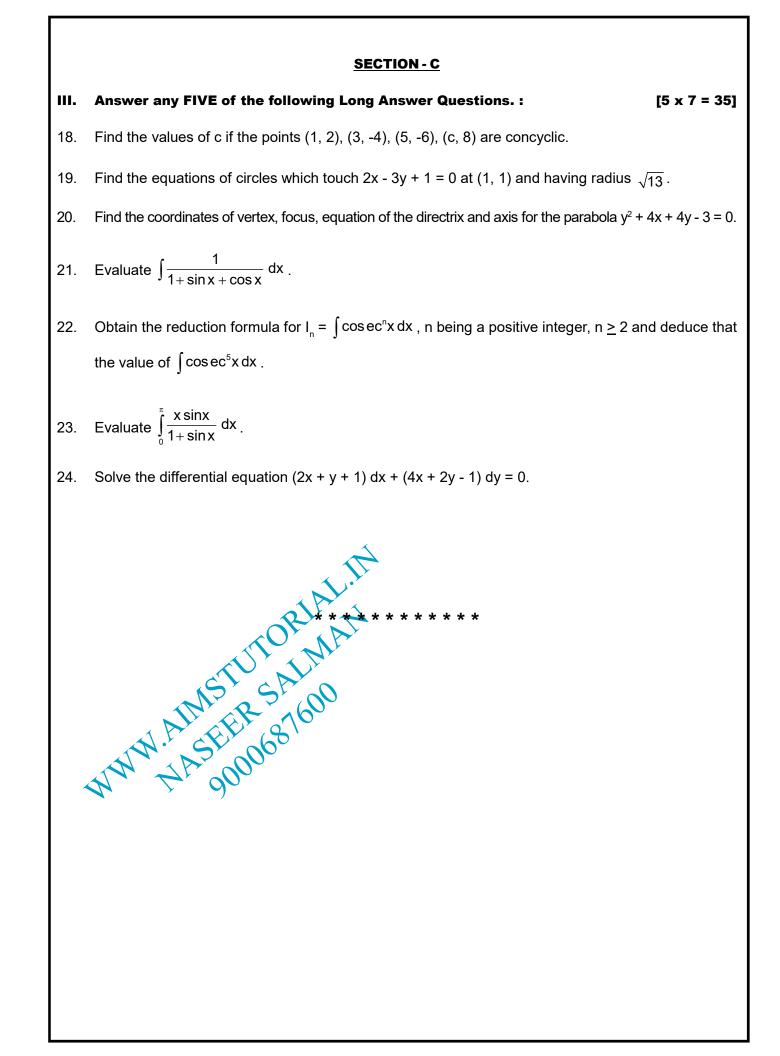
[10 x 2 = 20]



# MATHS - 2B

## (Board of Intermediate Education Model Paper)

**SECTION - A**  $[10 \times 2 = 20]$ I. Answer ALL the following Very Short Answer Questions: 1. If the length of the tangent from (5, 4) to the circle  $x^2 + y^2 + 2ky = 0$  is 1, then find k. Find the equation of the polar of (1, -2) with respect to circle  $x^2 + y^2 - 10x - 10y + 25 = 0$ . 2. Find the radical centre of the circles  $x^2 + y^2 + 4x - 7 = 0$ ,  $2x^2 + 2y^2 + 3x + 5y - 9 = 0$  and  $x^2 + y^2 + y = 0$ . 3. Define latus rectum of a parabola. What is the length of the latus rectum of  $y^2 = 4ax$ ? 4. 5. Find the value of k if 3x - 4y + k = 0 is a tangent to the hyperbola  $x^2 - 4y^2 = 5$ . Evaluate ∫ sin mx sin nx dx. 6. Find  $\int \frac{(\log x)^2}{x} dx$ . 7. Evaluate  $\int_{-\pi/2}^{\pi/2} \sin|x| dx$ . 8. Find the value of  $\int_{0}^{2\pi} \sin^2 x \cdot \cos^4 x \, dx$ . 9. Find the I.F. of the D.E.  $(\cos x)\frac{dy}{dx}$ +ysinx  $\pm \tan x$  by transforming it into linear form. 10. SECTION - B Answer any FIVE of the following Short Answer Questions: II. [5 x 4 = 20] Find the condition that the tangents drawn from the exterior point (0, 0) to  $S = x^2 + y^2 + 2gx + 2fc = 0$ , are perpendicular to each other. 11. Show that the circles  $x^2 + y^2 - 8x$  $x^2$  +  $y^2$  - 2x + 6y = 0 touch each other and find the point 12. of contact Find the condition for the line lx + my + n = 0, to be a tangent to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ . 13. Prove that the equation of the chord joining the points  $\alpha$  and  $\beta$  on the ellipse  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$  is 14.  $\frac{x}{a}\cos\left(\frac{\alpha+\beta}{2}\right) + \frac{y}{b}\sin\left(\frac{\alpha+\beta}{2}\right) = \cos\left(\frac{\alpha-\beta}{2}\right)$ Prove that the point of intersection of two perpendicular tangents to the hyperbola  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = -1 = 0$ , lies 15. on the circle  $x^2 + y^2 = a^2 - b^2$ . Find the area of the region enclosed by the curves  $y = 4x - x^2$ , y = 5 - 2x. 16. Solve  $y^2 dx + (x^2 - xy) dy = 0$ . 17.



## MATHS - 2B

### (Board of Intermediate Education Model Paper)

#### **SECTION - A**

#### [10 x 2 = 20]

- 1. If  $x^2 + y^2 + 2gx + 2fy 12 = 0$  is a circle with centre (2, 3) then find (g, f) and its radius.
- 2. Find the value of k if the length of tangent from (5, 4) to  $x^2 + y^2 + 2ky = 0$  is 1.
- 3. Find k if the pair of circles are  $x^2 + y^2 + 2by k = 0$ ,  $x^2 + y^2 + 2ax + 8 = 0$ .
- 4. Find the equation of tangent to the parabola  $y^2 = 16x$ . inclined at 60°.

Answer ALL the following Very Short Answer Questions:

- 5. If e e<sub>1</sub> are the eccentricities of a hyperbola and its conjugate hyperbola, then prove that  $\frac{1}{e^2} + \frac{1}{e_1^2} = 1$ .
- 6. Evaluate  $\int \sqrt[3]{\sin x} \cos dx$ .

I.

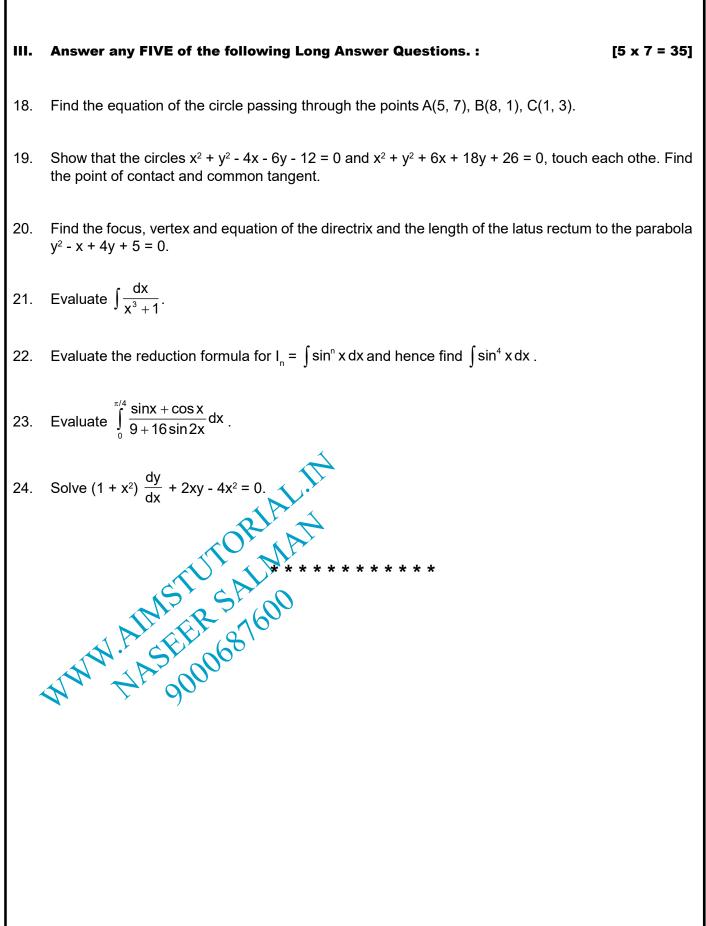
- 7. Evaluate  $\int e^{x} (\tan x + \sec^{2} x) dx$ .
- 8. Evaluate  $\int_{0}^{1} x \cdot e^{-x^2} dx$ .
- 9. Evaluate  $\int_{0}^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$ .
- 10. Find the order of the differential equation of the family of all circles with their centres at the origin.

# SECTION - B

## II. Answer any FIVE of the following Short Answer Questions:

#### [5 x 4 = 20]

- 11. Find the equations of the tangents to the circle  $x^2 + y^2 4x + 6y 12 = 0$  and parallel to the line x + y 8 = 0.
- 12. Find the radical centre of the circles  $x^2 + y^2 4x 6y + 5 = 0$ ,  $x^2 + y^2 2x 4y 1 = 0$ ,  $x^2 + y^2 6x 2y = 0$ .
- 13. Find the equation of the ellipse, if focus = (1, -1), e = 2/3 and directrix is x + y + 2 = 0.
- 14. Find the equation of the ellipse in the standard form such that the distance between the foci is 8 and the distance between directrices is 32.
- 15. Tangents to the hyperbola  $\frac{x^2}{a^2} \frac{y^2}{b^2} = 1$  make angles  $\theta_1$ ,  $\theta_2$  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  $\tan \theta_1 + \tan \theta_2 = k$ .
- 16. Find the area enclosed by the curves  $y = x^2$  and  $y = \sqrt{x}$ .
- 17. Solve  $\frac{dy}{dx} x \tan(y x) = 1$ .



## MATHS - 2B

(Board of Intermediate Education Model Paper)

#### SECTION - A

[10 x 2 = 20]

- Answer ALL the following Very Short Answer Questions:
  Find the Parametric equations of the circle x<sup>2</sup> + y<sup>2</sup> 6x + 4y 12 = 0.
- 2. Find the value of k if the points (4, 2), (k, -3) are conjugate w.r.to the circle  $x^2 + y^2 5x + 8y + 6 = 0$ .
- 3. Find the angle between the circles  $x^2 + y^2 12x 6y + 41 = 0$  and  $x^2 + y^2 + 4x + 6y 59 = 0$ .
- 4. Find the vertex, focus, equation of the directrix and axis of the parabola  $y^2 = 16x$ .
- 5. If the eccentricity of a hyperbola is 5/4, then find the eccentricity of its conjugate hyperbola.
- 6. Evaluate  $\int \frac{x^8}{1+x^{18}} dx$ .
- 7. Evaluate  $\int e^{x} \left( \frac{1 + x \log x}{x} \right) dx$
- 8. Evaluate  $\int_{0}^{\pi} \sqrt{2 + 2\cos\theta} \, d\theta$ .
- 9. Prove that  $\int_{0}^{\pi/2} \sin^{n} x \, dx = \int_{0}^{\pi/2} \cos^{n} x \, dx$ .
- 10. Form the D.E corresponding to  $y = cx 2c^2$  where c is a parameter.

## SECTION - B

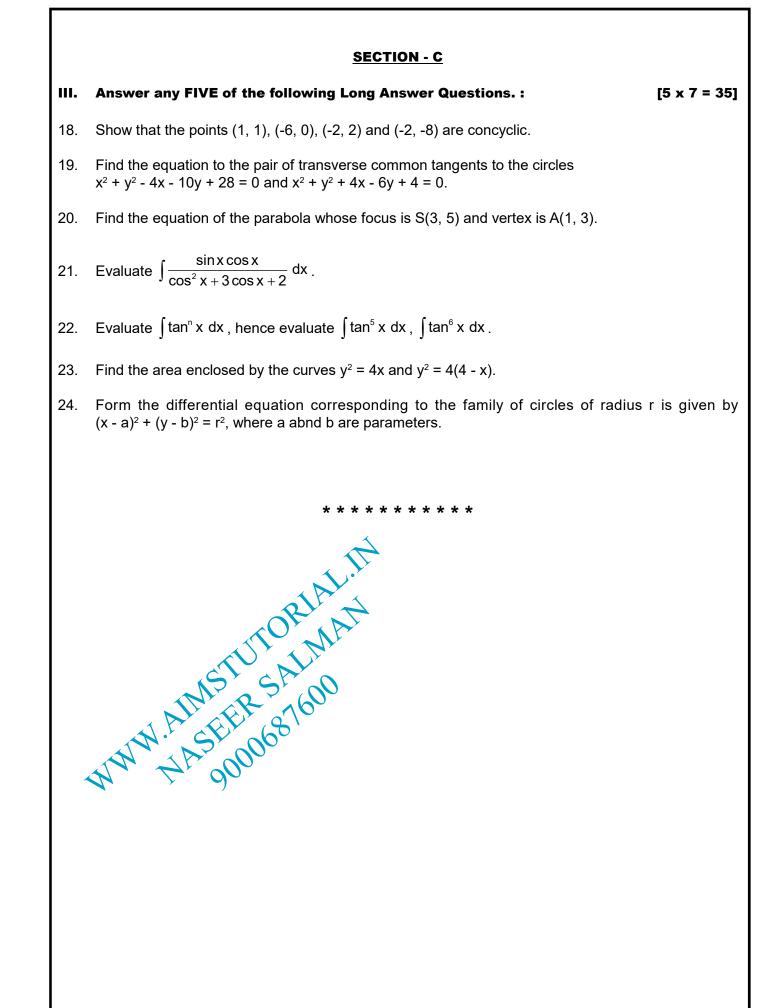
#### II. Answer any FIVE of the following Short Answer Questions:

#### [5 x 4 = 20]

- 11. Find the locus of P, where the tangents drawn from P to  $x^2 + y^2 = a^2$  are perpendicular to eachother.
- 12. 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).
- 13. Find the eccentricity, coordinates of foci, Length of latus rectum and equations of directrices of the ellipse  $9x^2 + 16y^2 36x + 32y^2 = 0$ .
- 14. 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.
- 15. Find the euqations of the tangents to the hyperbola  $3x^2 4y^2 = 12$  which are a) Parallel to b) Perpendicular to the line y = x 7.

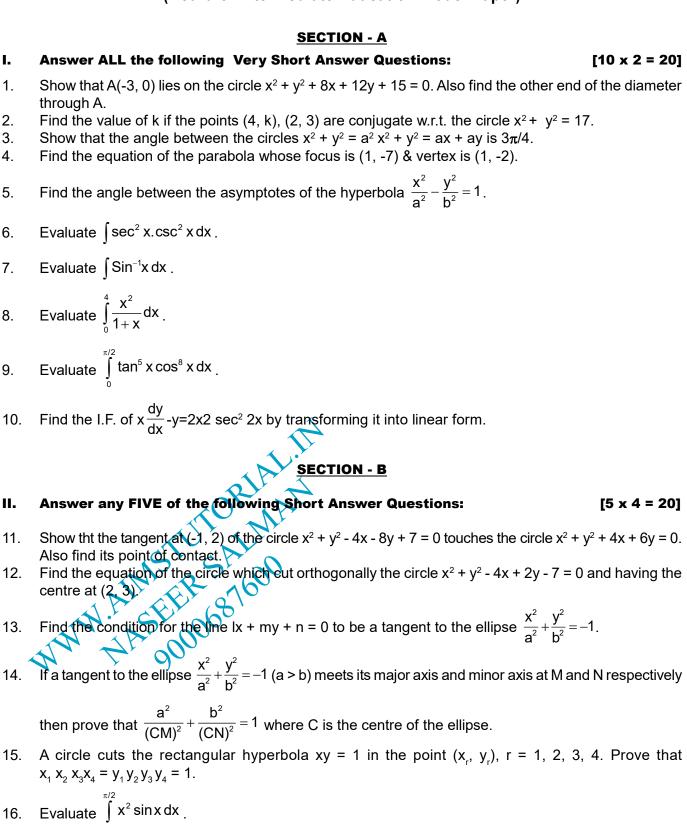
16. Evaluate 
$$\int_{0}^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$$

17. Solve  $(x^2 + y^2) dx = 2xydy$ .

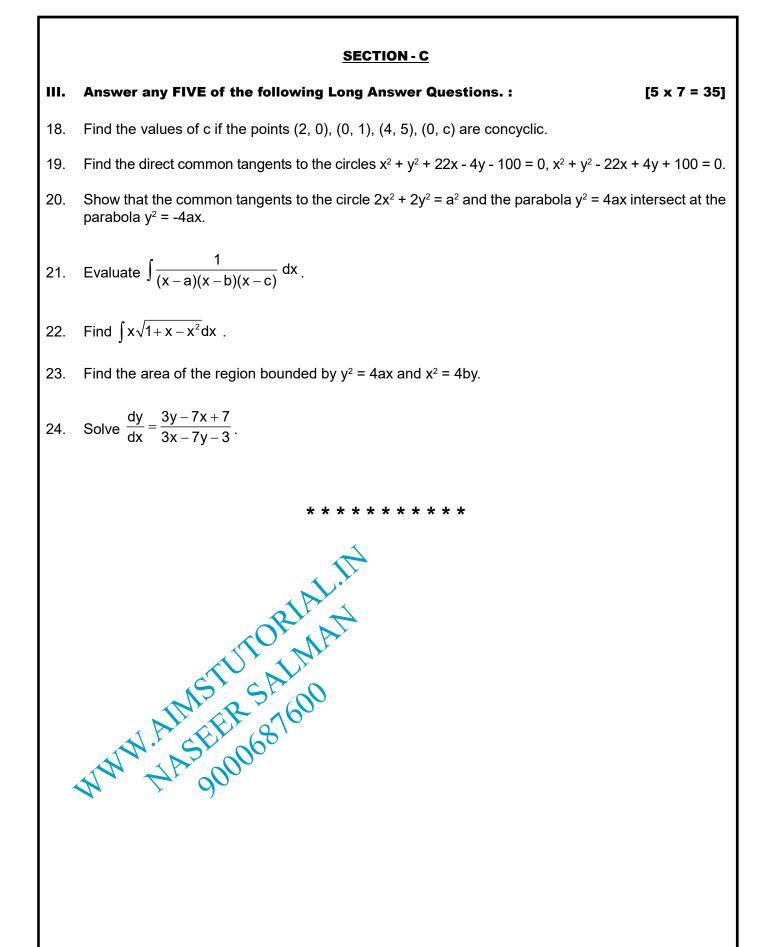


# MATHS - 2B

## (Board of Intermediate Education Model Paper)



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



## MATHS - 2B

### (Board of Intermediate Education Model Paper)

#### SECTION - A

#### [10 x 2 = 20]

1. if  $x^2 + y^2 - 4x + 6y + c = 0$  represents a circle with radius 6, find the value of c.

Answer ALL the following Very Short Answer Questions:

- 2. Find the value of k if the points (1, 3), (2, k) are conjugate w.r.to the circle  $x^2 + y^2 = 35$ .
- 3. Find the equation of the common chord of  $(x a)^2 + (y b)^2 = c^2$ ,  $(x b)^2 = c^2$ ,  $(x b)^2 + (y a)^2 = c^2$ .
- 4. Find the coordinates of the point on the parabola  $y^2 = 8x$ , whose focal distance is 10.
- 5. Find the value of k if 3x 4y + k = 0 is a tangent to the hyperbola  $x^2 4y^2 = 5$ .
- 6. Evaluate  $\int \frac{1}{1+\cos x} dx$ .

I.

- 7. Find  $\int \frac{\log(1+x)}{1+x} dx$ .
- 8. Evaluate  $\int |1-x| dx$ .
- 9. Find the area enclosed by  $y = e^x$ , y = x, x = 0, x = 1.
- 10. Find the order and degree to the differential equation  $\left[\frac{d^2y}{dx^2} \left(\frac{dy}{dx}\right)^3\right]^5 = 6y$ .

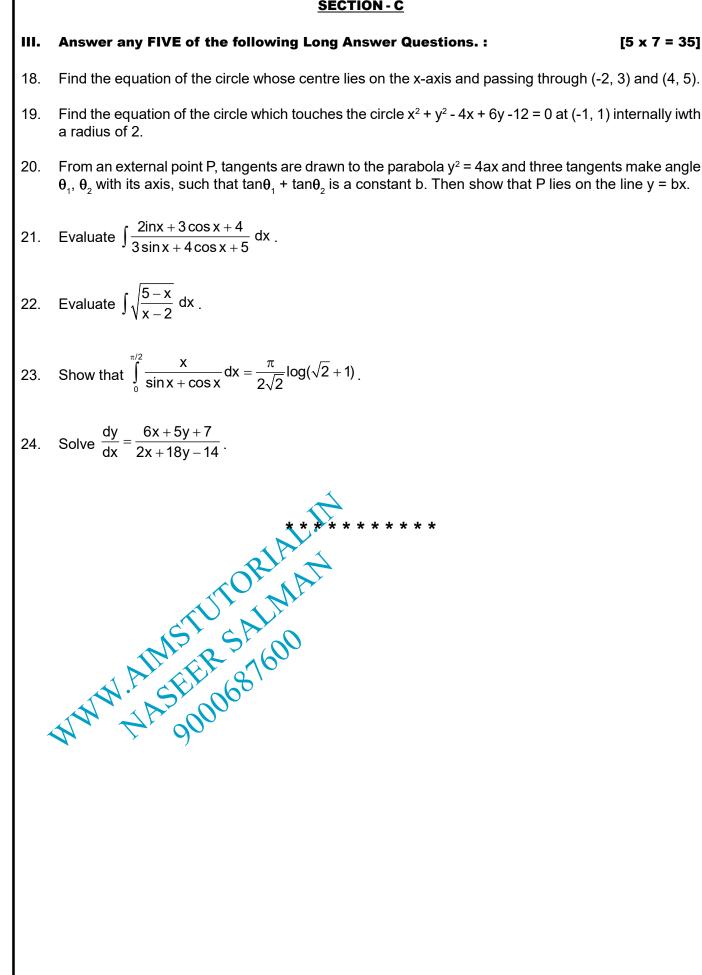
# SECTION - B

### II. Answer any FIVE of the following Short Answer Questions:

#### [5 x 4 = 20]

- 11. If a point P is moving such that the lengths of 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 the locus of P.
- 12. If the angle between the circles  $x^2 + y^2 12x 6y + 41 = 0$ ,  $x^2 + y^2 + kx + 6y 59 = 0$  is 45°, find k.
- 13. Find the eugations of the tangent to the ellipse  $2x^2 + y^2 = 8$  which are a) parallel to x - 2y - 4 = 0 b) Perpendicular to x + y + 2 = 0c) make an angle 45° with x-axis.
- 14. Find the equations of the tangent and normal to the ellipse  $2x^2 + 3y^2 = 11$  at the point whose ordinate is 1.
- 15. Find the centre, eccentricity, foci, length of latus rectum and equations of the directrices of the Hyperbola  $x^2 4y^2 = 4$ .
- 16. Find the area enclosed by the curve  $y = x^2$  and  $y = \sqrt{x}$ .
- 17. Solve  $(x + y + 1) \frac{dy}{dx} = 1$ .

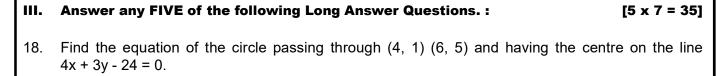




# **PREVIOUS IPE MARCH - 2014**

## MATHS - 2B

**SECTION - A** I. Answer ALL the following Very Short Answer Questions: [10 x 2 = 20] 1. Find the equation of the circle pssing through the pint (-2, 14) and concentric with  $x^2 + y^2 - 6x - 4y - 12 = 0$ . 2. Find the parametric equation of the circle  $x^2 + y^2 = 4$ . Show that the angle between the circles  $x^2 + y^2 = a^2$ ,  $x^2 + y^2 = ax + ay$  is  $3\pi/4$ . 3. 4. Find the coordinates of the point on the parabola  $y^2 = 8x$ , whose focal distance is 10. 5. Define Rectangular Hyperbola and find its eccentricity. Evaluate  $\int \frac{1}{(x+3)\sqrt{x+2}} dx$ 6. Evaluate  $\int \frac{dx}{(x+1)(x+2)} dx$ . 7. Evaluate  $\int_{1}^{2\pi} \sin^2 x \cos^4 x \, dx$ . 8. Evaluate  $\int_{0}^{\pi/2} \frac{\sin^5 x}{\sin^5 x + \cos^5 x} dx$ . 9. Find the order and degree of  $\left(\frac{d^3y}{dx^3}\right)^2 - 3\left(\frac{dy}{dx}\right)^2 - e^x = 4.$ 10. SECTION - B Answer any FIVE of the following Short Answer Questions: II. [5 x 4 = 20] If the abscissae of points A, B are the roots of the euqation  $x^2 + 2ax - b^2 = 0$  and ordinates of A, B are 11. roots of  $y^2 + 2py - \overline{q}^2 = 0$ , then find the equation of a circle for which  $\overline{AB}$  is a diameter. Show that the circles  $x^2 + y^2 - 8x + 2y + 8 = 0$ ,  $x^2 + y^2 - 2x + 6y + 6 = 0$  touch eachother and find the point 12. of contact. Find the eccentricity, foci, equation of directrices fo ellilpse  $9x^2 + 16y^2 = 144$ . 13. Find the condition for the line  $x\cos\alpha + y\sin\alpha = p$  to be a tangent to the ellipse  $\frac{x^2}{2^2} + \frac{y^2}{b^2} = 1$ . 14. Find the equation of the tangents to the hyperbola  $x^2 - 4y^2 = 4$  which are 15. i) Parallel to and ii) perpendicular to the line x + 2y = 016. Evaluate  $\int_{-\frac{\pi}{3}}^{\frac{\pi}{3}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$ 17. Solve cosx.  $\frac{dy}{dx}$  + y sinx = sec<sup>2</sup> x.



19. Find the equation to the pair of transverse common tangnets to the circles  $x^2 + y^2 - 4x - 10y + 28 = 0$ and  $x^2 + y^2 + 4x - 6y + 4 = 0$ .

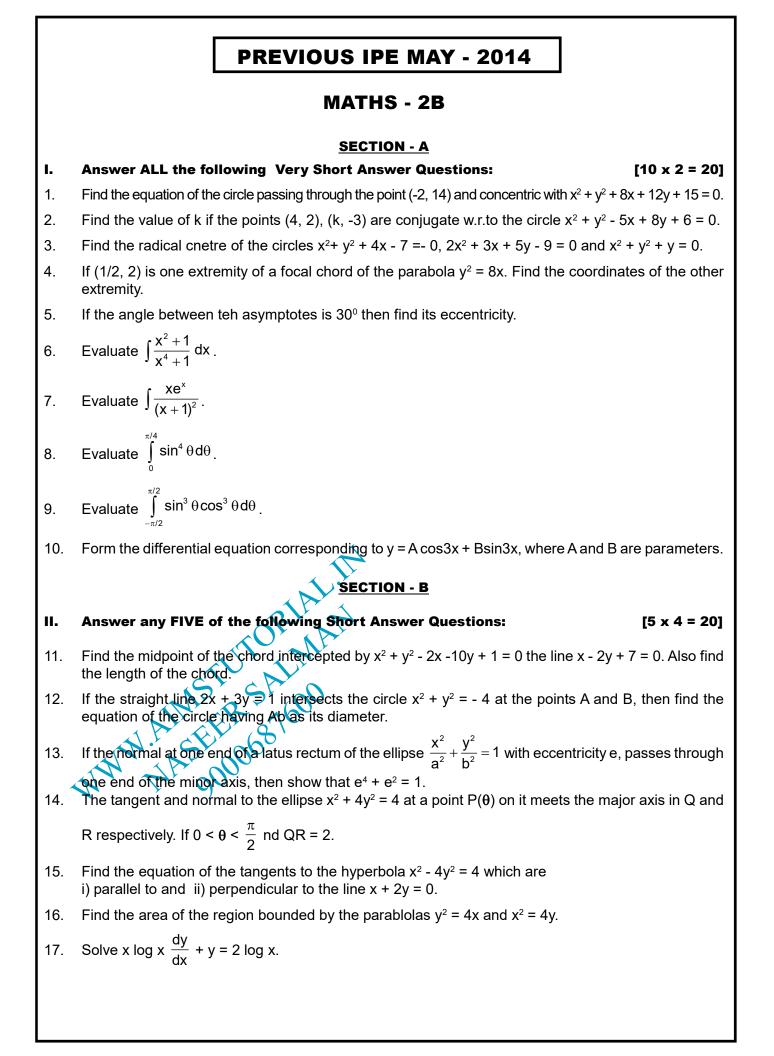
20. Evaluate  $\int \frac{2\sin x + 3\cos x + 4}{3\sin x + 3\cos x + 5} dx$ .

21. Evaluate the reduction formular for  $I_n = \int \sin^n x \, dx$  and hence find  $\int \sin^4 x \, dx$ .

22. Prove that the two parabolas  $y^2 = 4ax$  and  $x^2 = 4by$  intersect (other than the origin) at an angle of  $\begin{bmatrix} 3a^{1/3}b^{1/3} \end{bmatrix}$ 

Tan<sup>-1</sup> 
$$\left[\frac{3a}{2(a^{2/3}+b^{2/3})}\right]$$
.

- 23. Show that the area of the region bounded by the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  is  $\pi$ ab. Hence deduce the area of the circle  $x^2 + y^2 = a^2$
- 24. Given the solution of  $x \sin^2 \frac{y}{x} dx x dy$  which passes through the point  $(1, \pi/4)$ .

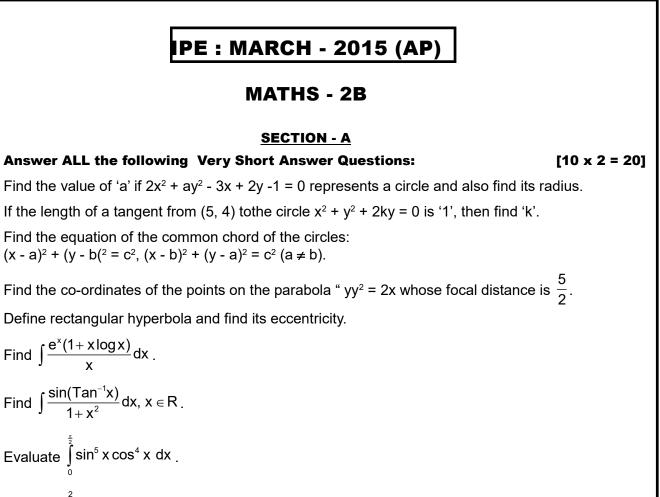


#### III. Answer any FIVE of the following Long Answer Questions. : $[5 \times 7 = 35]$

- 18. If (2, 0), (0, 1), (4, 5) and (0, c) are concyclic, then find c.
- 19. Prove that the combined equation of the pair of tangents drawn from an external point  $P(x_1, y_1)$  to the circle S = 0 is SS<sub>11</sub> = S<sub>1</sub><sup>2</sup>.
- 20. If a normal chord a point 't' on the parabola  $y^2 = 4ax$  subtends a right angle at vertex, then prove that  $t = \pm \sqrt{2}$ .

21. Evaluate 
$$\int \frac{1}{(1+x)\sqrt{3+2x-x^2}} dx$$
.

- 22. Obtain the reduction formula for  $I_n = \int \cos ec^n x \, dx$ , n being a positive integer,  $n \ge 2$  and deduce that the value of  $\int \csc ec^5 x \, dx$ .
- 23. Evaluate  $\int_{0}^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$ .
- 24. Solve  $(x^3 3xy^2) dx + (3x^2u y^3) dy = 0.$



9. Evaluate  $\int |1-x| dx$ .

I.

1.

2. 3.

4.

5.

6.

7.

8.

10. From the differential equation corresponding to  $y = A \cos 3x + B \sin 3x$ , where A and B are parameters.

# SECTION - B

II. Answer any FIVE of the following Short Answer Questions:

#### [5 x 4 = 20]

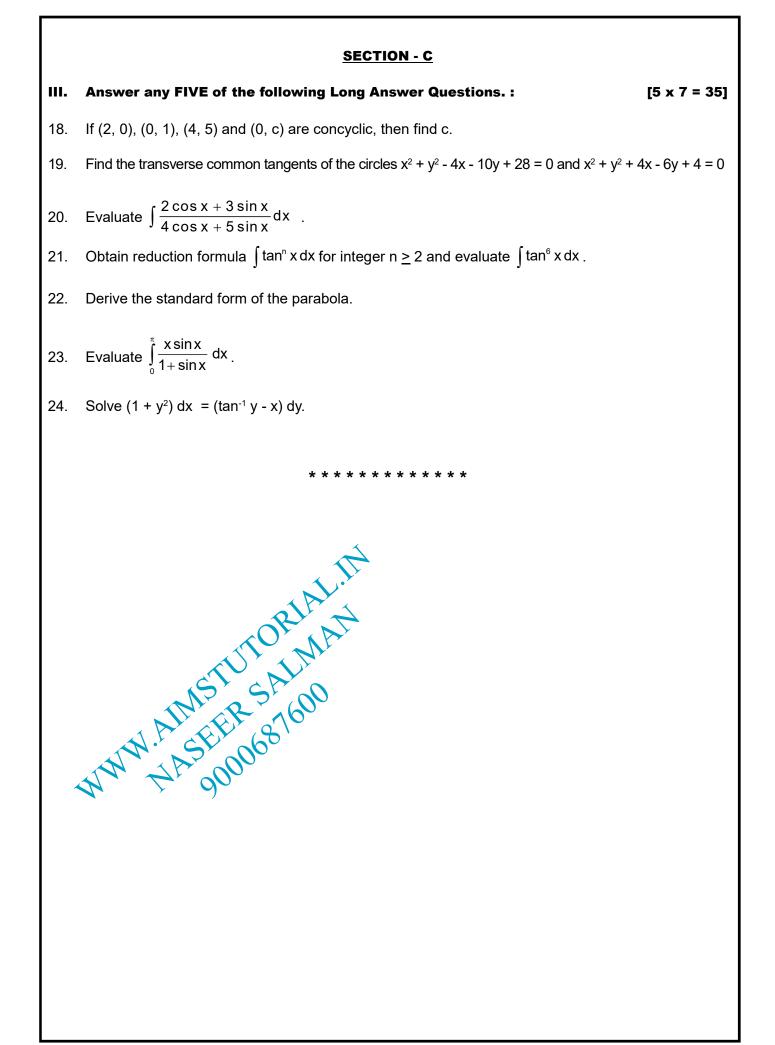
- 11. Find the equation of circle whose centre lies on the x-axis and passing thrugh (-2, 3) and (4, 5).
- 12. If x + y = 3 is the equation of the chord AB of the circle  $x^2 + y^2 2x + 4y 8 = 0$ , find the equation of the circle having AB as diameter.
- 13. Find the equation of tangent and normal to the ellipse  $9x^2 + 16y^2 = 144$  at the end of the latus rectum in the first quadrant.

14. Find the value of wif 4x + y + k = 0 is a tangent to the ellipse  $x^2 + 3y^2 = 3$ .

15. Find the equation of the tangents to the hyperbola  $3x^2 - 4y^2 = 12$  which are i) parallel and ii) perpendicular to the line y = x - 7.

16. Find  $\int_{0}^{\frac{1}{2}} \frac{dx}{4+5\cos x} dx$ .

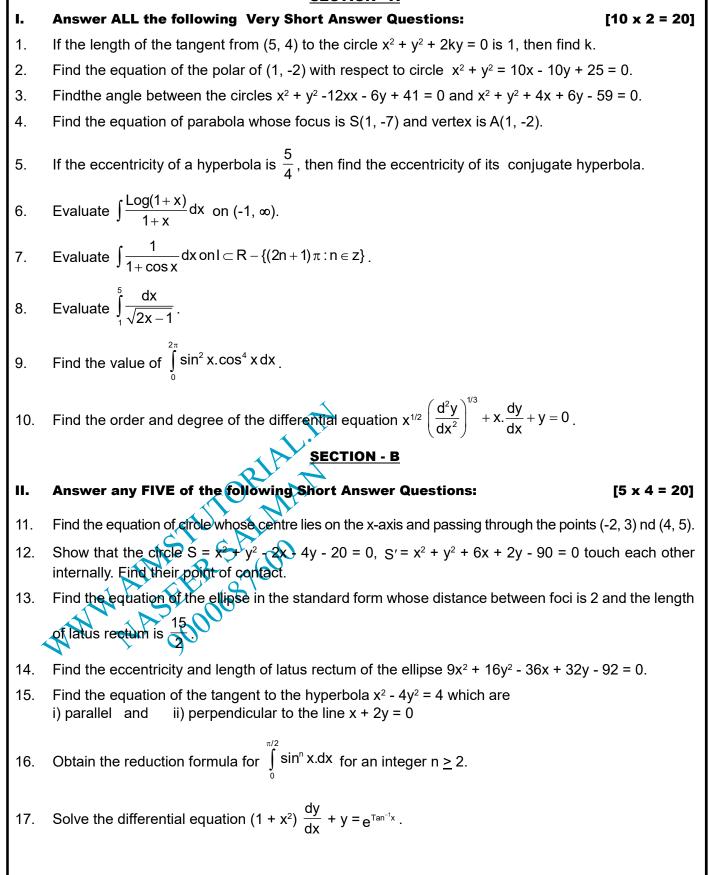
17. Solve the differential equation  $(xy^2 + x) dx + (yx^2 + y) dy = 0$ .

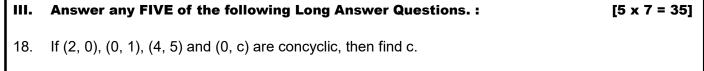


# **IPE : MARCH - 2015 (TS)**

## MATHS - 2B

#### **SECTION - A**





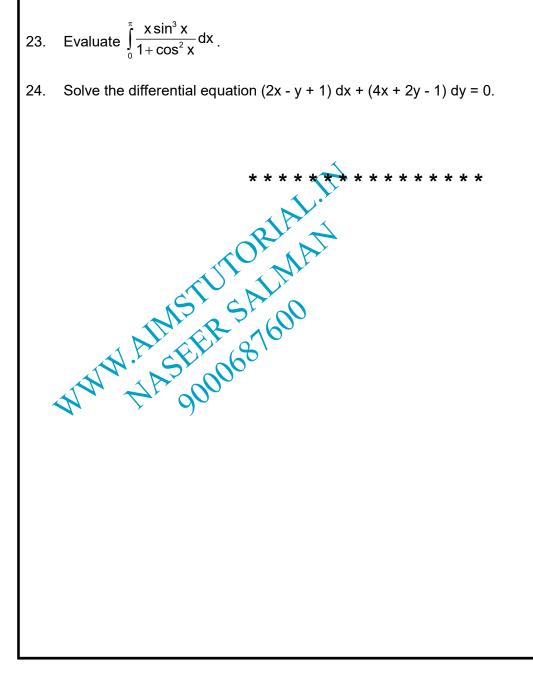
- Find the direct common tangents of the circles  $x^2 + y^2 22x 4y 100 = 0$  and  $x^2 + y^2 22x 4y + 100 = 0$ . 19.
- Prove that the area of the triangle formed by the tangents at  $(x_1, y_1)$ ,  $(x_2, y_2)$  and  $(x_3, y_3)$  to the parabola 20.  $y^2 = 4ax (a > 0)$  is

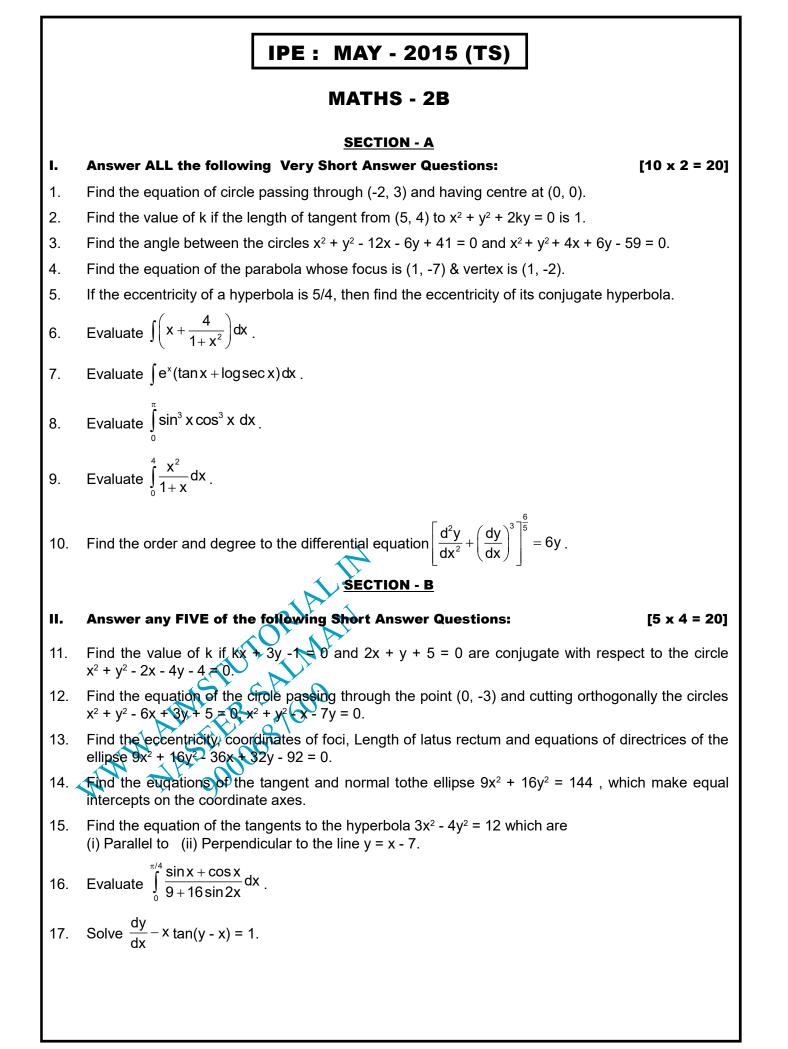
21. Evaluate 
$$\int \frac{1}{1+\sin x + \cos x} dx$$

22. Evaluate 
$$\int \frac{2x+5}{\sqrt{x^2-2x+10}} dx$$

23. Evaluate 
$$\int_{0}^{\pi} \frac{x \sin^{3} x}{1 + \cos^{2} x} dx$$
.

Solve the differential equation (2x - y + 1) dx + (4x + 2y - 1) dy = 0.



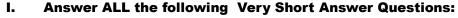


Ш. Answer any FIVE of the following Long Answer Questions. : [5 x 7 = 35] Find the equation of the circle passing through the three points (1, 2), (3, -4), (5, -6) and (19, 8) are 18. concyclic. Find the direct common tangents to the circles  $x^2 + y^2 + 22x - 4y - 100 = 0$ ,  $x^2 + y^2 - 22x + 4y + 100 = 0$ . 19. Prove that the area of the triangle insecribed in the parabola  $y^2 = 4ax$  with vertices  $(x_1, y_2)$ ,  $(x_2, y_2)$ , 20.  $(x_3, y_3)$  is  $\frac{1}{8a} |(y_1 - y_2), (y_2 - y_3) (y_3 - y_1)|$  sq. units. 21. Evaluate  $\int (3x-2)\sqrt{2x^2-x+1} \, dx$ . 22. If  $I_n = \int \sec^n dx$  then prove that  $I_n = \int \frac{\sec^{n-2} x \tan x}{n-1} + \frac{(n-2)}{n-1} I_{n-2}$ . 23. Evaluate  $\int_{0}^{\pi/2} \frac{\sin^2 x}{\cos x + \sin x} dx$ . 24.

# IPE : MARCH - 2016 (AP)

### MATHS - 2B

#### **SECTION - A**



[10 x 2 = 20]

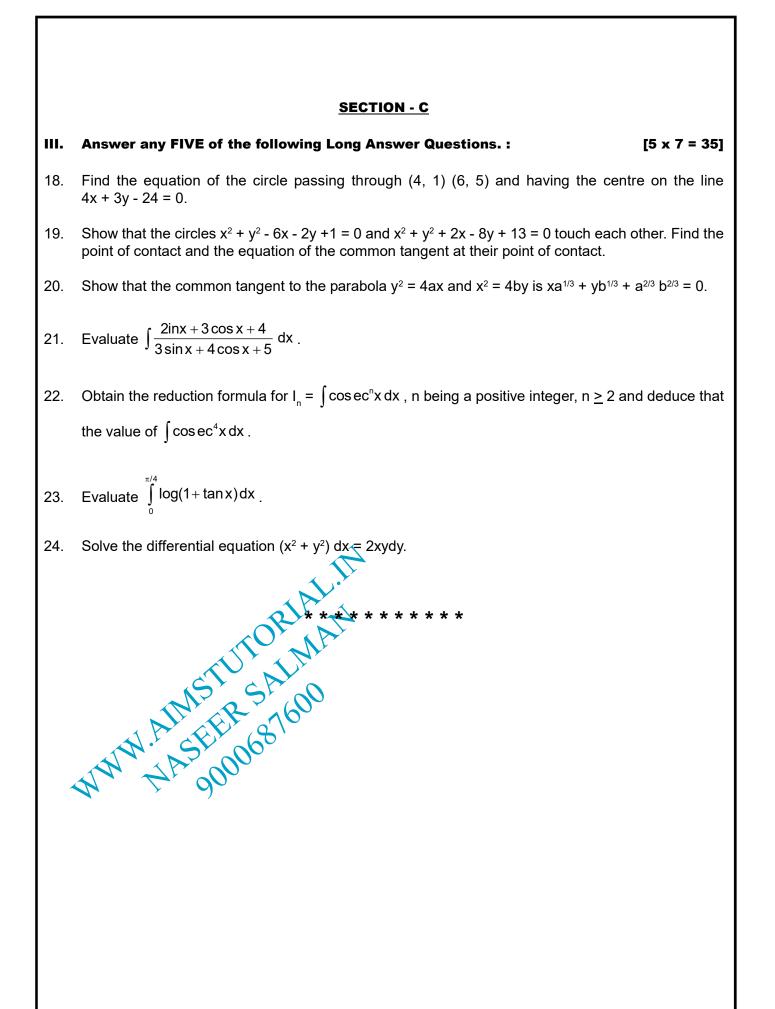
- 1. If hte circle  $x^2 + y^2 4x + 6y + a = 0$  has radius 4 then find a.
- 2. Obtain parametric equations of the circle  $(x 3)^2 + (y 4)^2 = 8^2$ .
- 3. Find k if the pairs of circles  $x^2 + y^2 + 4x + 8 = 0$ ,  $x^2 + y^2 16y + k = 0$  are orthogonal.
- 4. Find the coordinates of the points on the parabola  $y^2 = 8x$ , whose focal distance is 10.
- 5. If the eccentricity of a hyperbola is 5/4, then find the eccentricity of its conjugate hyperbola.
- 6. Evaluate  $\int \frac{1}{\cosh x + \sinh x} dx$ .
- 7. Evaluate  $\int \frac{x^8}{1+x^{18}} dx$ .
- 8. Evaluate  $\int_{-\pi/2}^{\pi/2} \sin^2 x \cdot \cos^4 x \, dx$
- 9. Evaluate  $\int_{0}^{\pi} \sqrt{2 + 2\cos\theta} \, d\theta$ .
- 10. Find the order and degree to the differential equation  $\left[\frac{d^2y}{dx^2} \left(\frac{dy}{dx}\right)^3\right]^{\frac{5}{5}} = 6y$ .

### SECTION - B

II. Answer any FIVE of the following Short Answer Questions:

[5 x 4 = 20]

- 11. Find the pole of the line 3x + 4y + 45 = 0 w.r.to the circle  $x^2 + y^2 6x 8y + 5 = 0$ .
- 12. 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.
- 13. Show that the points of intersection of the perpendicular tangents to an ellipse lie on a circle.
- 14. Find the value of k if 4x + y + k = 0 is a tangent to the ellipse  $x^2 + 3y^2 = 3$ .
- 15. Find the centre, foci, escentricity, equation of directrices of the Hyperbola  $x^2 4y^2 = 4$ .
- 16. Evaluate  $\int_{0}^{1} \frac{4}{4+5\cos x}$ .
- 17. Solve  $(1 + x^2) \frac{dy}{dx} + y = e^{Tan^{-1}x}$ .



# **IPE : MARCH - 2016 (TS)**

## MATHS - 2B

#### **SECTION - A**

- I. Answer ALL the following Very Short Answer Questions:
- 1. Find the power of the point P(-1, 1) with respect to the circle  $x^2 + y^2 6x + 4y 12 = 0$ .
- 2. Find the value of k if the points (1, 3), (2, k) are conjugate w.r.to the circle  $x^2 + y^2 = 35$ .
- 3. Find k if the paris of circles are  $x^2 + y^2 4x + 8 = 0$  and  $x^2 + y^2 6y + k = 0$  are orthogonal.
- 4. Find the value of k, if the line 2y = 5x + k is a tangent to the parabola  $y^2 = 6x$ .
- 5. Find the equation of the hyperbola whose foci are  $(\pm 5, 0)$ , the transverse axis is of length 8.
- 6. Evaluage  $\int \sqrt{x} \log x \, dx$  on  $(0, \infty)$ .
- 7. Evaluate  $\int \sec^2 x \cdot \csc ec^2 x \, dx$  on  $I \subset \mathbb{R}\left(\{n\pi : n \in z\} \cup \{(2n+1)\frac{\pi}{2} : n \in Z\}\right)$ .
- 8. Evaluate  $\int_{2}^{3} \frac{2x}{1+x^2} dx$ .
- 9. Evaluate  $\int_{0}^{a} \sqrt{a^2 x^2} dx$

11.

10. Form the differential equation corresponding to the family of curves  $y = c (x - c)^2$ , where c is a parameter.

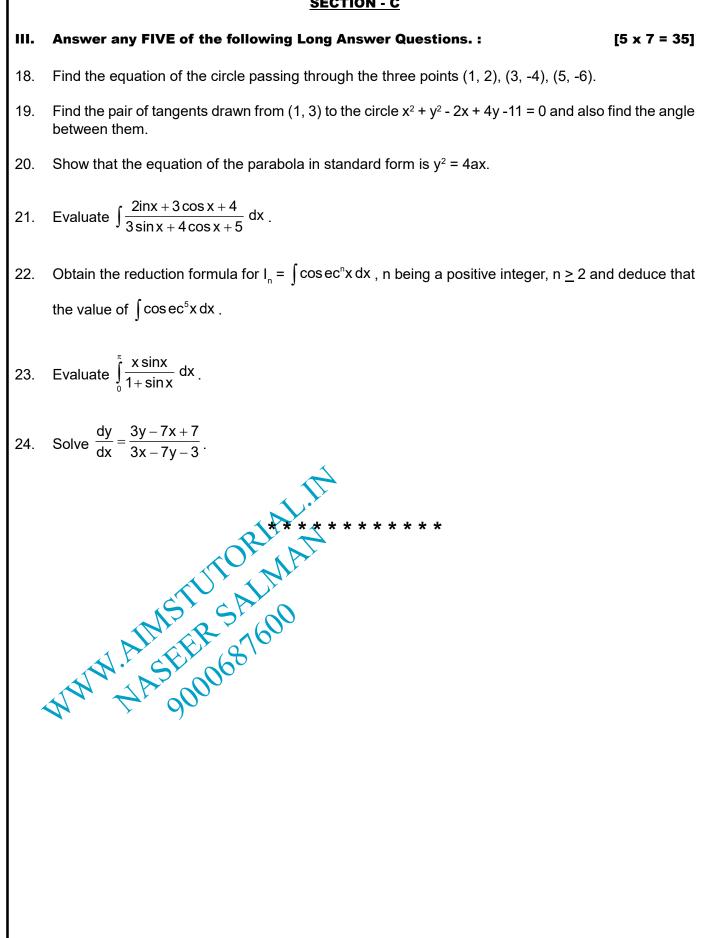
#### <u>SECTION - B</u>

#### II. Answer any FIVE of the following Short Answer Questions:

- 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.
- 12. If the two circles  $x^2 + y^2 + 2gx + 2fy = 0$ ,  $x^2 + y^2 + 2g'x + 2f'y = 0$  touch each other, then show that f'g = fg'.
- 13. Find the eccentricity, foci, length of the Latus rectum and the equation of directrices of the ellipse 9x<sup>2</sup> + 16y<sup>2</sup> = 144.
- 14. Find the equations of the tangent and normal to the ellipse  $2x^2 + 3y^2 = 11$  at the point whose ordinate is 1
- 15. Prove that the point of intersection of two perpendicular tangents to the hyperbola  $\frac{x^2}{a^2} \frac{y^2}{b^2} = -1 = 0$ , lies on the circle  $x^2 + y^2 = a^2 b^2$ .
- 16. Find the area of the region enclosed by the curves  $y = 4x x^2$ , y = 5 2x.
- 17. Solve the differential equation  $\frac{dy}{dx} + y \tan x = \sin x$ .

[10 x 2 = 20]

[5 x 4 = 20]

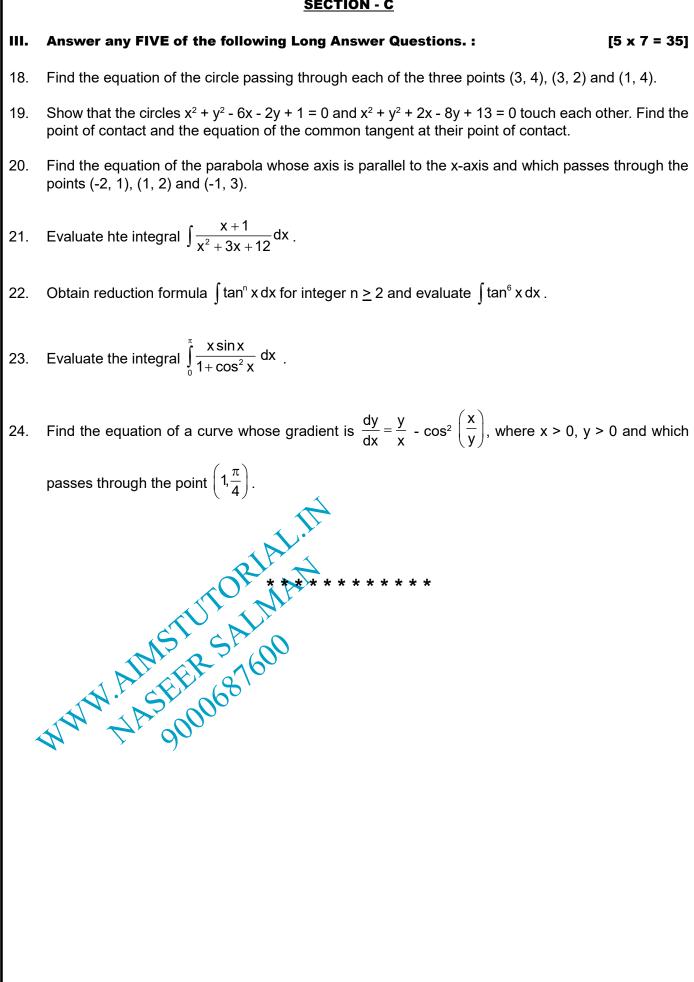


# IPE : MAY - 2016 (AP)

## MATHS - 2B

#### **SECTION - A**

I. Answer ALL the following Very Short Answer Questions: [10 x 2 = 20] If the length of the tangent from (5, 4) to the circle  $x^2 + y^2 + 2ky = 0$  is 1, then find k. 1. Find the pole of ax + by + c = 0 (c  $\neq$  0) with respect to x<sup>2</sup> + y<sup>2</sup> = t<sup>2</sup>. 2. Find the equation of the radical axis of the circles  $x^2 + y^2 - 2x - 4y - 1 = 0$ ,  $x^2 + y^2 - 4x - 6y + 5 = 0$ . 3. Find the equation of tangent to the parabola  $y^2 = 16x$  inclined at an angle 60° with its axis. 4. 5. If the eccentricity of a hyperbola is 5/4, then find the eccentricity of its conjugate hyperbola. Evaluate the integral  $\int \frac{(3x+1)^2}{2x} dx$ ,  $x \in I \subset R/\{0\}$ 6. Evaluate the integral  $\int e^{x}(\sec x + \sec x \tan x) dx$ . 7. Evaluate  $\int \sqrt{2+2\cos\theta} \, d\theta$ 8. Evaluate the definite intergral  $\int_{0}^{\pi/2} \sin^6 x \cdot \cos^4 x \, dx$ . 9. Find the general solution of  $x + y \frac{dy}{dx} = 0$ . 10. SECTION - B Answer any FIVE of the following Short Answer Questions: П. [5 x 4 = 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. 11. 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 12. circle having AB as diameter, Find the equation of the ellipse, it focus at = (1, -1), e = 2/3 and directrix is x + y + 2 = 0. 13. The tangent and normal to the ellipse  $x^2 + 4y^2 = 4$  at a point P( $\theta$ ) on it meets the major axis in Q and 14. R respectively. If  $0 < \theta < \pi/2$  and QR = 2, then show that =  $\theta = \cos^{-1}\left(\frac{2}{3}\right)$ . Find the centre, foci, eccentriicty, equation of the directrices of the hyperbola  $x^2 - 4y^2 = 4$ . 15. Find the area enclosed by the curves  $y = x^2 + 1$ , y = 2x - 2, x = -1, x = 2. 16. Solve the differential equation  $(1 + x^2) \frac{dy}{dx} + y = \tan^{-1} x$ . 17.



# IPE : MAY - 2016 (TS)

## MATHS - 2B

#### SECTION - A

- I. Answer ALL the following Very Short Answer Questions:
- 1. Find the length of the tangent from (-2, 5) to the circle  $x^2 + y^2 25 = 0$ .
- 2. Find the length of the chord formed by  $x^2 + y^2 = a^2$ , on the line  $x\cos\alpha + y\sin\alpha = p$ .
- 3. Show that the angle between the circles  $x^2 + y^2 = ax + ay$  is  $\frac{3\pi}{4}$ .
- 4. 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.
- 5. Find the product of lengths of the perpendiculars from any point on the  $\frac{x^2}{16} \frac{y^2}{9} = 1$  hyperbola to its asymptotes.
- 6. Evaluate  $\int \frac{e^x(1+x)}{\cos^2(xe^x)} dx$ .
- 7. Evaluate on  $\int \left(\frac{1}{1+x^2} + \frac{1}{1+x^2}\right) dx$  on (-1, 1).
- 8. Evaluate  $\int_{1}^{2} |1-x| dx$ .
- 9. Find the area bounded by the parabola  $\sqrt{2} x^2$  the x-axis and the lines x = -1, x = 2.
- 10. Form the differential equation corresponding to  $y = A \cos 3x + B \sin 3x$ , where A and B are parameters.
  - SECTION B
- II. Answer any FIVE of the following Short Answer Questions:
  - ns: [5 x 4 = 20]
- 11. Find the condition that the tangents drawn from (0, 0) to S =  $x^2 + y^2 + 2gx + 2fy + c = 0$  be perpendicular to eachother.
- 12. Find the readical center of the circles  $x^2 + y^2 + 4x 7 = 0$ ,  $2x^2 + 2y^2 + 3x + 5y 9 = 0$  and  $x^2 + y^2 + y = 0$ .
- 13. Prove that the equation of the chord joining the points  $\alpha$  and  $\beta$  on the ellipse  $\frac{x}{a^2} \frac{y^2}{b^2} = 1$  is

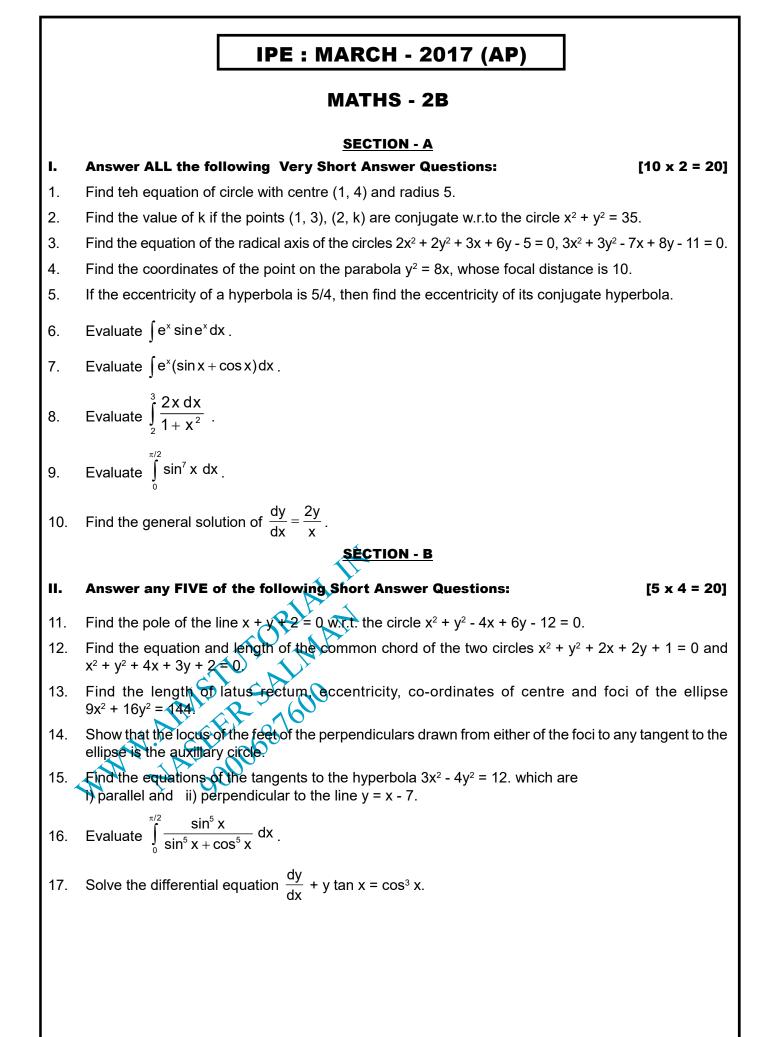
$$\frac{x}{a}\cos\left(\frac{\alpha+\beta}{2}\right)+\frac{y}{b}\sin\left(\frac{\alpha+\beta}{2}\right)=\cos\left(\frac{\alpha-\beta}{2}\right).$$

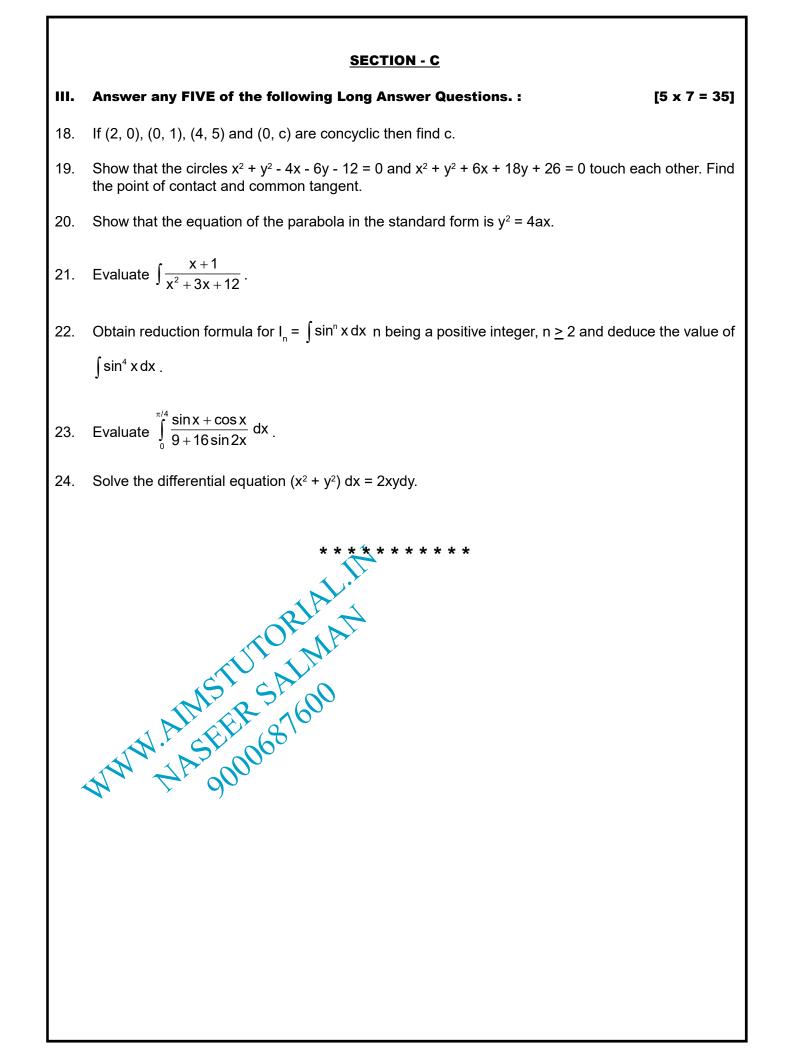
- 14. Find the equation of tangent and normal to the ellipse  $x^2 + 8y^2 = 33$  at (-1, 2).
- 15. Tangents to the hyperbola  $\frac{x^2}{a^2} \frac{y^2}{b^2} = 1$  make angles  $\theta_1$ ,  $\theta_2$  with transverse axis of a hyperbola. Show that the point of intersection of these tangents lies on the curve  $2xy = k(x^2 a^2)$  when  $\tan \theta_1 + \tan \theta_2 = k$ .

16. Find 
$$\int_{-\pi/2}^{\pi/2} \sin^2 x \cos^4 x \, dx$$
.

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

Answer any FIVE of the following Long Answer Questions. : [5 x 7 = 35] .... Find hte equation of the circle passing through each of the three points (3, 4), (3, 2) and (1, 4). 18. Find the equation of the circle which touches the circle  $x^2 + y^2 - 2x - 4y - 20 = 0$  externally at (5, 5) with 19. radius 5. Show that the equation of common tangents to the circle  $x^2 + y^2 = 2a^2$  and the parabola  $y^2 = 8ax$  are 20. y = + (x + 2a).21. Evaluate  $\int \frac{2\cos x + 3\sin x \sin x}{4\cos x + 5\sin x} dx$ . 22. If  $I_n = \int \cos^n x \, dx$ , then show that  $I_n = \frac{1}{n} \cos^{n-1} x \sin x + \frac{n-1}{n} I_{n-2}$  n being a positive integer  $n \ge 2$ . 23. Evaluate  $\int_{1}^{\pi/4} \log(1 + \tan x) dx$ Find the equation of a curve whose gradient is  $\frac{dy}{dx} = \frac{y}{x} - \cos^2\left(\frac{x}{y}\right)$ , where x > 0, y > 0 and which IS dy dx 24.





# **IPE : MARCH - 2017 (TS)**

### MATHS - 2B

#### **SECTION - A**



[10 x 2 = 20]

- 1. Obtain the parametric equation of the circle  $4(x^2 + y^2) = 9$ .
- 2. Find the value of k if the points (4, 2), (k, -3) are conjugate w.r.to the circle  $x^2 + y^2 5x + 8y + 6 = 0$ .
- 3. Find the angle between the circles  $x^2 + y^2 12x 6y + 41 = 0$  and  $x^2 + y^2 + 4x + 6y 59 = 0$ .
- 4. Find the coordinates of the point on the parabola  $y^2 = 8x$ , whose focal distance is 10.
- 5. Find the value of k if 3x 4y + k = 0 is a tangent to the hyperbola  $x^2 4y^2 = 5$ .
- 6. Evaluate  $\int \frac{1}{\cosh x + \sinh x} dx$ .
- 7. Evaluate  $\int \frac{e^{x}(1+x)}{\cos^{2}(xe^{x})} dx$ .
- 8. Evaluate  $\int_{-\pi/2}^{\pi/2} \sin |x| dx$ .
- 9. Evaluate  $\int_{0}^{3} \frac{x}{\sqrt{x^2 + 16}} dx$ .
- 10. Find the order of the differential equation of the family of all circles with their centres at the origin.

## SECTION - B

#### II. Answer any FIVE of the following Short Answer Questions:

[5 x 4 = 20]

- 11. If a point P is moving such that he lengths of tangents drawn form 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 the locus of P.
- 12. Find the equation and length of the common chord of the two circles  $x^2 + y^2 + 2x + 2y + 1 = 0$  and  $x^2 + y^2 + 4x + 3y + 2 = 0$ .
- 13. Find the equation of ellipse in the standard form, if passes through the points (-2, 2) nd (3, -1).
- 14. Find the equations of the tangent to the ellipse  $2x^2 + y^2 = 8$  which are i) Paralle to x > 2y - 4 = 0 ii) perpendicual to x + y + 2 = 0

15. If e e<sub>1</sub> are the eccentricities of a hyperbola and its conjugate hyperbola then prove that  $\frac{1}{e^2} + \frac{1}{e^2} = 1$ .

- 16. Find the area of the region bounded by the parabolas  $y^2 = 4x$  and  $x^2 = 4y$ .
- 17. Solve  $(x + y + 1) \frac{dy}{dx} = 1$ .

