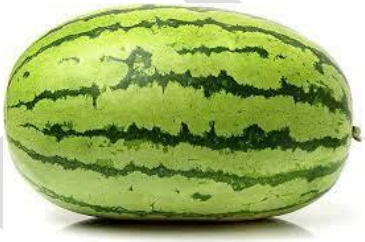
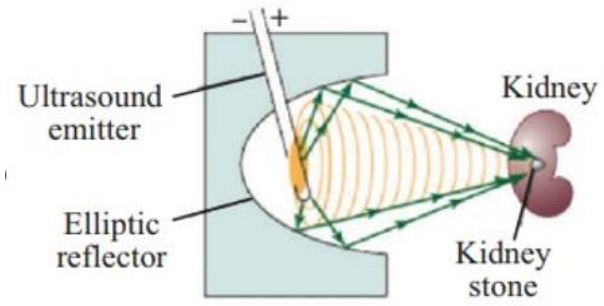
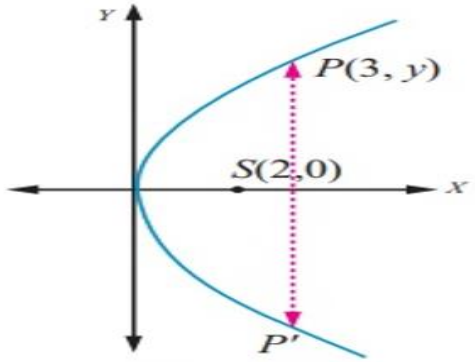
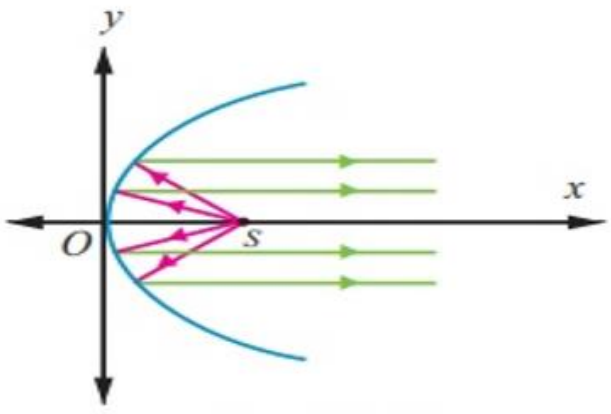
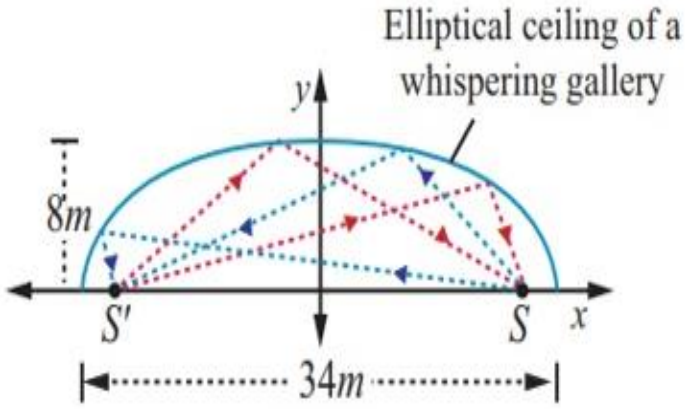
CHAPTER-11

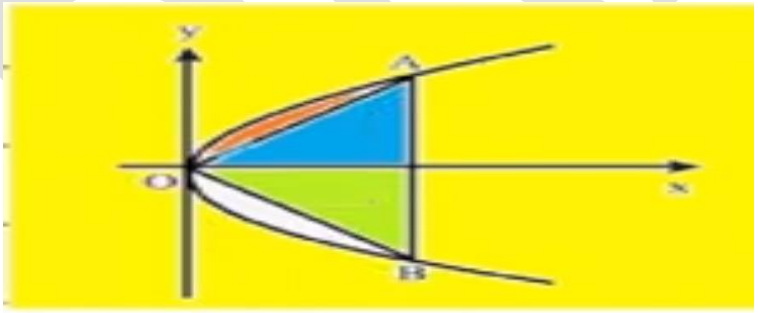
CONIC SECTIONS

02 MARK TYPE QUESTIONS

Q. NO	QUESTION	MARK
1.	Anish is playing in a circular playground having equation $2x^2 + 2y^2 - x = 0$. Compute the centre and radius of the circular playground. 	2
2.	Ramesh is potato chips which is in the shape of hyperbola whose conjugate axis is equal to the half of the distance between foci then find the eccentricity of the hyperbola . 	2
3.	Jagriti brought a watermelon from the market and while cutting it she observed that it is in the shape of an ellipse.  Find the length of major axis and minor axis of $4x^2 + y^2 = 100$	2
4.	A group of students went for atourto the ocean with their class teacher and they saw a dolphin is swimming in the ocean by making as parabolic shape. Find the length of latus rectum of the parabola $x^2 = -10y$ 	2
5.	A tyre is placed in such a way that it is adjacent to the wall and having radius 3 units. The wall and the floor are acting as Y- axis and X- axis respectively then find the equation of the circular tyre:	2
6.	An engineer designs a satellite dish with a parabolic cross section. The dish is 5m wide at the opening, and the focus is placed 1.2m from the vertex	2

	(a) Position a coordinate system with the origin at the vertex and the x -axis on the parabola's axis of symmetry and find an equation of the parabola. (b) Find the depth of the satellite dish at the vertex.	
7.	If the equation of the ellipse is $\frac{(x-11)^2}{484}+\frac{y^2}{64}=1$ (x and y are measured in centimeters) where to the nearest centimeter, should the patient's kidney stone be placed so that the reflected sound hits the kidney stone? 	2
8.	The parabolic communication antenna has a focus at 2m distance from the vertex of the antenna. Find the width of the antenna 3m from the vertex. 	2
9.	A search light has a parabolic reflector (has a cross section that forms a 'bowl'). The parabolic bowl is 40 cm wide from rim to rim and 30 cm deep. The bulb is located at the focus . (1) What is the equation of the parabola used for reflector? (2) How far from the vertex is the bulb to be placed so that the maximum distance covered? 	2

10.	A room 34*m* long is constructed to be a whispering gallery. The room has an elliptical ceiling, as shown in Fig. 5.64. If the maximum height of the ceiling is 8*m* , determine where the foci are located.  	2
11.	Ram is standing at a point whose coordinate is (3,4), Laxman wants to move in a path such that its distance from Ram is always 3 unit. Find the equation of path followed by Laxman	2
12.	Harmit wants to construct a solar parabolic reflector which is 20 cm, wide and 5 cm deep. Find the coordinate of the point at which maximum concentration of sunlight will occur(assuming sunlight travel parallel to the axis of parabolic reflector).	2
13.	A boy made a model in which Earth moves on a path whose equation is $4x^2 + 9y^2 = 36$. Find the possible coordinate of the sun in the model.	2
14.	A road is in the form of straight line whose equation can be given as y=2 and Mohan is standing at some point whose coordinate can be mentioned as (0, – 2), Suresh moves in such a way that his distance from Mohan and Road is always equal. Find the locus of Suresh.	2
15.	If the eccentricity of an ellipse is 5/8 and the distance between its foci is 10, then find latus rectum of the ellipse	2
16.	Find the equation of the latus rectum of the parabola $y^2=-4x$	2
17.	Find the equation of the Ellipse with major axis on the x-axis and passes through the points (4,3) and (6,2).	2
18.	Prove that the no portion of the curve $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ lies between the lines x = + a and x = – a, (i.e. no real intercept on the conjugate axis).	2
19.	Prove that the length of the latus rectums of the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ is $\frac{2b^2}{a}$ unit.	2
20.	Find the eccentricity of the Hyperbola whose Foci are at (± 4, 0) and the latus rectum is of length 12unit.	2
21.	Indian track and field athlete Neeraj Chopra,who competes in the javelin throw, won a gold medal at Tokyo Olympics. He is the first track and field athlete to win a gold medal for India at the Olympics.	2

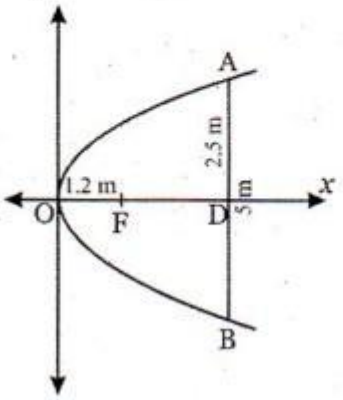
	  i) Name the shape of the path followed by a javelin. ii) If equation of such a curve is given by x^2 =-16y, then the coordinates of the foci are?	
22.	The cable of a uniformly loaded suspension bridge hangs in the form of a parabola. The roadway which is horizontal and 100 m long is supported by vertical wires attached to the cable, the longest wire being 30 m and the shortest being 6m. Find the length of a supporting wireattached to the roadway 18 m from the middle. 	
23.	Sheena is a graphic designer and nowadays she is making a design using mathematical curves and polygons (as shown in the figure).  She is drawing a parabola $y^2 = 8x$ and a triangle whose one of the vertex is same as that of the parabola. I) What will be the side of the triangle if it is an equilateral triangle? ii) What will be the length of the three sides of the triangle if it is an isosceles triangle, with its base as √2 times any of the two equal sides?	2
24.	An athlete is running along a path such that sum of distances from the two flag posts from him is always 26m and also distance between two flags is 10m. I) Find the coordinates of F1 and F2. ii) Find the length of Latus rectum.	2

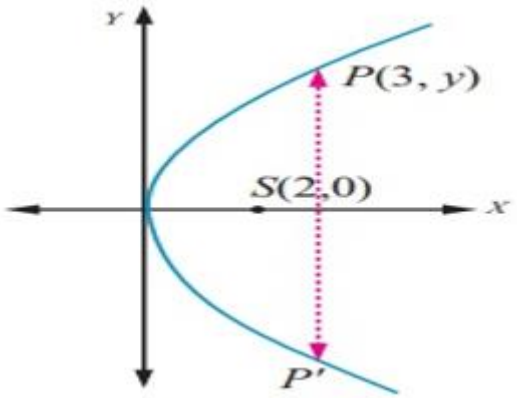
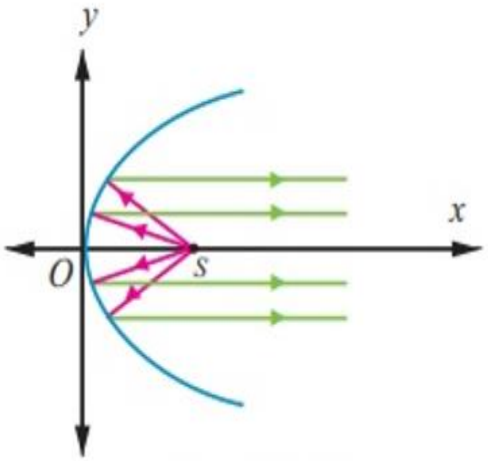
		
25.	In a classroom, teacher explains the properties of a conic curve by saying that this particular conic curve has beautiful ups and downs as per there nature.we can see these curves in nature and in daily life in the form of pillar, bridges and in tunnel.This conic curve can be seen in the logo of Mc Donald. Figure is shown below.   (i)Name the conic section about which teacher is explaining in the classroom . (ii)write down all four form of standard equation of the given partivular conic section.	2
26.	Find the equation of the circle which touches x-axis and whose centre is (1,2).	2
27.	If (0, 4) and (0, 2) are vertex and focus of a parabola, then find the equation of parabola.	2
28.	Find equation of ellipse whose length of major axis is 20 and foci $(0, \pm 5)$	2
29.	Find equation of circle, the end points of one of whose diameter are (2, -3) and (-3, 5).	2
30.	Find equation of parabola which is symmetric about Y –axis and passes through (2, -3).	2
31.	Determine the equation of the circle with radius 4 and Centre (-2, 3).	2
32.	Find the equation of the parabola with focus at F (5,0) and directrix is $x = -5$	2
33.	Find the equation of the parabola with vertex at the origin and y+5=0 as its directrix. Also,	2

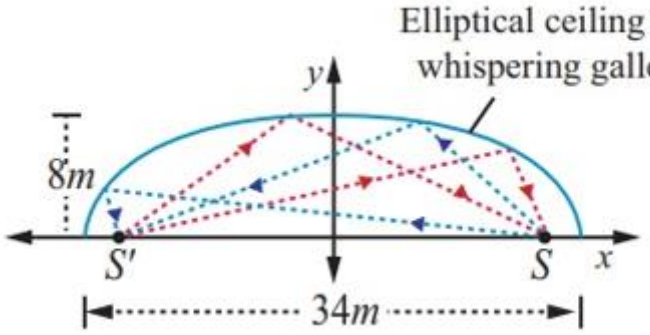
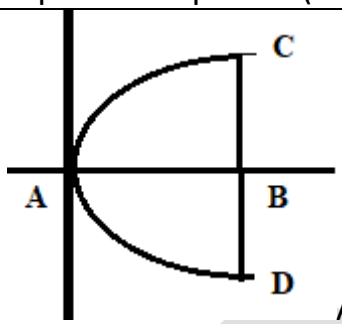
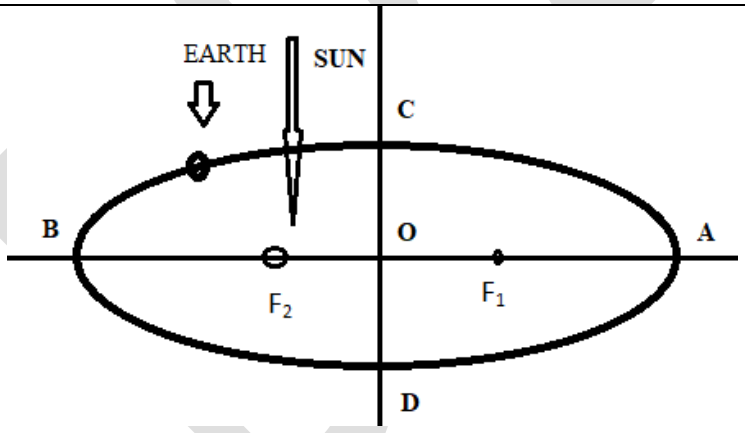
	find its focus?	
34.	Find the eccentricity of the hyperbola of $y^2/9 - x^2/16 = 1$	2
35.	Find the equation of the ellipse, the ends of whose major axis are (±3,0) and at the ends of whose minor axis are (0,±4)	2

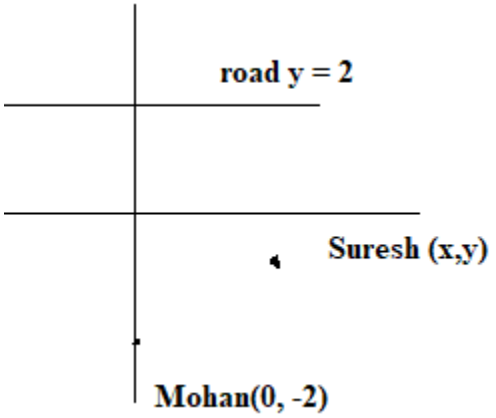
ANSWERS:

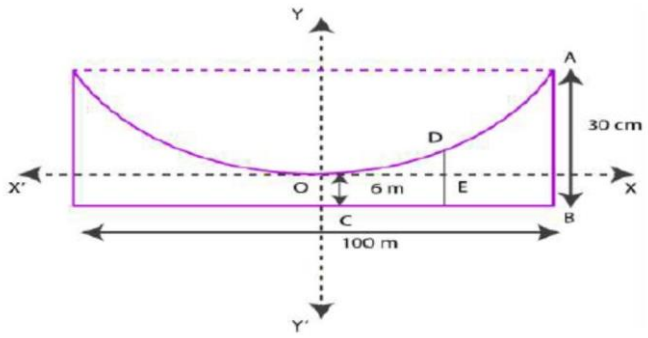
Q. NO	ANSWER	MARKS
1.	$2x^2+2y^2-x=0$ $\Rightarrow (2x^2-x)+2y^2=0$ $\Rightarrow 2\left[\left(x^2-\frac{x}{2}\right)+y^2\right]=0$ $\Rightarrow \left\{x^2-2.x\left(\frac{1}{4}\right)+\left(\frac{1}{4}\right)^2\right\}+y^2-\left(\frac{1}{4}\right)^2=0$ $\Rightarrow \left(x-\frac{1}{4}\right)^2+(y-0)^2=\left(\frac{1}{4}\right)^2$	1+1
2.	we have, we have, $\frac{2b^2}{a}=l$ and 2b = c =) 2b = ae Consider, 2b = ae squaring, $4b^2=a^2e^2$ $4a^2(e^2-1)=a^2e^2$ $4e^2-e^2=4$ $3e^2=4$ $e=\pm\frac{2}{\sqrt{3}}$	1+1
3.	Given equation is $25x^2+100y^2=1$ this is of the form $b^2x^2+a^2y^2=1, a^2>b^2$ ∴ it is an equation of a vertical ellipse Now ($b^2=25\Rightarrow b=5$);($a^2=100\Rightarrow a=10$) $\therefore c=a^2-b^2=100-25=75=5\sqrt{3}$ thus a=10,b=5,c=$5\sqrt{3}$ (i) Length of the major axis =2a=20 units (ii) Length of the minor axis =2b=10units	1+1
4.	We have,$x^2=-4by, \Rightarrow -4b=-8$,b=2 Length of latus rectum=4b=8 unit	1+1
5.	We have, Centre=(3,0) Then,$(x-h)^2+(y-k)^2=r^2$ $(x-3)^2+(y-0)^2=3^2$ $x^2+6x+9+y^2=9$ $x^2+y^2+6x=0$	1+1

6.	**SOLUTION** Given the vertex is at the origin focal distance a = 1.2 m. Axis of the parabola is x - axis.  A is $(x, 2.5)$ $\therefore$ The equation of the parabola is $y^2 = 4ax$ $y^2 = 4 \times 1.2x \Rightarrow y^2 = 4.8x$ -----(1) Let OD be the depth of the dish. Given width of the dish AB = 5 m. $\therefore$ AD = 2.5 m. Let OD = x. The coordinates of A are (OD, AD), Substituting in equation (1) we get $(2.5)^2 = 4.8x \Rightarrow x = \frac{(2.5)^2}{4.8} = 1.302$ $\therefore$ Required depth of the dish = 1.3 m	2
7.	The origin of the sound wave and the kidney stone of patient should be at the foci in order to crush the stones. $a^2 = 484$ and $b^2 = 64$ $c^2 = a^2 - b^2$ = 484 -64 = 420 $c \approx 20.5$ Therefore the patient's kidney stone should be placed 20.5cm from the center of the ellipse.	2
8.	Let the parabola be $y^2 = 4ax$. Since focus is 2m from the vertex a = 2 Equation of the parabola is $y2 = 8x$	2

	 Let *P* be a point on the parabola whose *x* -coordinate is 3*m* from the vertex *P* (3, *y*) $y^2 = 8 \times 3$ $y = \sqrt{(8x3)}$ $= 2\sqrt{6}$ The width of the antenna *3m* from the vertex is $4\sqrt{6}$ *m*.	
9.	Let the vertex be (0, 0) .  The equation of the parabola is $y^2 = 4ax$ (1) Since the diameter is 40 *cm* and the depth is 30 *cm* , the point (30,20) lies on the parabola. $20^2 = 4a \times 30$ $4a = 400/30 = 40/3$. Equation is $y^2 = 40/3\ x$. (2) The bulb is at focus (0, *a*) . Hence the bulb is at a distance of 10/3 cm from the vertex	2
10.	The length *a* of the semi major axis of the elliptical ceiling is 17*m* . The height *b* of the semi minor axis is 8*m* .	2

	 Thus $c^2 = a^2 - b^2 = 17^2 - 8^2$ then $c = \sqrt{[289 - 64]} = \sqrt{225}$ $= 15$ For the elliptical ceiling the foci are located on either side about 15m from the center, along its major axis.	
11.	Equation of path is $(x - 3)^2 + (x - 4)^2 = 3$	2
12.	 AB = 5, CD= 20, CORDINATE OF C(5,10) Equation of parabola is $y^2=4ax$, $(5)^2=4a(10) \Rightarrow a = \frac{5}{4}$	2
13.	 Sun will be at one of the focus Equation of ellipse $4x^2 + 9y^2 = 36$ Standard form $\frac{x^2}{9} + \frac{y^2}{4} = 1, a^2 = 9\ b^2 = 4, a^2 = b^2 + c^2$ $c^2 = 9 - 4 = 5 \Rightarrow c = \pm\sqrt{5}$ So possible co-ordinate of sun is $(\pm\sqrt{5}, 0)$	2

14.	 Let Mohan coordinate be (x,y) $\sqrt{x^2+(y+2)^2}=(y-2)\Rightarrow x^2=-4y$	2
15.	$e=\frac{5}{8}=\frac{c}{a}\Rightarrow\frac{5}{8}=\frac{5}{a}\Rightarrow a=8, a^2=b^2+c^2\Rightarrow b^2=64-25=49$ $l=\frac{2b^2}{a}=\frac{98}{8}$	2
16.	Since it passes through the focus (-1,0) and perpendicular to x axis so its equation is x=-1	
17.	Putting the points on the equation $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, and solving two equations ,$a^2=52$ and $b^2=13$. Thus its equation is $\frac{x^2}{52}+\frac{y^2}{13}=1$	
18.	have for every point (x, y) on the hyperbola, $\frac{x^2}{a^2}=1+\frac{y^2}{b^2}\geq 1$. i.e, $\left\|\frac{x}{a}\right\|\geq 1$, i.e., $x\leq -a$ or $x\geq a$. Therefore, no portion of the curve lies between the lines $x=+a$ and $x=-a$, (i.e. no real intercept on the conjugate axis).	
19.	The ends of the latus rectum of a hyperbola are $(ae, \pm b^2/a^2)$, and the length of the latus rectum is $2b^2/a$.	
20.	$2b^2/a=12$ and $ae=\pm 4$, we know for hyperbola $e^2=1+b^2/a^2$. Thus by solving $a=2$ & $b^2=12$. So $e=2/\sqrt{3}$	
21.	i) Parabola ii) $x^2=-16y$ so, $a=4$ Then foci (0, -4)	2
22.	The vertex is at the lowest point of the cable. The origin of the coordinate plane is taken as the vertex of the parabola, while its vertical axis is taken along the positive y-axis. This can be diagrammatically represented as.	2

	 equation of the parabola, x^2 = 4 x 625/24 x y Rightarrow 6x ^ 2 = 625y The x-coordinate of point D is 18. Hence, at x = 18 Rightarrow 6 * (18) ^ 2 = 625y → y = (6 * 18 * 18) / 625 ⇒ y = 3.11 (approx.) Therefore, DE = 3.11m DF = DE + EF = 3.11m + 6m = 9.11 m	
23.	I) b = cos 30° => b=√3/2a (√3/2a, a/2) lies on the parabola y== 8x a^2 - 4√3 a = 0 a^2-16√32=0 =) a (a-16.√3)=0 =) α=0,16√3 But a=0 Not possible .so,a= 16√3 ii) Let equal sides = a Then base = √2 a Then A(a/√2,a/√2) lies on the the the parabola a = 8√12	2
24.	i) (c, 0) =(5, 0) &(- c, 0)=(- 5 , 0) ii)a = 13 b = 12 , Length of latus rectum=288/13	2
25.	I) Parabola ii) Right hand parabola y^2 =4ax Left hand parabola :y^2=-4ax Upward parabola:x^2=4ay Downward parabola:x^2=-4ay	2
26.	Given that, circle with centre (1,2) touches x-axis. Radius of the circle is, r = 2	2

	So, the equation of the required circle is: $(x - l)^2 + (y - 2)^2 = 2^2$ $=>x^2-2x + 1 + y^2-4y + 4 = 4$ $=> x^2 + y^2 - 2x-4y + 1 = 0$	
27.	Given (0, 4) and (0, 2) are vertex and focus (h, k) = (0, 4) and (0, a) = (0, 2) h = 0, k = 4, a = 2 Required equation : $(x - 0)^2 = -4.2(y - 4)$ $x^2 + 8y = 32$	2
28.	Since the foci $(0, \pm 5)$ are on Y – axis, therefore equations of ellipse is $x^2/b^2 + y^2/a^2 = 1$ Length of major axis = 20 2a = 20 a = 10 Now foci = $(0, \pm 5)$ = foci $(0, \pm ae)$ ae= 5 $b^2 = a^2(1-e^2) = a^2 - a^2e^2 = 100 - 25 = 75$ $b^2=75$ So, equation of ellipse is $x^2/75 + y^2/100 = 1$	2
29.	Equation of circle whose end points are (2, -3) and (-3, 5) : (x – 2)(x + 3) + (y + 3)(y – 5) = 0 $X^2 + x - 6 + y^2 - 2y - 15 = 0$	2
30.	Equation of the parabola is $x^2 = - 4ay$ It passes through (2, -3)	2

	$2^2 = -4a(-3)$ So, $a = 1/3$ Required equation of parabola is $x^2 = 4y/3$	
31.	Given that: Radius, r = 4, and center (h, k) = (-2, 3). We know that the equation of a circle with centre (h, k) and radius r is given as $(x – h)^2 + (y – k)^2 = r^2$ ….(1) Now, substitute the radius and center values in (1), we get Therefore, the equation of the circle is $(x + 2)^2 + (y – 3)^2 = (4)^2$ $x^2 + 4x + 4 + y^2 – 6y + 9 = 16$ Now, simplify the above equation, we get: $x^2 + y^2 + 4x – 6y – 3 = 0$ Thus, the equation of a circle with center (-2, 3) and radius 4 is $x^2 + y^2 + 4x – 6y – 3 = 0$	2
32.	F(5,0) lies on the right hand side of origin. Thus, it is a right hand parabola. Let the required equation be $y^2=4ax$ and a=5 Hence, $y^2=20x$	2
33.	Let the vertex of the parabola be O(0,0) y + 5 = 0 ⇒ y = −5 The directrix is a line parallel to the x−axis at a distance of 5units below the x−axis. Thus, the focus is F(0,5) So, the equation of the parabola is $x^2= 4ay$ where a = 5 i.e. $x^2=20y$	2
34.	Here, a = 3 and b = 4 And $c^2 = a^2 + b^2$ $\Rightarrow c^2 = 9+16$ $\Rightarrow c^2 = 25$ Thus, c = 5 ⇒e = ca	2

	$\Rightarrow$ e = 53	
35.	Let the required equation be $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ Its vertices are (±a,0) So, a = 3 Ends of minor axis are C(0,−4) and D(0,4) $\therefore$ CD = 8 i.e. length of the minor axis = 8units $\Rightarrow$ 2 b = 8 $\Rightarrow$ b = 4 $\therefore$ a = 3 and b = 4 Therefore, the required equation is $\frac{x^2}{9}+\frac{y^2}{16}=1$	2