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Faculty	:	Electronic Engineering	Time	:	90 M
Department	:	Physics & Eng. Maths.	No. of Pages	:	1
Academic Level	:	Preparatory Year	Full Mark	:	50 Marks
Course Name	:	Analytic Geometry	Exam	:	Terminal Exam
Course Code	:	PHM1	Examiner	:	Prof. R. El-Shanawany

Answer all the following.

1. **(17 Marks)**

   (a) **(6 Marks)** Radio (or any electromagnetic) waves travel at the speed of light, 3×10^8 *meter*/sec. a radio signal is received by one station located at $A(-4,0)$ and 5 microseconds (1 microsecond $= 10^{-6}$ seconds) later by another station located at $B(4,0)$. If the units of the coordinate system are in kilometers, describe the possible location of the sending station.

   (b) **(6 Marks)** Analyze and sketch the graph of $8x^2 - 4xy + 5y^2 = 36$.

   (c) **(5 Marks)** Sketch the graph $r^2 \cos 2\theta = 1$.

2. **(17 Marks)**

   (a) **(6 Marks)** Find an equation of the graph with foci $(1,-1)$, and $(3,-1)$, and eccentricity $\frac{3}{4}$.

   (b) **(5 Marks)** Transform the equation $r - 6\sin\theta = 0$ into an equation in Cartesian coordinate and sketch it.

   (c) **(6 Marks)** Analyze and sketch the graph of $x^2 + 2xy + y^2 + 8\sqrt{2}x = 0$.

3. **(16 Marks)**

   (a) **(6 Marks)** Find the center, foci, and asymptotes, and sketch the graph of $x^2 - 2x - 2y^2 - 8y - 3 = 0$.

   (b) **(10 Marks)** Let F be a point, D be a vertical line, and e be any positive number. Find a polar equation whose graph is the set of points P with $d(P,F) = e\,[d(P,D)]$. Change to rectangular coordinates and show that the graph is a conic section. Furthermore, sketch the graph of $r = \dfrac{2}{1 + e\cos\theta}$ at $e = 0.5, 1, 2$.