Engineering Mathematics and Physics Department Algebra and Analytical Geometry Course Code: Math 102 Final Exam Time Allowed: 2 hours	Modern University For Technology & Information **Faculty of Engineering**	Academic year: 2009/2010 Semester: Spring May, 16, 2010 Examiners: Dr. Mona Mehanna Dr. Mohamed Husein Eid

Answer Five questions only

Question 1

(a) Find the vertex, focus, and sketch the parabola $y^2 - 4x - 4y = -20.$

(b) Find the center, vertices and foci of the curve $x^2 + 4y^2 - 8x - 16y + 16 = 0.$

Question 2

(a)Separate the lines and find the angle between them $x^2 - y^2 + 3x - y + 2 = 0.$

(b)Write the equation of the plane which passes through the point (1, –1, 3) and parallels to the plane $2x + 3y - z + 12 = 0.$

Question 3

(a)Write the equation of hyperbola of foci $F_1(5, 0)$, $F_2(-1, 0)$ and transverse axes is 4.

(b)Describe each of the following surfaces: (i) $x^2 - y^2 + z^2 = 0$

(ii) $x^2 + y^2 + z^2 - 2x - 8z + 6 = 0$ (iii) $x^2 + y^2 - 2z = 0$

(c)Determine the centre and radius of the circle $x^2 + y^2 - 2x + 4y - 4 = 0.$ Also, write it in parametric form.

Question 4

(a) Solve the equation $x^3 - 5x^2 + 8x - 6 = 0$, if one of the roots is (1+ i).

(b) Using mathematical induction to prove the validity of the following:

$$1^2 + 2^2 + 3^2 + \cdots + n^2 = \frac{1}{6}n(n+1)(2n+1).$$

Question 5

(a) Using the binomial theorem, expand $(8 + 12x)^{\frac{2}{3}}$.

(b) Use De Moiver's theorem to evaluate: $(-\sqrt{3} + i)^{\frac{3}{5}}$.

(c) Find the sum $\sum_{r=1}^{n} \frac{1}{(r+1)(r+3)}$.

Question 6

(a) Find the eigenvalues and the eigenvectors of the matrix $A=\begin{bmatrix} 1 & 2 \\ -2 & -2 \end{bmatrix}$.

(b) Solve the linear system $4x + 2y - z = 5$, $3x - y - z = -2$, $x + y - z = 0$.

Good luck *Dr. Mona Mehanna* *Dr. Mohamed Eid*

Mathematics 2: A. Geometry Mid-Term Exam

Time: 1 hour Date 14 – 4 – 2010

Answer the following questions:

[1]Complete the following statements:

(a)The circle is the locus of moving point such that….

(b)The equation $x^2 - y^2 = 0$ represents pair of lines passing through …..and the angle between them is ….

[2]Separate the lines $x^2 - 3xy + 2y^2 + 2x - 4y = 0$

[3]Write the equation of circle where the points (2, – 1), (4, 1) are ends of diameter. Also, determine its center and radius.

[4] Find the vertex and focus of the parabola $y^2 - 4x - 4y + 16 = 0$

[5]Find the center, vertices and foci of the ellipse $4x^2 + 9y^2 - 24x - 54y + 81 = 0$

Also, sketch its curve.

Good luck *Dr. Mohamed Eid*