Basic Science Department **Math. 2 Code: Math 102** **Final Exam: 26 – 5 – 2013** **Time Allowed: 2 hours**	**Modern University** For Technology & Information **Faculty of Engineering**	**Academic year: 2012 / 2013** **Semester: Spring** **Examiner: Dr. Mona Samir** **Dr. Mohamed Eid**
Answer All questions		Total Mark: 40

Question 1

(a) If $\alpha, \beta \text{ and } \gamma$ are the roots of the equation: $x^3 - 6x - 3x^2 + 8 = 0$, Find: (i) $\sum_{i=1}^{3} C_i^2$ (ii) $\sum_{i=1}^{3} C_i^3$ (iii)The roots if they form an A.S. — 4

(b) Using mathematical induction, prove that: — 3

$$\frac{1}{2x3} + \frac{1}{3x4} + \frac{1}{4x5} + \cdots + \frac{1}{(n+1)(n+2)} = \frac{n}{2(n+2)}$$

(c)Find the sum to **n** terms of the series: $\frac{1}{1x2} + \frac{1}{2x3} + \frac{1}{3x4} + \cdots + \frac{1}{n(n+1)}$ — 3

Question 2

(a) Find the eigenvalues and the eigenvectors of the matrix: $A=\begin{bmatrix}1 & 0 & 2\\ 0 & 2 & 0\\ 0 & 1 & 3\end{bmatrix}$ — 4

(b) Solve the equation $x^3 - 8x^2 + 21x - 20$, if $2 - i$ is one of the root. — 3

(c) Solve the following linear system by inverse method: — 3

$y + 2z + 2x - 8 = 0, \quad x + z - y = 1, \quad x + 2z + y = 7.$

Question 3

(a)State the definition of parabola. — 2

(b) Determine the center and radius of the circle $x^2 + y^2 + 4x - 6y + 3 = 0$. Also, write its tangent at the point (1, 2). — 4

(c) Find center, vertices and sketch the hyperbola $4x^2 - y^2 + 24x + 4y + 36 = 0$. — 4

Question 4

(a)Find center, vertices and sketch the ellipse $x^2 + 4y^2 + 4x + 8y + 4 = 0$. — 3

(b)Write the equation of plane that passes through (1, 2, 3), (2, 0, 1), (4, 1, – 1). — 3

(c)Find the angle between the line $\frac{x-2}{2} = \frac{y-1}{1} = \frac{z}{-1}$ and the plane $x - 2y + z + 1 = 0$ Also, find the point of intersection. — 4

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

Basic Science Department **Mathematics 2 Code: Math 102** **Mid-Term Exam: 7 / 4 / 2013** **Time Allowed: 70 Minuets**	Modern University For Technology & Information **Faculty of Engineering**	**Academic year: 2012 / 2013** **Semester: Spring** **Examiners: Dr. Mona Samir** **Dr. Mohamed Eid**
Answer All questions		Total **Mark: 30**

The answer of **Algebra** and the answer of **Geometry** in two separated papers

Algebra

(1) Using mathematical induction to prove the validity of the following: 4

$$\frac{1}{1\times2}+\frac{1}{2\times3}+\cdots+\frac{1}{n\times(n+1)}=\frac{n}{n+1}$$

(2) Use Horner's method to divide $(2x^3 - x^2 + 4x - 1)$ by $(x + 1)$. 4

(3) Find the sum of n terms of the series: $\sum_{r=1}^{n} r(r-3)(r+4)$ 4

(4) Using the binomial theorem, expand $(7 - 3x^4)^{-4}$. 3

A. Geometry

(1)State the definition of parabola. 2

(2) Find the radical axis of the circles: 2

$x^2 + y^2 + 3x - 4y = 0$ and $x^2 + y^2 + x - y - 2 = 0$.

(3) Write the equation of circle with center (1, – 2) and radius 2. 3

Also, find its tangent line at the point (1, 0).

(4)Find the vertex, focus and sketch the parabola $x^2 - 4x + 8y - 12 = 0$. 4

(5)Find the center, vertices and sketch the ellipse $4x^2 + y^2 - 8x - 12 = 0$. 4

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

Group	ID	Name

[1]Complete the statement: The circle is the locus of moving point such that….

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

[3]Write the equation of circle where the points (2, – 1), (0, 3) are ends of diameter.
Also, find its center and write the tangent of this circle at the point (2, 3).

Answer

Group	ID	Name

[1]State the definition of radical axis of two circles.

[2]Separate the lines $x^2 + 4xy + 4y^2 + 3x + 6y + 2 = 0$.

[3] Find vertex, focus and sketch the parabola $y^2 + 8x = 0$ and write its tangent at the point (– 2, 4)

Answer

Group	ID	Name

[1]Complete the statement: The line is the locus of moving point such that….

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

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

Answer

Group	ID	Name

[1]Complete the statement: The parabola is the locus of moving point such that….

[2]Separate the lines $2x^2 + xy - y^2 + 5x - y + 2 = 0$

[3]Determine the center and radius of circle: $x^2 + y^2 + 2x - 4y - 4 = 0$

Find the radical axis of the circles: $x^2 + y^2 + x + 2y = 0$, $x^2 + y^2 + 2x - 4y - 4 = 0$

Answer

Group	ID	Name

[1]State the definition of circle.

[2]Separate the lines $2x^2 + 3xy + y^2 = 0$ and find the angle between them and the point of intersection.

[3] Find the vertex, focus and sketch the parabola $x^2 - 4x + 8y - 20 = 0$

Answer

Group	ID	Name

[1]State the definition of parabola.

[2]Separate the lines $2x^2 + xy - y^2 = 0$ and find the angle between them and the point of intersection.

[3] Find the vertex, focus and sketch the parabola $y^2 - 12x - 4y + 16 = 0$

Answer

1-Name:	Group:	ID

[1]Determine center, vertices and sketch the hyperbola $x^2 - 4y^2 + 4x - 16y - 16 = 0$

[2]Write the line that passes through the points (2, 1, 4), (3, 0, 1) in symmetric form and parametric form.

[3]Find the angle between the lines: $\frac{x-4}{2} = \frac{y-2}{-2} = \frac{z-1}{1}$, $\frac{x}{2} = \frac{y-2}{2} = \frac{z-1}{-1}$

2-Name:	Group:	ID

[1]Determine center, vertices and sketch the hyperbola $4x^2 - y^2 + 24x + 4y + 36 = 0$

[2]Write the equation of plane that passes through the points: (1, 1, 0), (1, 0, 3), (4, 3, 1)

[3]Find the angle between the lines $\frac{x-4}{2} = \frac{y+1}{2} = \frac{z-3}{1}$, x = 2, y = 3t, z = 4t –1, t in R

3-Name:	Group:	ID

[1]Determine center, vertices and sketch the hyperbola $x^2 - 4y^2 - 6x - 24y - 31 = 0$

[2]Find the point of intersection of the line $\frac{x-2}{2} = \frac{y-1}{1} = \frac{z}{-1}$ with the plane

$x - 2y + z + 1 = 0$

[3]Find the angle between the line $\frac{x-3}{2} = \frac{y}{1} = \frac{z+3}{2}$ and the plane $x - 2y + 2z - 10 = 0$

4-Name:	Group:	ID

[1]Determine center, vertices and sketch the hyperbola $x^2 - 4y^2 + 4x + 24y - 36 = 0$

[2]Show that the line $\frac{x-2}{1} = \frac{y-1}{2} = \frac{z+2}{-1}$ lies in the plane $3x - y + z - 3 = 0$

[3]Find the angle between the planes: $3x + 4z + 5 = 0$, $x - 2y + 2z = 0$

5-Name:	Group:	ID

[1]Determine center, vertices and sketch the hyperbola $4x^2 - y^2 + 16x - 4y + 16 = 0$

[2]Write the equation of plane that passes through the points: (2, 1, 0), (1, 2, 3), (3, 0, 4)

[3]Find the angle between the planes: $x + y - z + 1 = 0$, $2x + 2y - 2z + 5 = 0$

6-Name:	Group:	ID

[1]Determine center, vertices and sketch the hyperbola $3x^2 - y^2 + 18x - 4y + 24 = 0$

[2]Write the line that passes through the points (0, 1, 3), (3, 2, –2) in symmetric form and parametric form.

[3]Find the angle between the lines $x = t + 2$, $y = 3t$, $z = 2t - 1$,

$x = 2t - \frac{1}{2}$, $y = t + 2$, $z = \frac{1}{2}t - \frac{3}{4}$, $t \in \mathbb{R}$
