Basic Science Department **Mathematics 2 Code: Math 102** **Final Exam: May, 2012** **Time Allowed: 2 hours**	Modern University For Technology & Information **Faculty of Engineering**	**Academic year: 2011 / 2012** **Semester: Spring** **Examiners: Dr. Mona Samir** **Dr. Mohamed Eid**
Answer All questions		**Marks**

Question 1

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

$$1^3 + 2^3 + 3^3 + \cdots + n^3 = \frac{1}{4}n^2(n+1)^2.$$

(b)If α, β and γ are the roots of the equation: $3x^3 - x + 1 = 0$. 4

Find (i) $\sum_{i=1}^{3} c_i^2$, (ii) $\sum_{i=1}^{3} c_i^3$

(c) Find the sum $\sum_{r=1}^{n}(3r-1)(3r+2)$ 2

Question 2

(a) Use De Moiver's theorem to evaluate: $\sqrt[3]{4 - 4\sqrt{3}\,i}$ 3

(b) Solve the linear system $2y + x - 3z = 6$, $2x - y - 4z = 2$, $3y + 4x - 2z = 14$. 3

(c) Find the eigenvalues and the eigenvectors of the matrix $A=\begin{bmatrix}2 & 1 & 1\\ 1 & 2 & 1\\ 0 & 0 & 1\end{bmatrix}$. 4

Question 3

(a)State the definition of parabola. 2

(b)Separate the lines of the equation $x^2 - xy - 2y^2 + x + y = 0$. 4

Also, find the angle between them.

(c)Write the circle $x^2 + y^2 - 2x + 4y + 1 = 0$ in parametric form. 4

Also, write its tangent at the point (1, – 4)

Question 4

(a)Determine the type of the surface: 2

(i) $x^2 + z^2 - 2y^2 = 0$ (ii) $x^2 + y^2 + z^2 - 2y = 0$

(b)Find center, vertices and sketch the ellipse $9x^2 + y^2 - 18x - 6y + 9 = 0$. 4

(c)Determine the type of the curve $x^2 - 2xy + y^2 + 2x = 0$ and eliminate the xy- term. 4

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

Basic Science Department **Mathematics 2 Code: Math 102** **Mid-Term Exam: 1 / 4 / 2012** **Time Allowed: 1 hour**	Modern University For Technology & Information **Faculty of Engineering**	**Academic year: 2011 / 2012** **Semester: Spring** **Examiners: Dr. Mona Mehanna** **Dr. Mohamed Eid**
Answer All questions		**Marks**

Algebra

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

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

(2) Use De Moiver's theorem to evaluate: $(\sqrt{2} - 4i)^{\frac{7}{3}}$. 4

(3) Find the sum of n terms of the series: $\frac{1}{1x2} + \frac{1}{2x3} + \frac{1}{3x4} \ldots + \frac{1}{n(n+1)}$ 4

(4) Using the binomial theorem, expand $(9 - 2x^3)^{-5}$. 3

A. Geometry

(1)Complete the statement: The parabola is the locus of moving point such that…. 2

(2)Separate the lines of the equation $x^2 - 3xy + 2y^2 + 3x - 4y + 2 = 0$ 5

Also, find the angle between them.

(3)Write the equation of circle where (1, 2), (3, – 2) are ends of its diameter. 4

Also, find its center and radius.

(4)Find vertex, focus and sketch the parabola $x^2 - 4x + 8y - 20 = 0$. 4

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

I-Name: Group: ID .

(1)Complete the statement: The ellipse is the locus of moving point such that….

(2)Sketch the ellipse $4x^2 + 9y^2 - 24x - 36y + 36 = 0$.

Also, write its equation in parametric form.

(3)Sketch the hyperbola $4x^2 - y^2 + 24x + 4y + 36 = 0$

(4)Determine the types of the surfaces: (a) $x^2 + y^2 + z^2 - 4x + 8y - 2 = 0$

(b) $x^2 + z^2 - 2 = 0$

Answer

II-Name: Group: ID .

(1)Complete the statement: The hyperbola is the locus of moving point such that….

(2)Sketch the ellipse $9x^2 + y^2 - 36x + 6y + 36 = 0$.

Also, write its equation in parametric form.

(3)Sketch the hyperbola $4x^2 - y^2 + 24x - 4y + 36 = 0$

(4)Determine the types of the surfaces: (a) $x^2 + y^2 - 3z^2 = 0$

(b) $y^2 + z^2 - 2 = 0$

Answer

III-Name: Group: ID .

(1)Complete the statement: The hyperbola is the locus of moving point such that….

(2)Sketch the ellipse $x^2 + 9y^2 - 6x + 18y + 9 = 0$.

Also, write its equation in parametric form.

(3)Sketch the curve $x^2 - y^2 - 4x + 4y + 1 = 0$

(4)Determine the types of the surfaces: (a) $x^2 + y^2 + z^2 - 4x - 2 = 0$

(b) $y^2 + z^2 - 2x^2 = 0$

Answer

IV-Name: Group: ID .

(1)Complete the statement: The ellipse is the locus of moving point such that….

(2)Sketch the ellipse $x^2 + 4y^2 + 6x - 16y + 21 = 0$.

Also, write its equation in parametric form.

(3)Sketch the curve $4x^2 - y^2 + 16x - 4y + 16 = 0$

(4)Determine the types of the surfaces: (a) $y^2 + z^2 - 4 = 0$

(b) $x^2 + z^2 - y^2 = 0$

Answer

V-Name: Group: ID .

(1)Complete the statement: The ellipse is the locus of moving point such that….

(2)Sketch the ellipse $x^2 + 2y^2 - 4x - 12y + 18 = 0$.

Also, write its equation in parametric form.

(3)Sketch the curve $3x^2 - y^2 + 18x - 4y + 24 = 0$

(4)Determine the types of the surfaces: (a) $x^2 + y^2 + z^2 + 8y = 0$

(b) $x^2 + y^2 - 5 = 0$

Answer

VI-Name: Group: ID .

(1)Complete the statement: The hyperbola is the locus of moving point such that….

(2)Sketch the ellipse $x^2 + 2y^2 + 6x - 8y + 13 = 0$.

Also, write its equation in parametric form.

(3)Sketch the hyperbola $x^2 - y^2 - 4x - 4y + 1 = 0$

(4)Determine the types of the surfaces: (a) $y^2 + x^2 - z^2 = 0$

(b) $x^2 + z^2 - 2 = 0$

Answer

VII-Name: Group: ID .

(1)Complete the statement: The hyperbola is the locus of moving point such that….

(2)Sketch the ellipse $4x^2 + 5y^2 - 24x - 30y + 61 = 0$.

Also, write its equation in parametric form.

(3)Sketch the hyperbola $2x^2 - y^2 - 12x + 6y - 13 = 0$

(4)Determine the types of the surfaces: (a) $x^2 + y^2 + z^2 - 2 = 0$

(b) $y^2 + z^2 - x^2 = 0$

Answer

VIII-Name: Group: ID .

(1)Complete the statement: The ellipse is the locus of moving point such that….

(2)Sketch the ellipse $9x^2 + 4y^2 - 54x + 24y + 81 = 0$.

Also, write its equation in parametric form.

(3)Sketch the curve $x^2 - 4y^2 - 6x - 24y - 31 = 0$

(4)Determine the types of the surfaces: (a) $x^2 + y^2 + z^2 - 2z = 0$

(b) $x^2 + z^2 - 3 = 0$

Answer