Benha University Faculty of Engineering- Shoubra Eng. Mathematics & Physics Department Preparatory Year		Final Term Exam Date: 2 – 6 – 2013 Course: Mathematics 1 – B Duration: **3** hours

- Answer **All** Questions
- The Exam consists of one page

- No. of questions: 4
- Total Mark: 100 Marks

Question 1

(a) If $A = \begin{bmatrix} 2 & -2 & -1 \\ 1 & 1 & 0 \\ 3 & 0 & -3 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ 0 & 2 \\ 2 & -1 \end{bmatrix}$. Find, if possible, A + B, A.B, |A|, |B|. 6

(b) Find the eigenvalues and eigenvectors of the matrix: $A = \begin{bmatrix} 2 & 1 \\ 3 & 0 \end{bmatrix}$ 6

(c) Solve the linear system: x + y – z = 2, 3x + 2y + z = 3, 2x + y + 2z = 1. 6

(d)Find S_n , S_{10} from each series: (i) $\sum_{k=1}^{n} k(2k+1)$ (ii) $\sum_{k=1}^{n} \frac{2}{k^2+k}$ 6

Question 2

(a)If $z_1 = 2 - i$, $z_2 = -3 + 2i$. Find $z_1 . z_2$ and $(z_1 + z_2)^{10}$ 6

(b)Find u and v of the complex function: $f(z) = z^2 + \cos \bar{z}$. 6

(c)Using the binomial theorem, expand : $\frac{1}{\sqrt{4-3x}}$ 6

(d)Using the mathematical induction, prove that:

(i) $1 + 3 + 5 + \cdots + (2n - 1) = n^2$ (ii) $(1 + x)^n \geq (1 + nx)$ 8

Question 3

(a) Write the equation of tangent line to the hyperbola $4x^2 - 9y^2 = 1$ which is parallel to the line 4y = 5x + 7. 7

(b) Find the equation of ellipse where the length of latus rectum is 10 and the distance between the foci equals to the minor axis. 7

(c) Find the equation of pair of lines joining the origin with the points of intersection of the circles: $x^2 + y^2 - 4x - 2y = 4$, $x^2 + y^2 - 2x - 4y - 4 = 0$. 7

(d) Write the equation of line in space passing through the points: P(3,4,5), Q(5, 2, –1). 7

Question 4

(a) Find the equation of circle whose radius $4\sqrt{5}$ and its tangent at the point (6, –7) is line x – 2y = 20. 7

(b) Find the equation of the plane which contains the line $x = \lambda,\ y = \lambda,\ z = \lambda - 2$ and is perpendicular to the plane 2x + 7y – 3z = 1. 7

(c) Prove that the line: $x = -1 + 3\lambda,\ y = 2 + 6\lambda,\ z = 3 + 4\lambda$ is parallel to the plane 2x + 3y – 6z + 7 = 0 and find the distance between them. 8

Good Luck *Dr. Ibrahim Sakr* *Dr. Mohamed Eid*

Algebra **Mid-Term Exam** **Total mark: 15**

Group	Section	No.	الإسم:

[1]Complete the following statements:

(a)A square matrix A is called symmetric if…….....

(b)A square matrix A has inverse A^{-1} **if**…….....

(c) A linear system AX = B is called consistent if……..

(d)The rank of a matrix A is……

……

……

[2]Solve the linear system: x – y + 2z = 3, – x + y – 2z = 2, 2x + y + z = 1.

[3]If $A=\begin{bmatrix}1 & 2 & 3\\ 0 & 2 & 1\end{bmatrix}$, $B=\begin{bmatrix}2 & 1\\ 0 & 2\\ 3 & 1\end{bmatrix}$**. Find if possible: A + B, A + B^t, |A| and |BA|**

[4]Find the eigenvalues and the eigenvectors of the matrix: A = $\begin{bmatrix}2 & 2\\ 2 & -1\end{bmatrix}$