Benha University Faculty of Engineering- Shoubra Eng. Mathematics & Physics Department Preparatory Year		Final Term Exam Date: 14 – 6 – 2014 Course: Mathematics 1 – B Duration: **3** hours
• Answer **All** Questions • The Exam consists of one page (تخلفات)		• No. of questions: 4 • Total Mark: 100

Question 1

(a)If $A = \begin{bmatrix} 0 & -2 & -1 \\ 1 & 2 & 0 \\ 3 & 0 & -3 \end{bmatrix}$. Show that A + A`, A.A` are symmetric matrices and find |A| — 5

(b)If $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$. — 15

(i)Find the eigenvalues and eigenvectors of A (ii)Write and satisfy Hamilton equation

(iii)Find the eigenvalues of $B = A^2 - 2A$

(c) Solve the linear system: x + 2y – 2z = 2, 2x + y + 3z = 2, 3x + 3y + z = 4. — 5

Question 2

(a)If $z_1 = 2 - i$, $z_2 = -1 + 2i$. Find $z_1 . z_2$, z_1/z_2 and $(z_1 + z_2)^9$ — 6

(b) Find S , S_{12} from each series: (i) $\sum_{r=1}^{n} r^2(2r-1)$ (ii) $\sum_{r=1}^{n} \frac{2}{4r^2-1}$ — 8

(c)Using the mathematical induction, prove that:

(i) $\frac{1}{2x5} + \frac{1}{5x8} + \frac{1}{8x11} + \cdots n - term = \frac{n}{6n+4}$ (ii) $n^3 + 2n$ is divisible by 3 — 8

(d)Using the binomial theorem, expand : $\frac{1}{3x-2}$ — 3

Question 3

(a)Find the equations of straight lines bisecting the angle between the pair of lines: $4x^2 - 24xy + 11y^2 = 0$. — 9

(b)Find the equation of the tangent to the circle: $x^2 + y^2 - 6x + 4y - 12 = 0$ which parallels to the line: 4x + 3y + 5 = 0. — 8

(c)Find the equation of the parabola where its focus at (0, 3) and D: x = 1. — 8

Question 4

(a)Find the latus rectum, eccentricity and the foci of the ellipse: $x^2 + 2y^2 + 4x + 4y - 2 = 0$. — 9

(b)Find the equation of hyperbola whose eccentricity 5/4 and focus at (a, 0) and directrix 4x – 3y – a = 0. — 8

(c)Find the equation of the plane passing through the line: 2x + 3y + 4z = 16, 4x + y + 6z = 14 and parallels to the plane: x – y + z + 6 = 0. — 8

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