


<b>Ministry Of Higher Education</b> <b>Higher Institute of Engineering</b> <b>October 6 City</b> <b>Department of Basic Science</b>	 <b>مدينة الثقافة و العلوم</b>	<b>1<sup>st</sup> Level: Final Exam</b> <b>Mathematics: (Calculus II)</b> <b>Course Code, BAS 115</b> <b>Date: May, 2013</b>	
<b>Time 3 Hours</b>	<b>الإمتحان (5) أسئلة في صفحة واحدة و المطلوب الإجابة عن كل الأسئلة</b>		<b>Marks</b>
[1](a) If $A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 3 & 2 \end{bmatrix}$ , $B = \begin{bmatrix} 1 & -1 & 2 \\ 3 & -2 & 1 \end{bmatrix}$ . Find, if possible, $A + B$ , $A.B$ , $ A.B^t $ .			5
(b) Find $S_n$ and $S$ of the series $\sum_{r=1}^n \frac{1}{r^2+r}$ .			3
(c) Test the series: (i) $\sum_{n=0}^{\infty} \frac{(-1)^n}{n^4+n^2}$	(ii) $\sum_{n=1}^{\infty} \frac{n}{1+3^n}$	2 + 2	
[2] (a) If $z_1 = 3 - 2i$ and $z_2 = -4 + i$ . Find $z_1 + z_2$ and $z_1 \cdot z_2$ .			4
(b) Find $u$ and $v$ of the complex function $f(z) = 2z + \cos z$ .			4
(c) Determine the interval of convergence of the series $\sum_{n=0}^{\infty} \frac{1}{4^n} (x - 1)^n$ .			4
[3](a) Using binomial theorem, expand $\frac{2}{\sqrt{1-3x}}$ .			3
(b) Find $z_x$ and $z_y$ from the equation $2^{xy} + y \sin z + xz^3 = 0$			3
(c) If $f(x, y, z) = y^2 z^3 5^x$ and $\bar{U} = (x \sin y)i + (2y + 3z)j + (xz^3)k$ . Find $\nabla f$ , $\nabla \cdot \bar{U}$ , $\nabla \times \bar{U}$ .			6
[4](a) Determine the extrema of the function: $f(x, y) = x^3 - y^3 - 3xy$ .			4
(b) Find the envelope of the curves: $(x - c)^2 + y^2 = 2c$ , $c$ is parameter.			4
(c) Find the integral $\iint_S \frac{xy}{x^2+y^2} dS$ , where $S$ is the surface $x^2 + y^2 + z = 1$ .			4
[5](a) Compute the integral $\int_0^2 \int_0^x (15xy^2) dy dx$			3
(b) Find the integral $\int_{(0,0)}^{(1,1)} (y + x^2) dx + (x - y) dy$ through the curves: (i) $y = x^4$ (ii) $y = x^3$ (iii) $y = x$ .			3
(c) Verify Green's theorem for $\oint_C (x + y^2) dx + (x^2 - y) dy$ , where $C$ is formed by sides of triangle of vertices $(1, 0)$ , $(1, 1)$ , $(0, 1)$ .			6

*Good Luck*

*Dr. Mohamed Eid*