Ministry Of Higher Education **Higher Institute of Engineering** **October 6 City** **Department of Basic Science**	مدينة الثقافة و العلوم	**1st Level: Final Exam** **Mathematics: (Calculus II)** **Course Code, BAS 115** **Date: September, 2013**

Time 3 Hours	الإمتحان (5) أسئلة في صفحة واحدة و المطلوب الإجابة عن كل الأسئلة	Marks

[1](a) If $A = \begin{bmatrix} 2 & 1 & 3 \\ 0 & 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 & -2 \\ 3 & 0 & -1 \end{bmatrix}$. Find, if possible, A + B, A.B, A.B^t. 5

(b) If $A = \begin{bmatrix} 2 & 4 \\ 1 & 5 \end{bmatrix}$, $B = \begin{bmatrix} 0 & 2 & -2 \\ 1 & 3 & -1 \end{bmatrix}$. Find, if possible, A + B, A.B, |A|, |B|. 5

(c) Find S_{10} *and* S of the series $\sum_{r=1}^{n} \frac{1}{r(r+1)}$ 5

[2](a)If $z_1 = 3 - i$ and $z_2 = 2 + 2i$. Find $z_1 + z_2$, $z_1 . z_2$ *and* $(z_2)^9$ 5

(b)Using binomial theorem, expand $\frac{1}{\sqrt{1-3x}}$ 4

(c)Using binomial theorem, expand $\frac{1}{x-4}$ 4

[3](a) Find f_x , f_x , f_z where $f(x,y,z) = x^3 + y^4 \sin x + z^3 \ln y$ 4

(b)If $f(x,y,z) = x^4 + y^2 z^3$ and $\bar{U} = (y \sin x)i + (y^3 + 3z)j + (z^2 + 3^y)k$. 4

Find ∇f, $\nabla . \bar{U}$, $\nabla x \bar{U}$.

[4](a)Determine the extrema of the function: $f(x,y) = x^3 + y^3$. 4

(b)Find the extrema of the function: $f(x,y) = x^2 + y^2 - 2y + 1$. 4

[5]Compute the integrals: 16

(a) $\int_0^1 \int_0^2 (2x + y^2)\, dydx$ (b) $\int_0^1 \int_0^{\sqrt{1-x^2}} \frac{xy}{\sqrt{x^2+y^2}} dydx$

(c) $\int_{(0,0)}^{(1,1)} (2y + x)\, dx + (2x - y)dy$

through the curves: (i) $y = x^3$ (ii) y = x (iii) $y = \sqrt{x}$

(d) $\oint_C (x + y^2)\, dx + (x^2 - y)dy$, C is formed by $y = x^2$ and y = x

Good Luck *Dr. Mohamed Eid*