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, 2014**

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

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

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

[2](a)If $z_1 = 2 - 3i$ and $z_2 = 3 + 2i$. Find $z_1 + z_2$, $z_1 . z_2$. 4

(b) Find S_{10} from the series $\sum_{r=1}^{n}(r+1)(r+2)$ 4

(c) Find S_{10} from the series $\sum_{r=1}^{n} \frac{1}{(r+1)(r+2)}$ 4

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

(b)Verify Euler's theorem for the function: $f(x,y) = 2x^3 + xy^2$ 4

(c)Determine the extrema of the function: $f(x,y) = x^3 + 2y^3 + 1$. 4

(d)Find the extrema of the function: $f(x,y) = x^2 + 2y^2 - 2x + 8y$. 4

[4](a)Find the envelope of the curves: $x^2 + (\alpha - y)^2 = 5$ 3

(b)If $f(x,y,z) = 2x^4 + y^2 + y \ln z$ and $\bar{U} = (x^2 \sin y)i + (y^3 + z^2)j + (x^3 + z^3)k$ 5

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

[5]Compute the integrals: 12

(a) $\int_0^2 \int_0^1 (x + 3y^2)\, dydx$ (b) $\int_0^2 \int_0^{\sqrt{4-x^2}} \frac{x}{\sqrt{x^2+y^2}}\, dydx$

(c) $\int_{(0,0)}^{(1,1)} (2y - 3x)\, dx + (2x + y)dy$

through the curves: (i) $y = x^3$ (ii) y = x (iii) $y^3 = x$

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

Good Luck *Dr. Mohamed Eid*