


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: June, 6, 2012	
Time 3 Hours	الإمتحان (5) أسئلة في صفحة واحدة و المطلوب الإجابة عن كل الأسئلة		Marks
[1](a) If $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 1 & 2 \\ 2 & 0 & 3 \end{bmatrix}$. Find, if possible, $A + B$, $A.B$, $A.B^t$.			5
(b) Find S_n and S of the series $\sum_{r=1}^n \frac{1}{r^2+3r+2}$.			3
(c) Test the series: (i) $\sum_{n=0}^{\infty} \frac{(-1)^n}{2+3^n}$	(ii) $\sum_{n=1}^{\infty} \frac{1+e^n}{n+e^n}$		2 + 2
[2] (a) If $z_1 = 2 - i$ and $z_2 = -1 + 2i$. Find $(z_1 + z_2)^{12}$.			4
(b) Find u and v of the complex function $f(z) = \sin z$ and show that $u_x = v_y$.			4
(c) Determine the interval of convergence of the series $\sum_{n=0}^{\infty} \frac{n}{3^n} x^n$.			4
[3](a) Using binomial theorem, find $\sqrt{2}$.			3
(b) Find the first derivatives of the function $f(x, y, z) = x 2^y + y \sin x + 2z^3$			3
(c) If $f(x, y, z) = x y^2 z^3$ and $\bar{U} = (xy)i + (yz)j + (xz^3)k$. Find ∇f , $\nabla \cdot \bar{U}$, $\nabla \times \bar{U}$, $\nabla \cdot f\bar{U}$			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: $x^2 + (y - a)^2 = 2a$, a is parameter.			4
(c) Find the integral $\iint_D \frac{\ln(x^2+y^2)}{(x^2+y^2)} dx dy$,			4
where D is the region between the circles $x^2 + y^2 = 4$, $x^2 + y^2 = 1$.			
[5](a) Compute the integral $\int_0^1 \int_0^x (2x + 3y^2) dy dx$			3
(b) Find the integral $\int_{(0,0)}^{(1,1)} (x^2 + 2y) dx + (2x + y) dy$			3
through the curves: (i) $y = x$ (ii) $y = x^2$, (iii) $y = x^5$.			
(c) Verify Green's theorem for $\oint_C (x + y) dx + (x^2 + y) dy$,			6
where C is $x^2 + y^2 = 1$, $y \geq 0$.			

Good Luck

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