


Ministry Of Higher Education Higher Institute of Engineering October 6 City Department of Basic Science	 Culture and Science City	1 st Level: Final Exam Mathematics: (Calculus II) Course Code, BAS 115 Date: May, 2014	
Time 3 Hours	ممنوع إستعمال المحمول كآلة حاسبة. يُسمح فقط بالآلة الحاسبة العادية الإمتحان (5) أسئلة في صفحة واحدة و المطلوب الإجابة عن كل الأسئلة		Marks
[1](a) If $A = \begin{bmatrix} 1 & 1 & 3 \\ 2 & -1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 & 2 \\ 3 & -2 & 1 \end{bmatrix}$. Find, if possible, $A + B$, $A.B$, $ A^t.B $ (b) Find S_n and S of the series $\sum_{r=1}^n (2r - 1)(r + 1)$. (c) Test the series: (i) $\sum_{n=0}^{\infty} \frac{3^{2n}}{(n+1)^n}$ (ii) $\sum_{n=0}^{\infty} \frac{e^n}{1+e^n}$		5 3 2 + 2	
[2](a) Determine the interval of convergence of the series $\sum_{n=0}^{\infty} \frac{n}{2^n} (x - 2)^n$. (b) Using binomial theorem, expand $\frac{1}{2+3x}$. (c) Using binomial theorem, find $\sqrt[3]{4}$.		4 4 4	
[3](a) Find the first and second derivatives of : $f(x, y) = x^4 \sin y + 3^y \cos x$ (b) Find y' from the equation: $e^{xy} + y \sin x = 3$ (c) If $u = \sin^{-1}\left(\frac{x+2y}{\sqrt{x+\sqrt{y}}}\right)$. Show that $x \cdot u_x + y \cdot u_y = \frac{1}{2} \tan u$		3 3 6	
[4](a) Determine the extrema of the function: $f(x, y) = x^3 - y^3 - 3xy$. (b) Show that the envelope of the curves: $(x - \alpha)^2 + (y + \alpha)^2 = 1$ is $(x + y)^2 = 2$ (c) Find the dimensions of a rectangular box having maximum volume bounded by the surface $x^2 + 2y^2 + 3z^2 = 12$.		4 4 4	
[5](a) Compute the integral $\int_0^2 \int_0^x (2 + 5yx^2) dy dx$ (b) Find the integral $\int_{(0,0)}^{(1,1)} (y - x^2) dx + (x + y) dy$ through the curves: (i) $y = 2x - x^2$ (ii) $y = \sqrt{x}$ (iii) $y = x$ (c) Verify Green's theorem for $\oint_C (x + y) dx + (x^2 + y) dy$, where C is formed by: $x^2 + y^2 = 1$, $y \geq 0$.		3 3 6	

Good Luck

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