


Benha University Faculty of Engineering – Shoubra Department of Control & Comm. Duration: 2 hours		Final Exam Course: Mathematics 5 Code: EEC 314 Date : October, 2018
The exam consists of one page No. of questions : 4 Answer All questions Total Mark: 40		
Question 1		
(a)By Gamma function, find the integral : $\int_0^{\infty} e^{-y^2+1} dy$	4	
(b)State Green's theorem and verify it for : $\oint_C (xy) dx + (x^2 - y)dy$ Where C is the circle $x^2 + y^2 = 4$.	4	
(c)Verify the Gauss's theorem for the vector : $\bar{U} = (y - z)i + (x + z^3)j + (z^2 - 1)k$ through $x^2 + y^2 + z^2 = 9, z \geq 0$.	4	
Question 2		
(a)Determine and sketch the image of the region G under the function : $f(z) = \sin z$ where G is $0 \leq x \leq \frac{\pi}{2}, 0 \leq y \leq 2$.	5	
(b)Show that $u(x,y) = x + e^x \cos y$ is harmonic and find its conjugate $v(x,y)$ and then write $f(z)$.	5	
Question 3		
(a)Prove that : $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$.	4	
(b)If C is the circle $ z - i = 1$, find the integral $\oint_C \frac{\cos 3z}{z^2 - 16} dz$	3	
(c)If C is the circle $ z = 3$, find the integral $\oint_C \frac{3^z}{z^2 - 4} dz$	3	
Question 4		
Find the integrals : (a) $\int_{-\infty}^{\infty} \frac{\sin^2 x}{x^2 + 4} dx$ (b) $\int_{-\infty}^{\infty} \frac{x}{(x - 3)(x^2 + 4)} dx$	8	

Good Luck

Dr. Mohamed Eid