

Benha University Faculty of Engineering – Shoubra Department of Control & Comm. Duration: 2 hours		Final Exam Course: Mathematics 5 Code: EEC 314 Date : September, 2018
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The exam consists of one page No. of questions : 4 Answer **All** questions Total Mark: 40

<u>Question 1</u>	
(a)By Gamma function, find the integral : $\int_0^{\infty} e^{-y^2} dy$	4
(b)State Green's theorem and verify it for : $\oint_C (x + xy) dx + (xy)dy$ Where C is the circle $x^2 + y^2 = 1$.	4
(c)Verify the Gauss's theorem for the vector : $\bar{U} = (y + z)i + (x + z)j + (1 + z^2)k$ through $x^2 + y^2 + z^2 = 1, z \geq 0$.	4
<u>Question 2</u>	
(a)Determine and sketch the image of the region G under the function $f(z) = e^{iz}$ where G is : $0 \leq x \leq 1, 0 \leq y \leq \frac{\pi}{2}$.	5
(b)Show that $v(x, y) = y + e^x \sin y$ is harmonic and find its conjugate $u(x, y)$ and then write $f(z)$.	5
<u>Question 3</u>	
(a)Prove that: If $f(z)$ is analytic function in a region D in $z -$ plane. Then $\oint_C f(z) dz = 0$ where C is any closed curve in D.	3
(b)If C is the circle $ z - 2i = 2$, find the integral $\oint_C \frac{\cos 3z}{z^2 - 16} dz$	3
(c)If C is the circle $ z = 2$, find the integral $\oint_C \frac{z+3}{z^2 - 1} dz$	4
<u>Question 4</u>	
Find the integrals : (a) $\int_{-\infty}^{\infty} \frac{\cos 2x}{x^2 + 4} dx$ (b) $\int_{-\infty}^{\infty} \frac{x}{(x - 2)(x^2 + 1)} dx$	8

Good Luck

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