

Benha University Faculty of Engineering – Shoubra Department of Elec. Eng. & Control Duration: 2 hours                      Group 2789		Final Exam Course: Mathematics 5 Code: EEC 314 Date : May 18, 2019
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The exam consists of one page    No. of questions : 4    Answer **All** questions    Total Mark: 40

<b><u>Question 1</u></b>	
(a)By Gamma function, find the integral : $\int_0^{\infty} \sqrt{y} e^{-y^3} dy$	3
(b)By Beta function, find the integral : $\int_0^{\infty} \frac{1}{x^4+1} dx$	3
(c)State Green’s theorem and verify it for : $\oint_C (1 - xy) dx + (3 + xy)dy$ Where C is the circle $x^2 + y^2 = 4$ .	4
(d)Verify the Stoke’s theorem for the vector field : $\vec{U} = (2y)i + (3x)j + (-z^2)k$ through $x^2 + y^2 + z^2 = 9, z \geq 0$ .	4
<b><u>Question 2</u></b>	
(a)Determine and sketch the image of the region G : $0 \leq y \leq 2, 0 \leq x \leq \pi$ under the function $f(z) = \cos z$ .	4
(b)Show that $u(x,y) = 2x + e^x \sin y$ is harmonic and find its conjugate $v(x,y)$ and then write $f(z)$ .	2
<b><u>Question 3</u></b>	
If C is the circle $ z - 2  = 2$ , find the following integrals by Residue theorem:	12
(a) $\oint_C \frac{2^z}{z^2+9} dz$ (b) $\oint_C \frac{2^z}{z^2-7z+10} dz$ (c) $\oint_C \frac{z+2}{z^2-4z+3} dz$ (d) $\oint_C \frac{1}{(z-1)^3} dz$	
<b><u>Question 4</u></b>	
Find the integrals : (a) $\int_{-\infty}^{\infty} \frac{2\sin^2 x}{x^2 + 1} dx$ (b) $\int_{-\infty}^{\infty} \frac{1}{(x - 1)(x^2 + 1)} dx$	8

*Good Luck*

*Dr. Mohamed Eid*