Zagazig University- Banha Branch
Faculty of Engineering- Shoubra
Math. and Phy. Eng. Department

1st Year: Elec. Engineering
Mathematics A
Date: 21/1/ 2004

الامتحان مكون من (5) أسئلة مكتوبة فى صفحة واحدة و المطلوب الإجابة على كل الأسئلة0

Time: 3 Hours

(1)(a)Test the series: $\sum_{n=1}^{\infty}(-1)^n\frac{\cos n}{n^2}$

(b)Show that the envelope of the curves: $(x-\cos\alpha)^2+(y-\sin\alpha)^2=1$ is the circle: $x^2+y^2=4$

(c)Find the extrema of the function: $f(x,y)=x^3+\frac{1}{2}x^2y-2x^2-\frac{1}{4}y^2$

(2)(a) Find the interval of convergence of the series: $\sum_{n=1}^{\infty}\frac{(2x-1)^n}{2n+1}$

(b)Verify Euler's theorem for the function $f(x,y,z)=x^2y+xy^2+z^3$

(c)Solve the equation: $(\cos x+y\sin x)dx+(4y-\cos x)dy=0$

(3)Solve the differential equations:

(a) $y`+\frac{2}{x+1}y=x^3$ (b) $y``+y=(1+2\cos x)^2$

(c) $(x^2D^2-xD+1)y=x^4+2$

(4)(a)Solve the equation: $y``+y=\sec x$

(b) If $\varphi=xyz$ and $\overline{U}=2xi+yzj+xzk$. Find $\nabla.(\varphi\overline{U})$ and $\nabla x(\varphi\overline{U})$

(c)Evaluate the integral: $\int_0^1\int_y^1 6y\,e^{x^3}dxdy$

(5)(a)Find the flux of the vector field: $\overline{U}=2xi+(y+z)j+xyk$ through the surface $x^2+y^2+z=1,\ z\geq 0$

(b)Verify Green's theorem for the integral: $\oint_C(1-xy)dx+(xy+3)dy$ where C is the circle $x^2+y^2=1$

Good Luck Dr. Mohamed H. Eid

Zagazig University- Banha Branch — 1st Year: Elec. Engineering
Faculty of Engineering- Shoubra — Mathematics A
Math. and Phy. Eng. Department (تخلفات) — Date: 27/12/ 2003

الامتحان مكون من (5) أسئلة مكتوبة فى صفحة واحدة و المطلوب الإجابة على كل الأسئلة0

Time: 3 Hours

(1)(a)Test the series: (i) $\sum_{n=1}^{\infty} \frac{2^n}{2n+1}$ (ii) $\sum_{n=1}^{\infty} \frac{(-1)^n}{n^4+1}$

(b)Find the interval of convergence of the series: $\sum_{n=1}^{\infty} \frac{(x-2)^n}{\sqrt{n+2}}$

(c)Find the envelope of the curves: $(y+\alpha)^2 + (x-\alpha)^2 = 2$

(2)(a)Find the extrema of the function: $f(x,y) = x^2 + y^3 - 4xy + 4y$

(b)Solve the differential equation: $y`` + y = \tan x$

(3)Solve the differential equations:

(a) $(x^3 + \cos y)dy + (x + 3y\,x^2)dx = 0$ (b) $y`` + y = e^{2x} + \cos x$

(c) $x^2 y`` - 3xy` - 5y = x^2$

(4)(a)Solve the system of equations: $(D+1)y - z = x$,

$-2Dy + (D+1)z = e^{2x}$

(b)If $\overline{U} = (2xy)i + (xy\,z^2)j - (xz\,y^2)k$. Find $\nabla.\overline{U}$ and $\nabla x\overline{U}$

(5)(a)Show that the function $u(x,y) = y + e^{2x}\cos 2y$ is harmonic and find its conjugate v(x,y) such that the function $w = u + iv$ is analytic

(b)Evaluate the integrals: (i) $\int_C \frac{z\cos 3z}{z^2+36}dz$ (ii) $\int_C \frac{\sin 2z}{z^3}dz$

where C (in the two integrals) is the ellipse $|z-4| + |z+4| = 10$

Good Luck — Dr. Mohamed H. Eid