Benha University Faculty of Engineering- Shoubra Eng. Mathematics & Physics Department First Year: Electrical Engineering-Power		Final Term Exam Date: 11 / 6 / 2012 Mathematics 2 – B Duration: 3 hours

- Answer all the following questions
- The Exam Consists of One page

- No. of questions: 5
- Total Mark: 100 Marks
- The first Page

Marks

[1]Find the series solution of the equations: 20

(a) $y`` - y = x$ (b) $2x^2y`` - xy` + (x^2 + 1)y = 0$

[2] Find the integrals: 20

(a) $\int_0^\infty x^2 e^{-\sqrt{x}}\, dx$ (b) $\int_1^\infty e^{(2x-x^2)}\, dx$ (c) $\int_{-\infty}^\infty \frac{e^{3z}}{1+e^{2z}}\, dz$ (d) $\int_0^\infty \frac{\sin^2 t}{t.e^t}\, dt$

[3](a)Prove that: $B(m,n) = \frac{\Gamma(m).\Gamma(n)}{\Gamma(m+n)}$ 8

(b)Find the Laplace transform of the functions: 12

(i) $f(t) = t^3 + \sin(t - \frac{\pi}{4})$ (ii) $f(t) = \sqrt{e^{2t} + e^{-2t} - 2}$

(iii) $f(t) = \cos(t-1)$, $t > 1$ (iv) $f(t) = \int_0^t \frac{\sin t}{t}\, dt$

[4](a) Find the inverse Laplace transform of: 12

(i) $F(s) = \frac{1}{(s-3)^4} + \frac{1}{s^2+4}$ (ii) $F(s) = \frac{1}{s^2(1+s^2)}$

(iii) $F(s) = \frac{s^2+1}{s^2-4}$ (iv) $F(s) = \frac{1}{1+s^2} e^{-2s}$

(b)Solve the equation by Laplace transformations: 8

$y`` - 3y` - 4y = e^{-t}$, $y(0) = y`(0) = 0$

[5]Solve the following P.D.E:

(a) $3u_x + 4u_y - 5u = 5$ 7

(b) $u_{xx} + 2u_{xy} - 3u_{yy} = \sin(x + y)$ 7

(c) $u_{tt} - 4u_{xx} = 0$, B.C: $u(0, t) = u(1, t) = 0$, I.C: $u(x, 0) = x$, $u_t(x, 0) = x + 1$ 6

Good Luck *Dr. Mohamed Eid*