



Form No. T651

Philadelphia University
Faculty of Engineering

Student Name:
Student Number:

Dept. of Communications & Electronics
Final Exam, Summer Semester: 2004/2005

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|---------------------------------------|-----------------------|
| Course Title: Engineering Analysis I | Date: 25/8/2005 |
| Course No: (630201) | Time Allowed: 2 Hours |
| Lecturer: Dr. Abdel-Rahman Al-Qawasmi | No. of Pages: 1 |

Question 1: (10 Marks)

Objective: First Order Differential Equations.

a- Solve the following Initial Value Problem

$$\frac{y'}{x} = \frac{e^x}{e^y} \quad y(0) = \ln|2|$$

b- Determine $f(y)$ so that the following differential equation will be Exact and solve

$$xf(y)dx + \frac{x^2}{2y} dy = 0$$

Question 2: (9 Marks)

Objective: About Laplace Transform.

a- Find the Laplace Transform:

1- $f(t) = 5\delta(t - 5) + t \sinh^2 t$

2- $f(t) = \cos(5t)$

b- Find the Inverse Laplace Transform:

1- $F(s) = \frac{se^{3s} [(s-1)^2 + 1] + e^{2s}(s-1)^2}{(s-1)^4 + (s-1)^2}$

2- $F(s) = \frac{3}{s-7}$

Question 3: (15 Mark)

Objective: Power series method.

a- Find the general solution of Hypergeometric differential Equation:

$$(x - x^2)y'' + xy' - y = 0$$

b- Write the general Solution of

$$x^2 y'' + xy' + x^2 y - 4y = 0$$

Question 4: (8 Mark)

Objective: Higher Order Differential equations.

Find the general solution:

$$x^3 y''' - 12xy' = 70x$$

Question 5: (8 Mark)

Objective: RLC circuit.

Model the RLC circuit and use Laplace Transform to find $I(t)$ if:

$$I'(0) = I(0) = 0, L = 1\text{henry}, C = 1\text{farad}, R = 2\text{ohms and } E(t) = \delta(t - 1) - u(t - 2)$$

(Good luck)