



Form No. T651

Philadelphia University
Faculty of Engineering

Student Name:
Student Number:

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

Course Title: Engineering Analysis I	Date: 22/8/2005
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

$$y' = \frac{\ln|x|}{\ln|y|} \quad y(1) = 1$$

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

$$f(x) \tan y dx - e^{\ln|x|} \ln|\sec y| dy = 0$$

Question 2: (9 Marks)

Objective: About Laplace Transform.

a- Find the Laplace Transform:

1- $f(t) = te^t u(t-1)$

2- $f(t) = \sinh(3t)$

b- Find the Inverse Laplace Transform:

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

2- $F(s) = \frac{1}{s-1}$

Question 3: (15 Mark)

Objective: Power series method.

a- Find the general solution of Hypergeometric differential Equation:

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

b- Write the general Solution of

$$x^2 y'' + xy' + (x^2 - \frac{1}{4})y = 0$$

Question 4: (8 Mark)

Objective: Higher Order Differential equations.

Find the general solution:

$$y^{(4)} - 3y''' + 2y'' = 18e^{3x} + 10$$

Question 5: (8 Mark)

Objective: RLC circuit.

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

$$I'(0) = I(0) = 0, L = 1\text{henry}, C = 1\text{farad}, R = 2\text{ohms} \text{ and } E(t) = \begin{cases} \sin 2t, & 0 < t < \pi \\ 0 & \text{otherwise} \end{cases}$$

(Good luck)