

Philadelphia University
Faculty of Engineering

Student Name:
Student Number:

Dept. of Communications & Electronics
Final Exam, First Semester: 2005/2006

Course Title: Engineering Analysis I	Date: 25/1/2006
Course No: (630201)+(650201)	Time Allowed: 2 Hours
Lecturer: Dr. Abdel-Rahman Al-Qawasmi Dr. Wael Al-Sawalmeh	No. of Pages: 1

(الرجاء كتابة اسم مدرس المادة والشعبة على ورقة الإجابة أو موعد المحاضرة)

Question 1: (10 Marks)

a- Objective: About Separable Differential Equations.

Solve the following Initial Value Problem and check your answer:

$$y' = e^x + \sin x, \quad y(\pi) = 1$$

b- Objective: About Exact First Order Ordinary Differential Equations

Find the Particular solution of the Differential Equation:

$$\frac{y}{x} dx + \ln|x| dy = 0, \quad y(0) = 1$$

Question 2: (10 Mark)

Objective: Linear Second Order Differential Equations.

a- Solve the following Differential Equation:

$$y'' + y = e^{\frac{1}{2}x}$$

b- Solve the Differential Equation and check the y_p :

$$x^2 y'' + 2xy' = \frac{1}{x}$$

Question 3: (10 Mark)

Objective: Linear Higher Order Differential Equations

Solve the Initial Value Problem: (Check your answer).

$$y''' = 6, \quad y(0) = 1; y'(0) = y''(0) = 2$$

Question 4: (10 Mark)

Objective: Laplace Transform:

a- Use the Laplace Transform to solve the Differential Equation:

$$y'' - 2y = e^t u(t-1), \quad y(0) = y'(0) = 0$$

b- Find the Inverse Laplace Transform:

$$F(s) = \frac{1}{s^3(s-1)} + \frac{e^{-s}}{s} - e^{-2s} + \frac{2e^{-2s}}{s+3} - \frac{e^{-\pi s}}{(s^2+1)-1}$$

Question 5: (10 Mark)

Objective: Power Series Method (Frobenius Method).

a- Solve the Hypergeometric Differential equation for $a = b = 0$ and $c = 1$

$$x(1-x)y'' + [c - (a+b+1)x]y' - aby = 0$$

c- Show that $\Gamma(v+1) = v\Gamma(v) = v!$

(Good luck)