King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
Math 513 Major Exam I
The First Semester of 2014-2015 (142)
Time Allowed: 90 Minutes

Name: _____ ID#: _____

Section/Instructor: _____ Serial #: _____

- Mobiles and calculators are not allowed in this exam.
- Provide details for full credit.

Question #	Marks	Maximum Marks
1		8
2		8
3		8
4		8
5		8
Total		40

Q1: (8 points): Find the inverse Laplace transforms for the following functions

1. $F(s) = \frac{s+4}{s^3-3s^2+2s}$, by using partial fractions.

2. $G(s) = \frac{s}{s^4+6s^2+9}$, by using $\mathcal{L}\{tf(t)\} = -F'(s)$.

Q2 (8 points): Use Laplace Transform to solve the initial value problem:

$$y'(t) + 4y(t) = H(t-1), \quad y(0) = 0.$$

Q3 (8 points): Use Laplace transform to solve the integral equation for the function f,

$$e^{-w}f(w) = 1 + \int_0^w e^{-x}f(x)dx.$$

Q4 (8 points): Find a cosine Fourier series for the periodic function $h(t) = \sin t, \quad t \in [0, \pi]$.

Q5 (8 points): Find the complex Fourier series expansion for the function:

$$g(t) = H(1 - t^2), \quad t \in [-\pi, \pi].$$