Kingdom of Saudi Arabia
King Abdulaziz University

Faculty of Science –Mathematics Department
Final Term Exam (120 Minutes) - (204 Math).
3/7/1433 H – 24/5/2012 A.D.
Second Semester 1432-1433 H

Model A

Name:	**Section:**
Student's I.N. :	**Serial Number:**

Q_1	Q_2	Q_3	Q_4	Q_5	Q_6	**Total Marks (40)**

(Answer the following questions)

1	**Choose the correct answer**	**[10 Marks]**
(i)	The differential equation $xy' - y = x^2$ is (a) Recati (b) Linear (c) Bernoulli	
(ii)	The differential equation $y' = \left(\frac{y}{x}\right)^2 - \frac{y}{x}$ is (a) Homogenous (b) Exact (c) Separable	
(iii)	If $y_1, y_2, y_3, \ldots, y_n$ is any set of n linearly independent solutions of a homogeneous linear differential equation of order n, then $y = c_1 y_1 + c_2\, y_2 + c_3 y_3 + \ \ldots + c_n y_n$ is (a) a solution (b) the general solution	
(iv)	The D. E. $y'' + y = 0\ ,\ y(0) = 4, y'(0) = 6$ is called (a) Initial - value problem (b) Boundary - value problem	
(v)	$\ell\{\mathcal{U}(t-a)\} = \dfrac{e^{-as}}{s}$ (a) true (b) false	
(vi)	$\ell\{f * g\} = \ell\{f(t)\}\ell\{g(t)\}$ (a) true (b) false	
(vii)	$\ell^{-1}\left\{\frac{1}{s^5}\right\} = \frac{1}{24}t^4$ (a) true (b) false	
(viii)	$\ell\{t^2\, f(t)\} = -\dfrac{d^2}{dx^2}F(s)$ (a) true (b) false	
(ix)	The function $f(t) = e^{t^2}$ is not exponential order (a) true (b) false	
(x)	The function $F(s) = \frac{s}{s+4}$ is not the Laplace transform of a function that is piecewise continuous and of exponential order (a) true (b) false	

2 **Solve the differential equation:** **[5 Marks]**

$$\frac{dy}{dx} = 2 + \sqrt{y - 2x + 4}$$

3 Solve the differential equation: **[5 Marks]**

$$y'' - 3y' + 2y = e^x$$

4 **Solve** $\frac{dx}{dt} = -5x - y; \qquad \frac{dy}{dt} = 4x - y$ **[5 Marks]**

$$x(0) = 0; \qquad y(0) = 1$$

5(a) Evaluate: **[6 Marks]**

(i) $\ell^{-1}\left\{\frac{1}{s^2+9}\,e^{\frac{-\pi s}{2}}\right\}$ **(ii)** $\ell^{-1}\left\{\frac{2s+5}{s^2-4s+20}\right\}$

5(b) **Solve** $\boldsymbol{f(t) = t + 1 - \int_0^t f(\tau)\,(t-\tau)\,d\tau}$ **for** $\boldsymbol{f(t)}$. **[4 Marks]**

6 Use the Laplace transform to solve the IVP: **[5 Marks]**

$$y'' + 9y = e^t, \qquad y(0) = 0, y'(0) = 0$$