



Kingdom of Saudi Arabia
King Abdulaziz University

Faculty of Science – Mathematics Department
Final Exam (120 Minutes)
(204 Math)
19/7/1435 H – 18/5/2014 A.D.
Second Semester
1434-1435 H

Model : A

Name:	Section	
	BA4: S.T.R. 10.00 : 10.50	
BA5: S.T.R. 11.00 : 11.50		
Student's I.N. :	BA2: S.T.R. 13.00 : 13.50	
	BA1: M.W. 8.00 : 9.20	
	BA3: M.W. 9.30 : 11.00	

Q_1	Q_2	Q_3	Q_4	Q_5	Q_6	Total Marks (40)

(Answer the following questions)

1	Choose the correct answer	[8 Marks]
(1)	The order of differential equation $\left(\frac{d^2y}{dx^2}\right)^3 + 6\left(\frac{dy}{dx}\right)^3 = \tan x$ is (a) first (b) second (c) third	
(2)	The differential equation $\tan y dx - x \sec^2 y dy = 0$ is an exact (a) true (b) false	
(3)	The form of a particular solution y_p of $y'' + 2y' + y = e^{-x}$ is (a) $y_p = Ae^{-x}$ (b) $y_p = Axe^{-x}$ (c) $y_p = Ax^2e^{-x}$	
(4)	If $f(t)$ is piecewise continuous on $[0, \infty)$, of exponential order, and periodic with period T , then $\mathcal{L}\{f(t)\} = \frac{1}{1 - e^{-sT}} \int_0^T e^{-s\tau} f(\tau) d\tau$ (a) true (b) false	
(5)	If $\mathcal{L}\{f(t)\} = F(s)$ then $\mathcal{L}\left\{\int_0^t f(\tau) d\tau\right\} = \frac{F(s)}{s}$ (a) true (b) false	
(6)	The function $F(s) = \frac{s^2}{s^2+5}$ has no Laplace transform (a) true (b) false	
(7)	$\mathcal{L}\{e^{2t} \sin 7t\} = \frac{7}{(s-2)^2 - 49}$ (a) true (b) false	
(8)	$\mathcal{L}\{u(t-a)\} = -\frac{e^{-as}}{s}$ (a) true (b) false	

2	Solve the differential equation: $y'' + y = \cot x$	[5 Marks]
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3 (a)	Solve the differential equation: $\frac{dy}{dx} = 2 + \sqrt{y - 2x + 4}$	[4 Marks]
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3 (b)	Evaluate: $\ell\{t \cos^2 t\}$	[3 Marks]
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4 (a)	Solve $f(t) = 3t^2 - \int_0^t f(\tau)e^{t-\tau}d\tau$ for $f(t)$.	[4 Marks]
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4 (b)	Evaluate: $\ell \left\{ \int_0^t e^\tau \sin(t - \tau) d\tau \right\}$	[3 Marks]
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5**Use the Laplace transform to solve the IVP:****[4 Marks]**

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

6	Evaluate:	[9 Marks]
(i)	$\ell^{-1} \left\{ \frac{2s}{s^2 + 4s + 10} \right\}$	[3 Marks]

(ii)	$\ell \left\{ \sin t \mathcal{U} \left(t - \frac{\pi}{2} \right) \right\}$	[3 Marks]
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(iii)	$\ell^{-1} \left\{ \frac{s}{s^2 - 9} e^{\frac{-\pi s}{2}} \right\}$	[3 Marks]
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