



**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 : B**

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

$Q_1$	$Q_2$	$Q_3$	$Q_4$	$Q_5$	$Q_6$	<b>Total Marks (40)</b>

(Answer the following questions)

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

2 (a)	Solve the differential equation: $\frac{dy}{dx} = \tan^2(x + y)$	[4 Marks]
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2 (a)	Evaluate: $\ell\{t \sin^2 t\}$	[3 Marks]
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3	Solve the differential equation:	[5 Marks]
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	$y'' + y = \tan x$	
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**4****Use the Laplace transform to solve the IVP:****[4 Marks]**

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

<b>5</b>	<b>Evaluate:</b>	<b>[9 Marks]</b>
<b>(i)</b>	$\ell^{-1} \left\{ \frac{s}{s^2 - 16} e^{\frac{-\pi s}{2}} \right\}$	<b>[3 Marks]</b>

<b>(ii)</b>	$\ell\{\cos t \mathcal{U}(t - \pi)\}$	<b>[3 Marks]</b>
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<b>(iii)</b>	$\ell^{-1} \left\{ \frac{2s}{s^2 + 4s + 10} \right\}$	<b>[3 Marks]</b>
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<b>6 (a)</b>	<b>Evaluate:</b> $\ell\{e^{2t} * \sin t\}$	<b>[3 Marks]</b>
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<b>6 (b)</b>	<b>Solve</b> $f(t) = 3t^2 - e^{-t} - \int_0^t f(\tau)e^{t-\tau}d\tau$ <b>for</b> $f(t)$ .	<b>[4 Marks]</b>
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