&RXUVH *URXS	&RXUVH 1R	&RXUVH 7LWOH	7	3	&UHGLW	QVW 8QLW 6WXGHQWV	7XWRULDO 8QLW SHU 6HFWLRQ	1R RI VXPEHUQWV KDYLQJ EDFNORJV	1R RI VWXGHQWV UHJLVWHUHG	)LQDO WVWLP LQ ,
Î	/,)	,QWURGXFWLRQ 7R %LR								
	7$	(QJLQHHULQJ *UDSKLFV								
	(7+	3UDFWLFDO (WKLFV								
	(/&	(QJOLVK /DQJXDJH &RPPXQLFDWLRQ								
	3(	0RUQLQJ ([HUFLVH								
(QJLQHHULQJ 6FLHQFH 2SWLRQV	(62	7KHUPRG\QDPLFV								
	(62	6ROLG 0HFKDQLFV								
	(62	)OXLG 0HFKDQLFV								
	(62	3ULQFLSOHV RI %LRWHF								
	(62	'DWD 6WUXFWXUHV DQG $OJRULWKPV								
	(62	&RPSXWDWLRQDO 0HWKRGV LQ (QJJ								
	(62	)XQGDPHQWDOV RI (DUWK 6FLHQFHV								
	(62	1DWXUH DQG 3URSHUWLHV RI 0DWHULDOV								
	7$	0DQXIDFWXULQJ 3URFH								
Î	7$	0DQXIDFWXULQJ 3URFH								

&RXUVH *URXS	&RXUVH 1R	&RXUVH 7LWOH 7	3	&UHGLW	7XWRULDO(V WLPDWHG QVW 8QLW 8QLW SHU 6WXGHQW6WXGHQW6HFWLRQ6WXGHQW	1R RI 1R RI)LQDO 6WXGHQWV WXGHQWV WLPD EDFNORJV , ,
‹è ô2èôÎ iUe :2\Î	+62 Î	$SSOLHG 3UREDELOLW\ DQG 6WÎ	Î	Î	Î Î Î	Î Î Î
	062 0	&RPSOH[9DULDEOHV				
	062 0	3DUWLDO 'LIIHUHQWLDO (TXD\				
	062	,QWURGXFWLRQ 7R 3UREDELOLW\ 7KHRU\				
“ XîÎ ‹ô1ô\eôXÎ I ï‹ F(a(Î :jX\ô\Î ÎÎ ÎÎ	&(	(QYLURQPHQW DQG 6XVWDLQDELOLW\				
	(6	(DUWK DQG (QYLURQPHQW				
	(6&2	(FRQRP\ 6RFLHW\ DQG 3XEOLF 3ROLF\				
	'06	,QWURGXFWLRQ WR 0DQDJH				
	(6&	,QWURGXFWLRQ WR (OHFW				
	+66 ,	+XPDQLWLHV ,				
‹ F(a(Î :jX\ôÎ	+66 ,,	+XPDQLWLHV ,,				
Íè'+: Î :jX\ô\Î	07+ 0	/LQHDU $OJHEUD				
	07+ 0	2UGLQDU\ 'LIIHUHQWLDO (TXDWLRQV				

ïX ‰ Œšu všl/ WrÁ]• Œ lµ‰ }(/v•šŒµ š]}v hv]š v]v d&µ]šŒE•š o~ h•v]š u(}•š Œ}E µŒµ]ŒP •šZ z Œ îìîòrîó

,QVWUXFWLRQ 8QLW ,8 IRU D FRXUVH ZLWK OHVV WKDQ RU HTXDO WR VWXGHQWV LV GHILQHG

$$IU = 1L + 0.5T + 0.5P$$

ZKHUH / LV WKH QXPEHU RI PLQXWHV OHFWXUH 7 LV WKH QXPEHU RI PLQXWHV WXWRULDO

PRGHO)RU D FRXUVH ZLWK VWXGHQWV¶ VWUHQJWK PRUH WKDQ ,8 LV GHILQHG DV IROORZ

$$IU = \left\lceil \frac{N}{90} \right\rceil \times (1L + 0.5T + 0.5P)$$

ZKH$\left\lceil \frac{N}{90} \right\rceil$+ LV WKH VPDOOHVW LQWHJHU JUHDWHU WKDQ RU HTXDO WR 1)RU HDFK VHFWLRQ RI WKH

$$TU = 0.5T + 0.5P$$

:KHUH 7 DQG 3 DUH DV GHILQHG HDUOLHU)RU PRGXODU FRXUVHV WKH ,8 DQG 7 8 FDOFXODWH

7DEOH 'HSDUWPHQW ,'3 ZLVH %UHDNXS RI ,QVWUXFWLRQ 8QLW

&RXUVH 1R	&RXUVH 7LWOH	7RWDO ,8	$(	%6%	(&(	&+(	&+0	&*6	&6(	'06	'3	(& 2	((	(6	+66	0(	06(	07+	3+<	6((	66 $
&+0	&KHPLVWU\ /DE																				
&+0 0	*HQHUDO &KHPLVWU\ 3K\VLFDO &KHPLVWU\																				
&+0 0	*HQHUDO &KHPLVWU\ ,QRUJDQLF 2UJDQLF &KHPLVWU\																				
07+ 0	6LQJOH 9DULDEOH &DOFXOXV																				
07+ 0	$SSOLFDWLRQ RI 6LQJOH 9DULDEOH &DOFXOXV 6HYHUDO 9DULDEOH																				
3+<	3K\VLFV /DERUDWRU\																				
3+<	&ODVVLFDO '\QDPLFV																				
3+<	&ODVVLFDO (OHFWURG\QDPLFV																				

7KH IDFWRU IRU LQ WKH HTXDWLRQ DVVXPHV HTXDO HIIRUW IURP WKH LQVWUXFWRU DQG WXWRU WR FR

&RXUVH 1R	&RXUVH 7LWOH	7RWDO ,8	$(	%6	%(&	(&	+(	&+0	&*6	&6(	'0 6	'3	(& 2	((	(6	+66	0(	06(	07+	3+<	6((	66 $
3+<	4XDQWXP 3K\VLFV																					
3+<	2VFLOODWLRQV DQG :DYHV																					
(6& 0	)XQGDPHQWDOV RI &RPSXWLQJ ± ,																					
(6& 0	)XQGDPHQWDOV RI &RPSXWLQJ ,,																					
/,)	,QWURGXFWLRQ WR %LRORJ\																					
7$	(QJLQHHULQJ *UDSKLFV																					
(7+	3UDFWLFDO (WKLFV	2SWLRQDO IRU $OO 'HSDUWPHQWV																				
(/&	(QJOLVK /DQJXDJH &RPPXQLFDWLRQ	,QVWUXFWRU IRU (/& WKLV FRXUVH ZLOO EH SURYLGHG E\ WKH '2$$ RIILFH +RZHYHU																				
3(	0RUQLQJ ([HUFLVH																					
(62	7KHUPRG\QDPLFV																					
(62	0HFKDQLFV RI 6ROLGV																					
(62	)OXLG 0HFKDQLFV																					
(62	3ULQFLSOHV RI %LRWHFKQRORJ\																					
(62	'DWD 6WUXFWXUHV DQG $OJRULWKPV																					
(62	&RPSXWDWLRQDO 0HWKRGV LQ (QJQ																					
(62	)XQGDPHQWDOV RI (DUWK 6FLHQFHV																					
(62	1DWXUH DQG 3URSHUWLHV RI 0DWHULDOV																					

5HTXLUHV WZR LQVWUXFWRUV SHU VHPHVWHU

&RXUVH 1R	&RXUVH 7LWOH	7RWDO ,8	$(	%6%	(&(	&+(	&+0	&*6	&6(	'0 6	'3	(&2	((	(6	+66	0(	06(	07+	3+<	6((	66$
7$	0DQXIDFWXUHQJ 3URFHVVHV ,																				
7$	0DQXIDFWXUHQJ 3URFHVVHV ,,																				
+62	$SSOLHG 3UREDELOLW\ DQG 6WDWLVWLFV																				
062 0	&RPSOH[9DULDEOHV																				
062 0	3DUWLDO 'LIIHUHQWLDO (TXDWLRQV																				
062	,QWURGXFWLRQ 7R 3UREDELOLW\ 7KHRU\																				
&(	(QYLURQPHQW DQG 6XVWDLQDELOLW\																				
(6	(DUWK DQG (QYLURQPHQW																				
(&2	(FRQRP\ 6RFLHW\ DQG 3XEOLF 3ROLF\																				
'06	,QWURGXFWLRQ WR 0DQDJHPHQW																				
(6&	,QWURGXFWLRQ WR (OHFWURQLFV																				
+66 ,	+XPDQLWLHV ,																				
+66 ,,	+XPDQLWLHV ,,																				
07+ 0	/LQHDU $OJHEUD																				
07+ 0	2UGLQDU\ 'LIIHUHQWLDO (TXDWLRQV																				
7RWDO ,QVWUXFWLRQ 8QLW			PVßTPX	SSPOßTXßQT					TVßTU	O	PVßTSO	R	XSQRßTP		XUßQTßTO						O
$SSUR[LPDWH)DFXOW\ 6WUHQJWK																					
7RWDO ,QVWUXFWLRQ 8QLW SHU			OßTDFXOW\	OßXOW	RWßVOTßOPßVSßQRßOOßVHßVTßPX																

7DEOH 'HSDUWPHQW ,'3 ZLVH %UHDNXS RI 7XWRU UHTXLUHPHQWV

&RXUVH	1R&RXUVH 7LWOH	7RWDO 6HFWLRQV	$(	%6%	(&(	&+(	&+0	&*6	&6(	'06	'3	(&2	((	(6	+6	0(	06(	07+	3+<	6((	6$
&+0	&KHPLVWU\ /DE																				
&+0 0	*HQHUDO &KHPLVWU\ 3K\VLFDO &KHPLVWU\																				
&+0 0	*HQHUDO &KHPLVWU\ ,QRUJDQLF 2UJDQLF &KHPLVWU\																				
07+ 0	6LQJOH 9DULDEOH &DOFXOXV																				
07+ 0	$SSOLFDWLRQ RI 6LQJOH 9DULDEOH &DOFXOXV 6HYHUDO 9DULDEOH																				
3+<	3K\VLFV /DERUDWRU\																				
3+<	&ODVVLFDO '\QDPLFV																				
3+<	&ODVVLFDO (OHFWURG\QDPLFV																				
3+<	4XDQWXP 3K\VLFV																				
3+<	2VFLOODWLRQV DQG :DYHV																				
(6& 0	)XQGDPHQWDOV RI &RPSXWLQJ ,																				
(6& 0	)XQGDPHQWDOV RI &RPSXWLQJ ,,																				
/,)	,QWURGXFWLRQ 7R %LRORJ\																				

&RXUVH 1R	&RXUVH 7LWOH	7RWDO &UHGLWV	$(	%%	(&	&+	&+0	&*6	&6	'06	'3	(&2	((	(6	+66	0(	06(	07+	3+<	6((	66
7$	(QJLQHHULQJ *UDSKLFV																				
(7+	3UDFWLFDO (WKLFV																				
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3(	0RUQLQJ ([HUFLVH																				
(62	7KHUPRG\QDPLFV																				
(62	0HFKDQLFV RI 6ROLG																				
(62	)OXLG 0HFKDQLFV																				
(62	3ULQFLSOHV RI %LRWHFKQRORJ\																				
(62	'DWD 6WUXFWXUHV DQG $OJRULWKPV																				
(62	&RPSXWDWLRQDO 0HWKRGV LQ (QJJ																				
(62	)XQGDPHQWDOV RI (DUWK 6FLHQFHV																				
(62	1DWXUH DQG 3URSHUWLHV RI 0DWHULDOV																				

&RXUVH	1R&RXUVH 7LWOH	7RWDO 6HFWLRQV	$(	%6	(&	&+	&+0	&*6	&6	'06	'3	(&2	((	(6	+66	0(	06(	07+	3+<	6((	66
7$	0DQXIDFWXULQJ 3URFHVVHV ,																				
7$	0DQXIDFWXULQJ 3URFHVVHV ,,																				
+62	$SSOLHG 3UREDELOLW\ DQG 6WDWLVWLFV																				
062 0	&RPSOH[9DULDEOHV																				
062 0	3DUWLDO (TXD\																				
062	,QWURGXFWLRQ 7R 3UREDELO																				
&(	(QYLURQPHQW DQG 6XVWDl																				
(6	(DUWK DQG (QYLURQPHQW																				
(&2	(FRQRP\ 6RFLHW\ DQG 3XEOLF 3RLF\																				
'06	,QWURGXFWLRQ WR 0DQDJHPHQW																				
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+66 ,	+XPDQLWLHV ,																				
+66 ,,	+XPDQLWLHV ,,																				
07+ 0	/LQHDU $OJHEUD																				
07+ 0	2UGLQDU\ 'LIIHUHQWLDO (TXDWLRQV																				

7DEOH 'HSDUWPHQW ,'3 ZLVH %UHDNXS RI 7XWRULDO 8QLW

&RXUVH 1R	&RXUVH 7LWOH	78	$(	7RWDO %6%(	&(	&+(	&+0	&*6	&6(	'06	'3	(&2	((	(6	+66	0(	06(	07+	3+<
&+0	&KHPLVWU\ /DE																		
&+0 0	*HQHUDO &KHPLVWU\ 3K\VLFDO &KHPLVWU\																		
&+0 0	*HQHUDO &KHPLVWU\ ,QRUJDQLF &KHP	2UJDQLF																	
07+ 0	6LQJOH 9DULDEOH &DOFXOXV																		
07+ 0	$SSOLFDWLRQ RI 6LQJOH 9DULDEOH &DOFXOXV 6HYHUDO 9DULDEOH																		
3+<	3K\VLFV /DERUDWRU\																		
3+<	&ODVVLFDO '\QDPLFV																		
3+<	&ODVVLFDO (OHFWURG\QDPLFV																		
3+<	4XDQWXP 3K\VLFV																		
3+<	2VFLOODWLRQV DQG :DYHV																		
(6& 0	)XQGDPHQWDOV RI &RPSXWLQJ ,																		
(6& 0	)XQGDPHQWDOV RI &RPSXWLQJ ,,																		
/,)	,QWURGXFWLRQ 7R %LRORJ\																		

&RXUVH	1R	&RXUVH 7LWOH 78	$(	%6	%(7&(	&RWDO &+(	&+0	&*6	&6(	'06	'3	(&2	((	(6	+06	06(	07+	3+	<	6(6$
7$	(QJLQHHULQJ *UDS																			
(7+	3UDFWLFDO (WKLFV																			
(/&	(QJOLVK /DQJXDJH &RPPXQL																			
3(	0RUQLQJ ([HUFLVH																			
(62	7KHUPRG\QDPLFV																			
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(62	)OXLG 0HFKDQLFV																			
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(62	&RPSXWDWLRQDO 0HWKRGV LQ (QJ																			
(62	)XQGDPHQWDOV RI (DUWK 6FLHQFHV																			
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7$	0DQXIDFWXULQJ 3URFHVVHV ,																			
7$	0DQXIDFWXULQJ 3URFHVVHV ,,																			
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&RXUVH 1R	&RXUVH 7LWOH 78	$(	%6	%(	7RWDO	&(	&+(	&+0	&*6	&6(	'06	'3	(&2	((	(6	+66	0(	06(	07+	3+<
062 0	&RPSOH[9DULDEOHV																			
062 0	3DUWLDO 'LIIHUHQWLDO (TXD\																			
062	,QWURGXFWLRQ 7R 3UREDELO																			
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(&2	(FRQRP\ 6RFLHW\ DQG 3XE(																			
'06	,QWURGXFWLRQ WR 0DQDJH																			
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+66 ,	+XPDQLWLHV ,																			
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07+ 0	/LQHDU $OJHEUD																			
07+ 0	2UGLQDU\ 'LIIHUHQWLDO (TXD\																			
7RWDO 7XWRULDO 8QLW																				
$SSUR[LPDWH)DFXOW\ 6WUHQJWK																				
7RWDO 7XWRULDO 8QLW SHU)DFXOW\																				

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ôXdZ vµu Œ }(• š]}v•]v •}u ^Kl^K }µŒ• • u Ç Œ µ]v Œš]v • • (š Œ Œ P]•šŒ š]}vU]v
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