"

P SHKALA PRASAD *! "##$%"&" ' ( ) $*+,"*

(

(

#$%&'(")*+,'--+*"+," . $%$/' 0 '%1",+*"234'*$("

5*1-"6178'%1-" "

9 ':1;"+," . $%$/' 0 '%1"<"=7-3%'--""

6&380+*'">+(('/'"

?!@"A+*1B"=*+$8C$D"

6$*$1+/$"6:*3%/-E"AF"!G?HHI!HJG"

)B;"K@!?L@?MI@MMM"

NI0$3(0":::*$-$8P-&380+*';'87"

"

" QQQQ

"

" " QQQQ

"

QQQQ

@"

"

Nf$ 0 3%3%/"1B'">+%1+7*-"+," b +*&:($T'"93S'*-31D0">+%T':1-E">+%1'f1-"$%8">B$(('%/'-"
KC31B"5(3-+%" i +%*$8"<"X7831B")*3%/('L;"W%"5;" i +%*$8E");")*$-$8"<"X;")*3%/('"KN8-;LE"
*B#':C556)5$)45"6<,#1.)D*-.'0&%E0"!IGG;"2+%8+%0"6$/'")74(3T$13+%-;"GMMH;"
"

93S'*-31D"+%"_7*" . 3%8-0" . $%$/3%/"93,,'*'%T'"3%">+%1'0:+*$*D"_*/$%3`$13+%-;"W%""
6;"A+7*"<"2;"A'((0$%"UB3-1'8"KN8-;LE"

"

REFEREED JO RNAL P BLICA IONS

"

6 0 +&'"$%8" . 3**+*-0"W%-131713+%$("N%1*'"*'%'7*-B3:"$%8"d'%8'*"W8'%1313'-"3%"1B'"R;6;"
U+4$TT+"W%87-1*DE"!\GMI!\a@"KC31B"5%-B7 0 $%")*$-$8"<"i'((D"=$&'*L;"*F"(#'&G#%&5'E"*
GM!HE"GJ0"GG]IGa\;"

"

W%%+S$13+%"3%"1B'"d(+4$("5/'0"W0:(3T$ +%-",+*"=7-3%'--"$%8" . $%$/'0'%1"3%"1B'"
i%+C('8/'"NT+%+0D"KC31B"5%-B7 0 $%")*$-$8L;"*J'%.''#%&5'#,)05+"'#,)5$)P+0&'.00)*
H:;&'&0%"#%&5'E"a0"?GI?\;"GM!J;"

j_%'" . 3**+*"3%"5%+1B'*k0" . $%$/3%/"93S'*-31D"$%8"1B'"93-T+7*-'"+,"^$-B3+%"KC31B"
5%-B7 0 $%")*$-$8"<"[$`$" . 3*L;"*B+;#')/.,#%&5'0E"GM!GE"Ha0"]MJ"n"]Ga;"*

"

. +S3%/"_710"U+C$*8"R%8'*-1$%83%/"1B'">+0:('f31D"+,"_71-+7*T3%/"3%"1B'"5/'"+,"
d(+4$(3`$13+%"KC31B"5%-B7 0 $%")*$-$8L;"*P+0&'.00)/.'#&00#'1.)*+#%.",*E*"GMM]E"G0"H]"I"\!;"

"

d(+4$("U*$%-313+%-0"UB'"N0'*/3%/"A'C"b+*(8"_*8'*"$%8"31-"W0:(3T$13+%-",+*"=7-3%'--"
$%8" . $%$/'0'%1"KC31B"5%-B7 0 $%")*$-$8L;""*P+0&'.00)/.'#&00#'1.)*+#'%.",*E*"GMMHE"!p"
\!I!!J;"

"

W%"1B'"A$0'"+,"1B'")*$T13T$(0"R%'$*1B3%/"1B'"Y'/'0+%D"+,")*$/0$ETQq21$. 2+81(/')0 . 2(]0 . 0 . 412589

]"
"

UB'"N('T1*+%3T"U*$%-,+*0$13+%"+,"1B'"_*/$%3`$13+%$(" . ''13%/0"R-3%/"U'TB%+(+/DI3%I
>+%1'f1"1+"R%8'*-1$%8"d*+7:"67::+*1"6D-1'0-"Kd66-L;"KC31B"9$%">($::'*L;"*9.12'5,5(E)*
>%+:&.0"E"!\\\E"S+(;aE""
"

NS'*D8$D"61*7//('-"$1"1B'"b+*&:($T'0"UB'"A$17*'"$%8"W0:(3T$13+%-"+,"[+713%'"['-3-1$%T'"
KC31B"5%-B70$%")*$-$8L;"/.0.#"12)&')%2.)>51&5,5(E)5$)F"(#'&G#%&5'0E"!\\?E"S+(;"!@E"GG@I
G@];"
"

bB'%"1B'"N1B%+/*$:B3T"674h'T1"6:'$&-"=$T&;"05+"'#,)5$)=#'#(.;.'%)J'L+&"EE"!\\?E"
S+(;]E"J!IJH;"
"

)$11'*%-"+," . +T&"=7*'$7T*$TD"3%" . 3%3%/"93-$-1'*-0"5%"5%$(D-3-"+,"1B'"b'-1*$D" . 3%'"
Nf:(+-3+%"KC31B"U30+1BD"YD%'-LE"05+"'#,)5$)=#'#(.;.'%)>%+:&.0E"!\\]E"S+(;JaE"HM!I
HGJ;"
"

>*313T$("UB'+*D"$%8" . $%$/'0'%1"N87T$13+%0"N%/$/3%/")+C'*E"W8'+(+/D"$%8")*$f3-"KC31B"
)$7($">$:*+%3L;"05+"'#,)5$)=#'#(.;.'%)K:+1#%&5'E"!\\]E"S+(;G!E"
"

b+*&3%/"C31B"1B'"q60$*1c" . $TB3%'0">+0:71'*3`$13+%"$%8"1B'"93-T+7*-'"+,"
5%1B*+:+0+*:B3-0"3%"_*/$%3`$13+%-;">%+:&.0)&')!+,%+".0N)F"(#'&G#%&5'0)#':)>51&.%&.0E"
!\\@E"S+(;!E"G@JIGH@;"
"

UB'"W8'+(+/D"+,")*+,'--3+%$(3-0"$%8"b+*&">+0:71'*3`$13+%0"5%"W%-131713+%$(3-1"6178D"+,"
U'TB%+(+/3T$(">B$%/''"KC31B"5%-B70$%")*$-$8L;"B+;#')/.,#%&5'0E"!\\aE"S+(;a]E"!aJJI
!a@?;"
"

9*7/"U'-13%/"$-"6D04+(3T" . $%$/'*3$("5T13+%"KC31B" . 3&'">$S$%$7/BL;"F"(#'&G#%&5')
>1&.'1.N"!\\aE"S+(;@E"GH]IG]!;"
"

6D04+(3T")*+T'--'-"3%"1B'"W0:('0'%1$13+%"+,"U'TB%+(+/3T$(">B$%/'0"5"6D04+(3T"
W%1'*$T13+%3-1"6178D"+,"b+*&">+0:71'*3`$13+%;"H1#:.;E)5$)=#'#(.;.'%)05+"'#,E"!\\aE"
S+(;JHE"!aMMI

"

P BLISHED PANEL DISC SSIONS

9+T1+*$("N87T$13+%"$%8"1B'"U'$TB3%/" . 3--3+%;"5"93$(+/7'"C31B"X'$%"=$*17%'&E"2''"
=7*&'E"X$%'"d3$T+44'I . 3(('*E">*$3/"27%84'*/"$%8")7-B&$($")*$-$8;)05+"'#,)5$)
=#'#(.;.'%)K:+1#%&5'-(!\\HE"S+(;GM;"

"

QQQQ

\"
"

9*7/"U'-13%/"3%"1B'" b +*&:($T'0"UB'"6D04+(3T" . $%$/'0'%1"+,"$%"_*/$%3`$13+%$(">*3-3-"
KC31B" . 3TB$'(">$S$%$7/B"$%8"X+B%" . 3TB$'("_$&'-L;"*7"51...:&'(0)5$)%2.)K#0%."')*
H1#:.;E)5$)=#'#(.;.'%E" . $D"!\\GE"=$(130+';"
"

23,'"$%8"9'$1B"3%">$*''*0"5%"Nf:'*3'%13$("Nf'*T3-'"23%&3%/">$*''*")($%%3%/"1+"6178'%1"
Z$(7'-"$%8"A+13+%-"+,"1B'"qd++8"23,'c;"*7"51...:&'(0)5$)%2.)K#0%."')H1#:.;E)5$)
=#'#(.;.'%E" . $D"!\\GE"=$(130+*';"
"

UB'">+%T':1"+,"5(3'%$13+%"$%8" b +*&:($T'"N0:+C'*0'%1"KC31B"5%-B70$%")*$-$8L;"
*7"51...:&'(0)5$)%2.)K#0%."')H1#:.;E)5$)=#'#(.;.'%E" . $D"!\\!E"Y$*1,+*8;"
"

qW0$/3%/c"1B'"_*/$%3`$13+%"3%"1B'">($--*++00")+*1$317*'"$-"$")'8$/+/3T"9'S3T'",+*"
Nf:'*3'%T3%/"93S'*-'"_*/$%3`$13+%$("['$(313'-"KC31B"X;" . 3TB$'(">$S$%$7/BL;"*7"51...:&'(0)
5$))%2.)K#0%."')H1#:.;E)5$)=#'#(.;.'%E" . $D"!\\ME"=7,,$(+;"
"

UB'">+0:71'*3`$13+%"+," b B31'I>+(($*" b +*&"3%"_*/$%3`$13+%-0"5">*313T$("$%8"
>+0:*'B'%-3S'"67*S'D"+,"1B'"231'*$17*'"C31B"67//'-13+%-",+*"^717*'"['-'$*TB;"
*7"51...:&'(0)5$)%2.)D.1&0&5')>1&.'1.0)H''+#,)=..&&'(0E"A+S'04'*"!\?\E"A'C"_*('$%-;""
"

_*/$%3`$13+%I . $&3%/"$%8" . $3%1'%$%T'0"5%"W%1'*:*'13S'"5TT+7%1"+,"$"R%3+%c-"^+*0$13+%"
3%"F$('"R%3S'*-31D;"*7"51...:&'(0)5$)%2.)K#0%."')H1#:.;E)5$)=#'#(.;.'%E" . $D"!\?\;"
"

" " QQQQ

"

W%-131713+%-"$%8"Nf+13T3`$13+%0" . $%$/3%/"1+" i '':"1B'"_1B'*"3%")($T';")$:'*":*'-'%1'8"$1"
1B'"5%%7$(" . ''13%/-"+,"1B'"5T$8'0D"+," . $%$/''0'%1E"9'%S'*E"57/7-1"GMMG;"
"
9'-3/%3%/"93,,'*'%T'0"93S'*-31D" . $%$/''0'%1"$%8"1B'"93-T+7*-'"+,"^$-B3+%"KC31B"
5%-B70$%")*$-$8L;")$:'*":*'-'%1'8"$1"1B'"!?1B"5%%7$(" . ''13%/-"+,"Nd_6"KN7*+:'$%"
d*+7:",+*"_*/$%3`$13+%"61783'-LE"=$*T'(+%$E"X7(D"GMMG;""
"
='1C''%"A$13S'"$%8")*+,'--3+%$("61*$%/''*0"N1B%+/*$:B3T"93('00$-"3%"1B'"6178D"+,"
_*/$%3`$13+%$(">7(17*'-;")$:'*":*'-'%1'8"$1"1B'"5%%7$(" . ''13%/-"+,"1B'"5T$8'0D"+,"
. $%$/''0'%1E"b$-B3%/1+%E"9;>;E"57/7-1E"GMM!;"
"
>*+--3%/">7(17*'-0"5")+-1T+(+%3$("5%$(D-3-"+,"$%"W%1'*I_*/$%3`$13+%$("N%T+7%1'*"KC31B"
5/%'1$" . +7('11'-L;")$:'*":*'-'%1'8"$1"1B'">*313T$(" . $%$/''0'%1"61783'-">+%,'*'%T'E"
. $%TB'-1'*E"R;i;E"X7(D"GMM!;"
"
>(+-'"N%T+7%1'*-"C31B"5T$8'03T"93-T*'831$13+%"KC31B" . $1-"5(S'--+%L;")$:'*":*'-'%1'8"
$1"1B'">*313T$(" . $%$/''0'%1"61783'-">+%,'*'%T'E" . $%TB'-1'*E"R;i;E"X7(D"GMM!;"
"
. $%$/3%/"2'/3130$TD"3%"qW(('/3130$1'c"_*/$%3`$13+%-;")$:'*":*'-'%1'8"$1"1B'"W%S31'8"
>+%,'*'%T'"+%"W%-131713+%-E">+%,(3T1"$%8">B$%/'E"A+*1BC'-1'*%"R%3S'*-31DE"NS$%-1+%E"W2E"
9'T'04'*"GMMM;"""
"
)*+03-3%/"[$3%4+C-0"5%"W%-131713+%$("5%$(D-3-"+,"93S'*-31D" . $%$/''0'%1"3%"A+*1B"
50'*3T$;")$:'*":*'-'%1'8"$1"1B'"5%%7$(" . ''13%/-"+,"1B'"5T$8'0D"+," . $%$/''0'%1E"
U+*+%1+E"57/7-1"GMMM;"
"
6$S3%/"1B'"N$*1B"W%T;0"UB'"2$%/7$/''"$%8"2+/3T"+," . $*&'1"93-T+7*-'-"3%"N%S3*+%0'%1$("
_*/$%3`$13+%-"KC31B"X',,"NS'*'11L;")$:'*":*'-'%1'8"$1"1B'"5%%7$(" . ''13%/-"+,"1B'"
5T$8'0D"+," . $%$/''0'%1E"U+*+%1+E"57/7-1"GMMM;"
"
>$-13%/"1B'"A$13S'"674h'T10"N1B%+/*$:B3T")*$T13T'"$%8"1B'"K['L)*+87T13+%"+,"93,,'*'%T'"
KC31B"5%-B70$%")*$-$8L;")$:'*":*'-'%1'8"$1"1B'"5%%7$(">+%,'*'%T'"+,"Nd_6"KN7*+:'$%"
d*+7:"+%"_*/$%3`$13+%"61783'-LE"Y'(-3%&3E"X7(D"GMMM;"
"
A$13S'")($T'-"3%"_*/$%3`$13+%$("6:$T'-0"N1B%+/*$:B3T"i%+C('8/''$%8"1B'"[':*+87T13+%"
+,"93,,'*'%T';")$:'*":*'-'%1'8"$1"1B'">*+--*+$8-"3%">7(17*$("61783'-"W%1'*%$13+%$("
>+%,'*'%T'E"=3*03%/B$0E"R%31'8"i3%/8+0E"X7%''GMMM;"
"
N1B%+/*$:B3T"g7'-13+%-"$%8"1B'"g7'-13+%"+,"N1B%+/*$:BD0"X+7*%'D3%/",*+0" . '1B+8"1+"
U*$8313+%"3%"$")(7*$(3-13T"b+*(8"KC31B"5%-B70$%")*$-$8L;")$:'*":*'-'%1'8"$1"1B'"5%%7$("
. ''13%/-"+,"1B'"5T$8'0D"+," . $%$/''0'%1E">B3T$/+E"!\\\;"
"
UB'"[',('T13+%"+,"W%-131713+%$(" . D1B-"3%"1B'"61*7T17*3%/"+,"$"A$13+%$(" . '83T$("[' -'$*TB"
W%313$13S'"KC31B"X7831B"=3*8-'(("<"b3(,*'8"#'*4'L;")$:'*":*'-'%1'8"$1"1B'"5%%7$(" . ''13%/-"
+,"1B'"5T$8'0D"+," . $%$/''0'%1E">B3T$/+E"!\\\;"
"

"

UB'"6D04+(3-0"+," b +*&">+0:71'*3`$13+%;")$:'*":*'-'%1'8"$1"1B'"5%%7$(" . ''13%/-"+,"1B'"
5T$8'0D"+," . $%$/'0'%1E"2$-"Z'/$-E"!\\G;"
"
^*+0" . '(13%/")+1"1+"6$($8"=+C(0" . $%$/3%/">7(17*$("W8'%1313'-"$-"1B'" b $((-">+0'"
U704(3%/"9+C%;")$:'*":*'-'%1'8"$1"5%%7$(" . ''13%/-"+,"1B'"_=U>"K_*/$%3`$13+%$("
='B$S3+*"U'$TB3%/">+%,'*'%T'LE">$(/$*DE">$%$8$E"!\\G;"
"
UB'"W8'+(+/D"+,")*+,'--3+%$(3-0"$%8"1B'"61*7T17*3%/"+,"_*/$%3`$13+%$("['$(31D0"5%"
W%1'*:*'13S'"6178D"+," b +*&">+0:71'*3`$13+%"KC31B"5%-B70$%")*$-$8L;")$:'*":*'-'%1'8"$1""
UB'"5%%7$(" . ''13%/"+,"1B'"5T$8'0D"+," . $%$/'0'%1E" . 3$03"='$TBE"!\\!;"
"
UB'"_4317$*D"Nf'*T3-'0"23%&3%/"W8'$-"+,"1B'"rd++8"23,'c"C31B">$*''*")($%%3%/;")$:'*"
:*'-'%1'8"$1"1B'"5%%7$(" . ''13%/"+,"1B'"_=U>"K_*/$%3`$13+%$("='B$S3+*"U'$TB3%/"
>+%,'*'%T'LE"='((3%/B$0E" b 5E"!\\!;"
"
9',3%3%/"U'TB%+(+/3T$("U*$%-,+*0$13+%-0"[$13+%$("$%8"[+0$%13T">+%-1*7T13+%-"+,"
_*/$%3`$13+%$("['$(313'-"$-" . +8'-"+,"5TT+0 0+8$13+%;")$:'*":*'-'%1'8"$1"6>_6"
K61$%83%/">+%,'*'%T'"+%"_*/$%3`$13+%$("6D04+(3-0LE"6$$*4*7T&'%E"d'*0$%DE"!\\M;"
"
Z+3T'-",+*0"1B'"N('T1*+%3T"6B$8+C0" b +0'%c-"Nf:'*3'%T'-"C31B"1B'">+0:71'*3`$13+%"+,"
b B31'I>+(($*" b +*&;")$:'*":*'-'%1'8"$1"1B'"5%%7$(" . ''13%/"+,"1B'"5T$8'0D"+,"
. $%$/'0'%1E"6$%"^*$%T3-T+E"!\\M;"
"
_,")D*$038-E"2$88'*-"$%8" . $`'-0"W%1'*:*'13%/"_*/$%3`$13+%$(")+*1*$31-"3%"1B'">($--*++0"
KC31B" . 3TB$'(">$S$%$7/BL;")$:'*":*'-'%1'8"$1"1B'"5%%7$(" . ''13%/"+,"_=U>"
K_*/$%3`$13+%$("='B$S3+*"U'$TB3%/">+%,'*'%T'LE">+(7043$E" . 3--+7*3E"!\?\;"
"
" " QQQQ

"

>B$3*"$%8"_*/$%3`'*E")*+,'--3+%$("9'S'(+:0'%1"b+*&-B+:E"q>+*:+*$1'"6+T3$("
['-:+%-343(31D"C31B"$">*313T$("N8/';c"6:+%-+*'8"4D">*313T$(".$%$/'0'%1"61783'-"$%8"
6+T3$("3--7'-"3%".$%$/'0'%1"93S3-3+%-E"5T$8'0D"+,".$%$/'0'%1"5%%7$(".''13%/-E"
.+%1*'$(E"57/7-1"GM!M;"

"

)$%'(3-1E"jW003/*$13+%"3%"1B'"R;6;0"W0:(3T$13+%-",+*"_7*"^717*'k;"N0:3*'"61$1'">+(('/'E"
6$*$1+/$"6:*3%/-E"A'C"F+*&;"9'T'04'*"GM!M;"

)$%'(3-1E")*+,'--3+%$("9'S'(+:0'%1"b+*&-B+:E"W%1'**+/$13%/">*313T$(".$%$/'0'%1"
61783'-;"6:+%-+*'8"4D"1B'"_*/$%3`$13+%$("9'S'(+:0'%1"<">*313T$(".$%$/'0'%1"61783'-"
93S3-3+%-E"5T$8'0D"+,".$%$/'0'%1"5%%7$(".''13%/-E">B3T$/+E"57/7-1"GMM\;"

"

_*/$%3`'*"$%8")*'-'%1'*E")*+,'--3+%$("9'S'(+:0'%1"b+*&-B+:E"q2++&3%/",+*"
KR%L>+00+%"d*+7%80""g7$%131$13S'"$%8"g7$(31$13S'"5::*+$TB'-"1+"6178D3%/"b+*&:($T'"
93S'*-31D;c""b+*&-B+:"-:+%-+*'8"4D"1B'">*313T$(".$%$/'0'%1"61783'-"$%8"d'%8'*"<"
93S'*-31D"3%"_*/$%3`$13+%-"93S3-3+%-"+,"1B'"5T$8'0D"+,".$%$/'0'%1E")B3($8'(:B3$E"
57/7-1"GMM];"

"

)$%'(3-1E")*+,'--3+%$("9'S'(+:0'%1"b+*&-B+:0">*313T$("N%T+7%1'*-0"2$4+*")*+T'--E"
61*7T17*$13+%"$%8")+-1T+(+%3$(3-03%"93$(+/7';"5T$8'0D"+,".$%$/'0'%1"5%%7$("
.''13%/-E"Y+%+(7(7E"YC33E"57/7-1"GMM@;"

"

W%S31'8")*'-'%1'*E"d9_"Kd'%8'*"<"93S'*-31D"3%"_*/$%3`$13+%-L"9+T1+*$(">+%-+*1370;"
5%%7$(".''13%/-"+,"1B'"5T$8'0D"+,".$%$/'0'%1E"Y+%+(7(7E"YC33E"57/7-1"GMM@;"

"

W%S31'8")*'-'%1'*E">.6"K>*313T$(".$%$/'0'%1"61783'-L"9+T1+*$("b+*&-B+:0"93-T7--"D+7*"
9+T1+*$("b+*&"$%8">$*''*"C31B"2'$83%/">.6"6TB+($*-;"5T$8'0D"+,".$%$/'0'%1"
5%%7$(".''13%/-E"Y+%+(7(7E"Y$C$33E"57/7-1"GMM@;""

"

>+I_*/$%3`'*"$%8">+I^$T3(31$1+*"+,"9+T1+*$("b+*&-B+:"+%"_*/$%3`$13+%"UB'+*D;"
6:+%-+*'8"4D"i5U5X5",+*"9+T1+*$("6178'%1-"3%".$%$/'0'%1E"2$:::''%*$%1$"
R%3S'*-31D+,"U'TB%+(+/DE"2$:::''%*$%1$E"X7%''HIX7%''!ME"GMM@;"

"

_*/$%3`'*"$%8")*'-'%1'*E")*+,'--3+%$("9'S'(+:0'%1"b+*&-B+:E"q[$3-3%/"Z+3T'-0"
67-1$3%3%/">*313m7''3%"_*/$%3`$13+%"['-'$*TBc;"b+*&-B+:"-:+%-+*'8"4D"1B'"['-'$*TB"
.'1B+8-"$%8">*313T$(".$%$/'0'%1"61783'-"93S3-3+%-"+,"1B'"5T$8'0D"+,".$%$/'0'%1E"
6'$11('E"57/7-1"GMMJ;"

"

^$T3(31$1+*"$%8")*'-'%1'*E")*+,'--3+%$("9'S'(+:0'%1"b+*&-B+:E"q>*$,13%/"g7$(31$13S'"
^3'(8C+*&c;"b+*&-B+:"-:+%-+*'8"4D"1B'">*313T$(".$%$/'0'%1"61783'-E"_*/$%3`$13+%"
UB'+*D"$%8"['-'$*TB".'1B+8-"93S3-3+%-"$1"1B'"5%%7$(".''13%/-"+,"1B'"5T$8'0D"+,"
.$%$/'0'%1E"6'$11('E"57/7-1"GMMJ;""

"

>+I>B$3*"<"^$T3(31$1+*E")*+,'--3+%$("9'S'(+:0'%1"b+*&-B+:E"q^+((+C3%/"1B'">*313T$("
U7*%0".$1'*3$(3-0E"9'T+%-1*7T13+%"<"W%-1317 13+%$("N1B%+/*$:BDc;"['-'$*TB".'1B+8-"

"

9 3S3-3+%E" 5 %%7$(" . ''13%/-"+,"1B'" 5 T$8' 0 D"+," . $%$/' 0 '%1E" b $-B3%/1+%E" 9;>;E" 5 7/7-1" GMM!;"

"

>B$3*"<"_*/$%3`'*E")*+,'--3+%$("9 'S'(+: 0 '%1" b +*&-B+:E"q . ''13%/"1B'">B$(('%/'-"+,"1B'" A'C"U3 0 '-0">*313T$("5 : :*+$TB'-",+*"U'$TB3%/"61*$1'/D"$%8" . $%$/' 0 '%1;c" . $%$/' 0 '%1" N87T$13+%" 9 3S3-3+%E" 5 %%7$(" . ''13%/-"+,"1B'" 5 T$8' 0 D"+," . $%$/' 0 '%1E"U+*+%1+E" 5 7/7-1E" GMMM;"

"

>+ITB$3*"$%8"^$T3(31$1+*E")*+,'--3+%$("9 'S'(+: 0 '%1" b +*&-B+:E"jW%1'*:*'13S'" _*/$%3`$13+%$("['-'$*TB"3%"1B'"A$**$13S'"d '%*'-kE"['-'$*TB" . '1B+8-"9 3S3-3+%E" 5 %%7$(" . ''13%/-"+,"1B'" 5 T$8' 0 D"+," . $%$/' 0 '%1E"U+*+%1+E" 5 7/7-1"GMMM;"

"

b +*&-B+:"_*/$%3`'*E"jW%1'*:*'13%/"1B'"W%1'*:*'13S'0"9 3,,'*'%1"d '%*'-"+,"g 7$(31$13S'" ['-'$*TB;")*'I>+%,'*'%T'" b +*&-B+:E"['-'$*TB" . '1B+8-"9 3S3-3+%E" 5 %%7$(" . ''13%/-"+," 1B'" 5 T$8' 0 D"+," . $%$/' 0 '%1E"6$%"9 3'/+E"!\\?;"

"

^$T3(31$1+*E"j=73(83%/">+(('T13S'"['-'$*TB"61*'$0-k;")*'I>+%,'*'%T'" b +*&-B+:E" b +0 '%" 3%" . $%$/' 0 '%1"9 3S3-3+%E" 5 %%7$(" . ''13%/-"+,"1B'" 5 T$8' 0 D"+," . $%$/' 0 '%1E">3%T3%%$113E" !\\H;"

"

)*'-'%1'*E"jW-"Z$(7'I^*''"U'$TB3%/"1B'" b $-1'($%8"+," 5 T$8' 0 3T"N%1'*:*3-'ek"9 +T1+*$(" >+%-+*137 0 E" b '-1'*%" 5 T$8' 0 D"+," . $%$/' 0 '%1" . ''13%/-E"=$%,,E">$%8E"!\\H;"

"

)$%'(3-1E"jR%3,D3%/"_*/$%3`$13+%"UB'+*D0")$*$83/ 0 E")$*$83/ 0 -"+*"),',,'*83/ 0 ek"9 '4$1'" -:+%-+*'8"4D"1B'"=7-3%'--")+(3TDE"_*/$%3`$13+%"UB'+*D"$%8" . $%$/'*3$(">+/%313+%" 9 3S3-3+%-E" 5 %%7$(" . ''13%/"+,"1B'" 5 T$8' 0 D"+," . $%$/' 0 '%1E"Z$%T+7S'*E"!\\@;"

"

)$%'(3-1E"jUB'" . 7(13T7(17*$(">($--*++ 0 k;")*'I>+%,'*'%T'" b +*&-B+:E"_*/$%3`$13+%$(" ='B$S3+*"9 3S3-3+%E" 5 %%7$(" . ''13%/"+,"1B'" 5 T$8' 0 D"+," . $%$/' 0 '%1E"9 $((($-E"!\\a;"

"

6D 0 :+-37 0 ">B$3*E"j_*/$%3`$13+%$("U'TB%+(+/3'-"$%8"1B'"U'f17*'"+," b +*&0">B$%/3%/" >+%,3/7*$13+%-"+,")+C'*E"i %+C('8/'"$%8" . '$%3%/"3%")+-1I%87-1*3$("%-1317 13+%-;k" 5 %%7$(" . ''13%/"+,"1B'" 5 T$8' 0 D"+," . $%$/' 0 '%1E"9 $((($-E"!\\a;"

"

)$%'(3-1E"jUB'"A'f1"d '%'*$13+%0" b B+" b 3(("U'$TB"UB' 0 ek" 5 %%7$(" . ''13%/"+,"1B'"N$-1'*%" 5 T$8' 0 D"+," . $%$/' 0 '%1E" 5 (4$%DE"A'C"F+*&E"!\\a;"

"

" " QQQQ

"

"

*M&C."#,)Y?"@&1%%5'03)H')J'0%%+%%5'#,)H'#,E0%0)5$)!+,%+"#,)!5'$,%1%0)%')H;."%1#')M&C."#,)H"%0)!5,,.(.0"K=++&"0$%7-T*3:1"7%8'*":*':$*$13+%L"*

"

" " QQQQ

"

"

5(4'*1$"N%'*/D">+*:+*$13+%"['-'$*TB"^'((+C-B3:"d*$%1"Ks!MEMMMLE"jR%8'*-1$%83%/"
N0:(+D''"['-3-1$%T'kE" . $D"!\\a;"
"
" " QQQQ

"

"

N('T1*+%3T" . ''13%/-"$%8"_*/$%3`$13+%$("9D%$03T-;"9':$*10'%1"+,")-DTB+(+/DE"
R%3S'*-31D"+," [3TB0+%8E"Z3*/3%3$E"X$%7$*D"!\\H;"
"
. $%$/3%/"1B'"=*$3%D" . +%-1'*0">+0:71'*-"$%8"U'TB%+(+/3T$("5%1B*+:+0+*:B3-0"3%"
_*/$%3`$13+%-;"^$T7(1D"+,"5803%3-1*$13S''6T3'%T'-E"F+*&"R%3S'*-31DE"U+*+%1+E" . $D"!\\@;"
"
W-"1B'"b'(T+0'" . $1",+*"b+0'%" . $%$/'*-"b'$*3%/"UB3%e"UB'"V'*+f"b+0'%",+*"
NfT'(('%T''A'1C+*&E">$(/$*DE"_T1+4'*"!\\a;"
"
" " QQQQ

"

Z;2;"N1B3*$h"5C$*8",+*")*+,3T3'%TD"3%"N%/(3-BE"R%3S'*-31D"+," . $8*$-E"!\]J;""

"

" " QQQQ

"

d . ' : . "ℕ) 4 5"6)#' :)F"(#'&G#%&5 '"
)
F"(#'&G#%&5 ')>%+ :& . 0)
"
F"(#'&G#%&5 ')
)
>1#' :& '#-&#')05+"'#,)5$)=#'#(. ; . '%)
)
H1#: . ; E)5$)=#'#(. ; . '%)05+"'#,)
)
H1#: . ; E)5$)=#'#(. ; . '%)/ . -& . Q)
)
=J>)*+#'%. ",E)
)
B+ ;#')/ . ,#%&5 '0)
)
F"(#'&G#%&5 ')>1& . '1 .)
)
H: ;&'&0%"#%&- .)>1& . '1 .)*+#'%. ",E)
)
J'$5"; #%&5 ')9 . 12'5,5(E)#' :)7 . 5<, .)
)
05+"'#,)5$)=#'#(. ; . '%)K: +1#%&5 ')
)

B. A C

_*/$%3`$13+%"$%8" . $%$/'0'%1"UB'+*D"93S3-3+%E"5T$8'0D"+," . $%$/'0'%1"
"
d'%8'*"$%8"93S'*-31D"3%"_*/$%3`$13+%-"93S3-3+%E"5T$8'0D"+," . $%$/'0'%1"
"
['-'$*TB" . '1B+8-"93S3-3+%E"5T$8'0D"+," . $%$/'0'%1"
"
N$-1'*%"5T$8'0D"+," . $%$/'0'%1"5%%7$(">+%,'*'%T'"
"

C. R G

6+T3$("6T3'%T'-"$%8"Y70$%313'-"['-'$*TB">+7%T3("K66Y[>L"+,">$%$8$"
"
A$13+%$("6T3'%T'"^+7%8$13+%"KA6^LE"R;6;5;"
"

D. B P

6$/'")74(3T$13+%-"
"
_f,+*8"R%3S'*-31D")*'--"
"

"

[+71('8/'")74(3T$13+%-"
"
N0'*$(8")74(3-B'*-"
"
N(-'S3'*"6T3'%T'")74(3-B'*-"
"
61$%,+*8"R%3S'*-31D")*'--"

Ga"

"

. '04'*E"U$-&"^+*T''1+"T+%-13171''$"%'C"03%+*"3%"^3(0"$%8" . '83$"61783'-E"GM!J"1+"GM!a;"

"

_*/$%3`'*E"5%%7$("2'T17*''3%"W%1'*%$13+%$("5,,$3*-E"GM!G"n":*'-'%1;""

"

^+7%8'*"$%8">+I+*83%$13+%"+,"1B''6&380+*'"['-'$*TB"

"

>B$3*"+,"674I>+0 0311' '"93*'T1'8"C31B"1B' "U$-&"+," b *313%/"$"6'T13+%"+,"1B' "9' :$*10 '%1$("
6'(,I-178D"[' :+*1"9 '$(3%/"C31B"^$T7(1D")*+,3('-E"9 'S'(+:0 '%1E"['T*7310 '%1"$%8"
['1'%13+%;"
"
>++*83%$1+*E"['-'$*TB"[+7%81$4('E" . $%$/' 0 '%1"<"=7-3%'--"9 ':$*10 '%1E"^$(("GMMMI
GMM!;"

B. L

"
. '04'*E"=7-3%'--IR%3S'*-31D")$*1%'*-B3:"W%313$13S'E"!\\?IGMMM;"
"
5--+T3$1' "93*'T1+*E"9+T1+*$("6178'%1"9 'S'(+:0 '%1")*+/*$0E"!\\?IGMMM;"
"
. '04'*E">+0 0311' ",+*"5TT*'831$13+%"K5 5>6=LE"W%1'((' T17$(">+%1*3471 3+%-"^+T7-E"!\\\I
GMMM;"
"
>++*83%$1+*E"d7'-1"6:'$&'*"^+*70E"!\\?IGMMM;"
"

C. C

"
. '04'*E"R%3S'*-31D">+0 0311' '"d*$%13%/"U'%7*' "$%8")*+0+13+%E"!\\@I!\\H;"
"
5--+T3$1' "93*'T1+*E"9+T1+*$(")*+/*$0E"^$T7(1D"+," . $%$/' 0 '%1E"!\\aI!\\];"
"
. '04'*E"R%3S'*-31D"U$-&",+*T' "+%"6'f7$("Y$*$--0 '%1E"!\\@I!\\];"
"
. '04'*E"R%3S'*-31D"U*$S'("^7%8-">+0 0311' 'E"!\\aI!\\H;"
"
. '04'*E")'*,+*0$%T' "NS$(7$13+%">+0 0311' 'E"^$T7(1D"+," . $%$/' 0 '%1E"!\\@I