

# **HUMS2006**

FYgYUfWX 'D`UWYa Ybhž'5fhg'UbX'GcWJU`'GWJYbWYg

HYfa 'Hk c''#'&\$&%

## 7ci fgY<sup>-</sup>Cj Yfj ]Yk

## GHJZ7cbHJWh8YHJ]`g

### 7cbj Ybcfg

B Ua Y	9a U]`	5j U]`UV]`]lm	@cWUhjcb	D\cbY
@]gU': cfX	`"ZcfX4 i bgk "YXi "Ui	VmUddc]bha Ybh	' ( - <sup>·</sup> A 6	

## GWXcc`7cbHJWhi±bZcfa Uh]cb

GWkcc`cZ<iaUb]hJYg'UbX'@Ub[iU[Yg

@c\\U||cb. G\\cc`C\\Z|\\\žA cfj\Yb'6fck\b'6i]\X]b[\\ž@Yj\Y``&\\z\&),

CdYb]b[ '<ci fg. 'A cbXUm! ': f]XUmž - Ua '!') da

D\cbY.'Ž\*%'&'-',)'%\*,%

: UI . Ž\*%'&'-',)', +\$)

9a U]`. <u>\U`4 i bgk "YXi "Ui</u>

## 7ci fgY 8YW] g

## 7 fYX]hDc]bhg\*\*

### Gi a a UfmcZh\Y 7ci fgY

 $+ b \cdot h \cdot g \cdot Wc i \cdot fgYz \cdot mc i \cdot k \cdot j \cdot h \cdot U \cdot fYU \cdot i \cdot j \cdot ZY \cdot UWUXYA \cdot g \cdot WfYgYUfW \cdot YI \cdot dYf]YbWY \cdot cb \cdot U \cdot a \cdot U \cdot cf \cdot dfc \cdot YWf \cdot YX \cdot Vm \cdot I \cdot BGK \cdot gW. c \cdot Ufg \cdot ]b \cdot 5 \cdot frg / \cdot GcWJU \cdot GWJYbWY g'' \cdot Mc i \cdot k \cdot j \cdot h \cdot U \cdot YUX]b[\cdot gW. c \cdot Ufz \cdot Wc a \cdot d \cdot YhY \cdot cf][\cdot ]bU \cdot fYgYUfW \cdot UbX \cdot k \cdot f]hY \cdot U \cdot dUdYf \cdot UVc i \cdot h \cdot mc i \cdot f \cdot UfYU \cdot cZfYgYUfW \cdot '' \cdot$ 

#### 7 ci fgY @YUfb]b[ Ci hWca Yg

%" 91 YW hY 'Ugg][ bYX 'fYgYUfW. 'hUg\_g']b 'U 'Wca dYhYbhž'dfcZYgg]cbU``UbX 'hJa Y`ma UbbYf &" 7 f]h]WU``mfYZYWicb 'mci f'fYgYUfW. 'hUg\_gž'XYa cbghfUh]b[ 'mci f'i bXYfghUbX]b[ 'cZmci f'fYgYUfW. dfc YWi]b '`][ \hcZgca Y'fY`Yj Ubh`]hYfUhi fY

"FYZYWicbimci fiYl dYf]YbWYicZk cf\_]b[icbiUifYgYUfWkidfcYWh

#### HYUWX]b[ 'GhfUhY[]Yq'

 $\label{eq:hammer} $H\setminus ]g:WUgg:k]:WX]YZm:VY:HUi: [\hih\fci: [\cbY!cb!cbY:cf:ga:U:``[fci:d:a:YY]b[g:k]h\himci:f:fYgYUfWX:hUi: [\hih\fci: [\h]\h]]]]]$ 

## 5ggYgga Ybh

### 5ggYgga Ybh'HUg\_g

5ggYgga Ybh'hUg_	K Y][\h	8i Y'8UHY	Gh XYbh@YUfb]b[ Ci hWca Ygʻ5ggYggYX
F YgYUfV% 'DcfhZc`]c'	) \$1	\$&#\$, #&\$&%`\$).\$\$`DA</td><td>%ž''</td></tr><tr><td>F YgYUfVX 'F Ydcfh'</td><td>(\$1</td><td>\$&#\$, #&\$&%`\$).\$\$`DA</td><td>&</td></tr><tr><td>F YgYUfVX 'Gi dYfj ]gcf 5ggYgga Ybh</td><td>%\$ı</td><td>Bch5dd`]WUV`Y</td><td>%</td></tr></tbody></table>	

### 5ggYgga Ybh'8YhJ]`g

5ggYgga Ybh% F YgYUfW DcfhZc`]c

GhUfh'XUhY. K YY\_'%

@Yb[ h\." \$\$\$

8 YHJ]`g.

#blYfbg\]d'dcfhZc`]c'fl \$\$\$'k cfXgL'H\Y'dcfhZc`]c'g\ci `X'VY'UggYa V`YX'h\fci [\ci hh\Y'h\fa"'#ig\ci `X XcW a Ybhimci f'Yl dYf]YbW'gž'dfc[fYgg'UbX'fYZYWjcbg'cZmci f'F #dfc[fUa "'8cW a YbhUhjcb']bWi XYg Zcfhb][\hmfYdcfhgž'UbX'Yj]XYbW'cZfYgYUfW\i bXYfhU\_Yb"'#ig\ci `X'U'gc']bWi XY'U'Wf]hJWD`fYZYWjcb'cb mci f'dfcW'ggž'dfc[fYggž'UbX'k\UhWcbgh]hi hYg'U'gi WW'ggZ\`fYgYUfW\dfc YWh]b'h\]g'Z]Y'X"'Mci 'k]`` k cf\_g\cd'mci f'dcfhZc`]c'k]h\mci f'Wcbj Ybcf'cf'XY'Y[UhY'UbX'fYWY]j Y'Zcfa Uhjj Y'ZYYXVUW\_cb'mci f'dfc[fYgg Uhh\Y'a]Xdc]bhcZh\Y'hYfa "'H\]g'dcfhZc`]c'k]``VY'[fUXYX'Vmh\Y'Wcbj Ybcf'cf'XY'Y[UhY']b'Wcbgi `hUhjcb'k]h\mci f'gi dYfj ]qcf": YYXVUW\_k\]i Yb'j ]U'U'a Uf\_]b['fi Vf]WUbX']b'k f|hb["

Gi Va ]gg]cb bchYg. J ]U Ya U]`

Hi fb]hb gYhb[. H\]g ]g bchU Hi fb]hb Ugg][ ba Ybh

5ggYgga Ybh& FYgYUfW FYdcfh

GhUfh'XUhY. K YY\_')

@Yb[h.: &\$\$\$"K cfXq

8YHJ]`g.

F YgYUfW. F Ydcfhf&\$\$\$ k cfXgŁ Mci f fYgYUfW. fYdcfhdfcj ]XYg Ub cddcfhi b]mhc k f]hY U fYgYUfW. dUdYf VUgYX cb Ub UgdYWicZmci f fYgYUfW. h\ Uh\ Ug dUfh]W `Uf mgdUf\_YX mci f ]bhYfYghz cf hc fYZYWicb mci f fYgYUfW. d`UWra YbhYl dYf]YbW" Mci g\ ci `X'dfcdcgY mci f dfc YWi]b k f]h]b[ 'UbX`\Uj Y ]hUddfcj YX Vmmci f gi dYfj ]gcf'UbX'h\ Y Wci fgY Wcbj Ybcf'VYZcfY h\ Y a ]XX`Y cZh\ Y hYfa "'=ha Um\ Uj Y Ub cfU`dfYgYbhUh]cb Wca dcbYbh—'hc VY XYhYfa ]bYX`]b Wcbgi `hUh]cb k ]h\ mci f gi dYfj ]gcf"'H\ ]g k ]``VY Xci V`Y a Uf\_YX Vmmci f Wcbj Ybcf'cf'XY`Y[ UhY UbX mci f gi dYfj ]gcf": YYXVUW\_k ]``VY [ ]j Yb j ]U'U a Uf\_]b[ fi Vf]WUbX`]b k f]h]b[ "

Gi Va ]gg]cb bchYg. 'J ]U 9a U]`

5ggYgga Ybh' . F YgYUfW Gi dYfj ]gcf 5ggYgga Ybh

GhUfhXUhY. Bch5dd`]WUV`Y

8YHJ]`g.

Mci f'fygYUfWX 'gi dYfj ]gcf'k ]``'UggYgg'mci f'dYfZcfa UbWY'U[ U]bgh'dfcj ]XYX'Wf]hYf]U''': YYXVUW\_']b'k f]h]b[ 'UbX Vmfi Vf]W'

FYgci fWyg

DfYgWf]VYX F Ygci fWYg

BchUj U]`UV`Y

FYWca a YbXYX FYgci fWYg

Bch'Uj U]`UV`Y

7ci fgY 9j U'i Uhjcb UbX 8Yj Y'cda Ybh

 $Ghi \ XYbhZYXVUW_k \ ] \ ``VY'[UhYfYX'] \ ] U Ya U ] \ ``UhhYYYbX'cZhY'Wci fgY'VmhY'Wci fgY'Wcbj Ybcf''Ghi XYbhg k ] \ ``VY'fYei YghYX'hc'dfcj ] XY'ZYYXVUW_cb'hY]f'Ugg] [bYX'dfc'YWhf]bWi X]b ['ei U`] mcZ gi dYfj ]g]cb/k cf_`cUX/hfUbgZyfUV] \ [mcZfYgYUfWk'g_] \ ``g/\ck 'Yb [U[]b['h\YmZci bX'h\Y'Ugg] [bYX'dfc'YWh'' H\Ymk] \ ``U`gc'VY'fYei YghYX'hc'Wca a Ybhcb'h\Y'cj YfU```ghfi Whi fY'cZh\Y'Wci fgY'UbX'] hg'UggYgga Ybhg'' : YYXVUW_cb']bX]j ] Xi U``dfc'YWhg'k ] \ ``VY'fYZYffYX'hc'gi dYfj ] gcfg'hc'[i] XY'h\Ya']b'ghfi Whi f]b['a UhYf]U``Zcf Z hi fY'< | A G&$$*'fYgYUfWk'] bhYfbg''': YYXVUW_cb'h\Y'Wci fgY'k ] \ ``VY'i gYX'hc'UX'\ gha cXYg'cZ UggYgga Ybh''$ 

## Gi Va ]gg]cb cZ5ggYgga YbhHUg\_g

## Hi fb]h]b Gi Va ]gg]cb

⊋mci YbWci bhYf'U'dfcV`Ya 'k \Yb'UhYa dhJb['hc'gi Va ]hmci f'Ugg][ ba Ybhh\fci [\'Hi fb]hJbž'd`YUgY hY`Yd\cbY'9| hYfbU`'Gi ddcfhcb'-', ) '' ' ' %cf'Ya U]`'h\Ya 'cb'Y! hYfbU`hYhgi ddcfh4 i bgk "YXi "Ui "''Gi ddcfh\ci fg'UfY', .\$\$Ua '-',\$\$.\$\$da 'cb'k YY\_XUmg'UbX'-.\$\$Ua '-').\$\$da 'cb'k YY\_YbXg'fl \*) 'XUmg'U'mYUfŁ'''⊋mci UfY'i bUV'Y'hc'gi Va ]hmci f'Ugg][ ba YbhXi Y'hc'U'ZJi `hk ]h\'Hi fb]hJb'mci 'a UmUdd`mZcf'Ub'Y! hYbg]cbž'Vi hmci a i ghfYhJ]b'mci f'hJW\_Yhbi a VYf'Zfca '9! hYfbU`'Gi ddcfhfU`cb['k]h\'Ubmch\Yf'fY`Yj UbhXcW a YbhgŁ'hc

## 5 WUXYa ]W<cbYghmUbX D`U[ ]Uf]ga

D`U[]Uf]ga `]g`i g]b[ 'h\Y`k cfXg`cf`]XYUg`cZch\Yfg`UbX'dfYgYbh]b[ 'h\Ya 'Ug`mci f`ck b"'=h\Wb'hU\_Y`a Ubm Zcfa qžZfca 'XY`]VYfUhY'W\YUh|b[ 'hc`UWW]XYbhU`mWcdm]b[ 'Zfca 'U'gci fW'k ]h\ci h'UW\_bck 'YX[ Ya Ybh'

IBGK '[fci dg'd'U[]Uf]ga ']bhc'h\Y'Zc``ck]b[ 'WUhY[cf]Yg.

7 cdm]b[.'i g]b['h\Y'gUa Y'cf'] Yfmg]a ]`Uf'k cfXg'hc'h\Y'cf][]bU`h\I hcf']XYU'k ]h\ci hUW\_bck `YX[]b['h\Y gci fW'cf'i g]b['ei chUh]cb'a Uf\_g"'H\]g'U'gc'Udd`]Yg'hc']a U[Ygž'Ufh'UbX'XYg][b'dfc'YWgž'Ug'k Y``'Ug dfYgYbhUh]cbg'k \YfY'gca YcbY'dfYgYbhg'Ubch\Yf'g']XYUg'cf'k cfXg'k ]h\ci h'WfYX]h'

⇒ Uddfcdf]UhY 'dUfUd\fUg]b[...7\Ub[]b[ 'U'ZYk 'k cfXg'UbX'd\fUgYg'k \]'Y 'a cghmfYhJ]b]b[ 'h\Y'cf][]bU` ghfi Wh fY 'UbX#cf'dfc[fYgg]cb'cZ]XYUg'cZh\Y'cf][]bU'žUbX']bZcfa Uh]cb'k ]h\ci hUW\_bck `YX[Ya Ybh'H\]g'U`gc Udd`]Yg']b'dfYgYbhUh]cbg'k \YfY'gca YcbY'dUfUd\fUgYg'Ubch\Yf'g']XYUg'cf'k cfXg'k ]h\ci hWfYX]hUbX'hc d]YW]b[ 'hc[Yh\Yf'ei chYg'UbX'dUfUd\fUgYg']bhc'U'bYk 'k \c`Yžk ]h\ci hUddfcdf]UhY'fYZYfYbW]b[ "

7 c``i g]cb. 'k cf\_jb[ 'k ]h\ 'ch\ Yfg'Vi h'dUgg]b[ 'cZZh\ Y 'k cf\_'Ug'U'dYfgcb'g']bX]j ]Xi U``k cf\_"'7 c``i g]cb'U`gc ]bWi XYg'dfcj ]X]b[ 'mci f'k cf\_'hc'Ubch\ Yf'ghi XYbhVYZcfY'h\ Y 'Xi Y 'XUhYzcf'Zcf'h\ Y' di fdcgY'cZh\ Ya d`U[ ]Uf]g]b[ 'Uh'Ubmh]a Yz'dUm]b[ 'Ubch\ Yf'dYfgcb'hc'dYfZcfa 'Ub'UWUXYa ]WhUg\_z'ghYU']b[ 'cf'UWei ]f]b[ Ubch\ Yf'dYfgcb'g' UWUXYa ]Wk cf\_'UbX'Wcdm]b[ ']hz'cZYf]b[ 'hc'Wca d`YhY'Ubch\ Yf'dYfgcb'g' k cf\_'cf'gYY\_]b[ dUma YbhZcf'Wca d`Yh]b[ 'UWUXYa ]Wk cf\_"

±bUddfcdf]UhY`W]hUh]cb.`7]h]b[ˈgci fW/gˈk \]WX`\Uj Y`bchVYYb`fYUXžk]h\ci hUW\_bck`YX[]b[ˈh\Y`″gYWcbXUfm″gci fW/Zfca ik \]WX`\_bck`YX[Y`cZh\Ya`\UgʻVYYb`cVhU]bYX"

8 i d`]\WUh]cb`ffgY`Zd`U[]\Uf]ga "Ł`gi Va]\h]b[`mci f`ck b`k cf\_ž]b`k \c`Y`cf`]b`dUfhžk \YfY`]h\Ug`dfYj]ci g`m VYYb`dfYdUfYX`cf`gi Va]\hYX`Zcf`Ubch\Yf`UggYgga Ybhcf\Wci fgY`UhI BGK `cf`Ubch\Yf`i b]j Yfg]\m'

7 cffYWhfYZYfYbWb[dfUWhWyg.

- DUfUd\fUq]b[žgi a a Uf]q]b[žYggUmk f]h]b['UbX'h]a Y'a UbU[Ya Ybh
- 5ddfcdf]UhY'i gY'cZUbX'Uhff]Vi h]cb'Zcf'U'fUb[Y'cZa UhYf]U`g']bWi X]b['hYl hž']a U[Ygž'Zcfa i `UY'UbX WbWYdhg"

±0X]j ]Xi U``Ugg]ghUbWr`]g`Uj U]`UV`Y`cb`fYei YghZfca `H\Y`@YUfb]b[ `7 YbhY`f\hd.#k k k "`Wi bgk "YXi "Ui #£" Ghi XYbhg`UfY`U`gc`fYa ]bXYX`h\UhWUfYZ ``h]a Y`a UbU[ Ya Ybh']g`Ub`]a dcfhUbhdUfhcZghi XmUbX`cbY`cZh\Y ]XYbh]Z]YX`WUi gYg`cZd`U[ ]Uf]ga `]g`dccf`h]a Y`a UbU[ Ya Ybh'`Ghi XYbhg`g\ci `X`U``ck `gi Z]W]Ybh'h]a Y`Zcf fYgYUfW\z`XfUZh]b[ `UbX`dfcdYf`fYZYfYbW]b[ `cZgci fWg`]b`dfYdUf]b[ `U```UggYgga Ybh']hYa g"

IBGK @]VfUfmU`gc`\Ugʻh\Y`9@&9`hcc``UjU]`UV`Y`hc`Ugg]ghmci`k]h\`mcif`ghiXmUhIBGK"`9@&9`]g XYg][bYX`hc`]bHfcXiWY`bYk`ghiXYbhg`hc`ghiXm]b[`UhIBGK`Vih]hWUb`U`gc`VY`U`[fYUhfYZfYg\Yf`Xif]b[`mcif

- i bXYfgfUbX mci f'f][\hg'UbX'fYgdcbg]V]`]hJYg'Ug'U'gh XYbhUhl BGK
- VY`Uk UfY`cZd`U[]Uf]ga ž`Wcdmf][\hz'l BGK `Gh XYbh7cXY`cZ7cbXi WhUbX`5VWWdhUV`Y`l gY`cZ I BGK `=\forall H`F Ygci f\W\g`Dc`]\m\m
- VY 'Uk UfY 'cZh\Y 'ghUbXUfXg 'cZVY\Uj ]ci f'Yl dYWYX 'cZYj YfmcbY ']b 'h\Y 'l BGK 'Wca a i b]hm
- `cWUHY 'qYfj |WYq'UbX']bZcfa UHcb'UVci hI BGK 'UbX'I BGK '@|VfUfm

Gca Y'cZh\YgY'UfYUg'k]``VY'ZJa]`]Uf'hc'mci ž'ch\Yfg'k]``VY'bYk"'; U]b]b['U'gc`]X'i bXYfgHJbX]b['cZU``h\YfY`UhYX'UgdYWng'cZ9@+69'k]``\Y`d'mci 'a U\_Y'h\Y'a cghicZmci f'ghi X]Yg'UhI BGK "'\\hd.##qi VYWfi |XYg"`]VfUfm'i bqk "YXi "Ui #\`]qY#JVci hY`]qY

## 5 WUXYa ]W = b Zcfa Uh cb

: cf'YggYbhJU`'gh XYbh']bZcfa UhJcb'fY`UhJb['hc.

- fYei Yghg 'Zcf'Yl hYbg]cb/
- `UhY`gi Va ]gg]cbg`[ i ]XY`]bYg/
- fYi]Yk cZa Uf\_g/
- I BGK '< YU'h\ 'UbX'GUZYhm'dc`]\\\Yg/
- YI Ua ]bUhcb dfcWXi fYg/
- gdYWJU`Wcbg]XYfUHjcb`]b`H\Y`Yj YbhcZ]``bYgg`cf`a ]gUXj Ybh fY/
- gh XYbhYei ]mUbX X]gUV]`]m/
- UbX'ch\Yf'YggYbhJU`'UWUXYa ]W]bZcfa UhJcbž'gYY

\hdg.#k k k "Ufhg"i bgk "YXi "Ui #W ffYbhgh XYbhg#UWJXYa ]W]bZcfa Uh]cb#dfchcWc`g![i ]XY`]bYg#

.

#### ⇒a U[Y'7fYX]h

GmbYf[]Yg^]b^GcibX^&\$%\*

#### 7F = 7CG

7 F = 7 C G 'Dfcj ]XYf'7 cXY. '\$\$\$-,;

#### 5Wbck YX[Ya YbhcZ7ci blfm

 $K_{Y'UW\underline{D}bck,YX[Y'h,Y'6YXY[U''dYcd'Y'k \c'UfY'h,Y'hfUX]h]cbU''W ghcX]Ubg'cZh,Y''UbXg'cb'k \] WX'I_BGK_{Ybg]b[hcb'WJa_di_q']q''cWJhYX'''$