FBGBKL?JKL<H G:MDB B <UKR?=H H;J:AH<:GBY JHKKB
N?>?J:PBB
n_^_jZevgh_]hkm^Zjkl_ggh_ Z\lhghfgh_ h[jZah\Zl_evgh_
h[jZah\Zgby
K:GDL?L?J;MJ=KDBC =HKM>:JKL<?GGUC MGB<?JKBL
:WJHDHKFBQ?KDH=H IJB;HJHKLJH?GBY

DZn_^jZ ‹

ML<?J@>:X
Jmdh\h^bl_ev gZijZ\e_gl

ijhn ^ l g ^hp

^he`ghklv mq kl_i_gv a\Z

? : Njheh\Z

bgbpbZeu nZfbeby

ih^ibkv

© ª bxgy B]

J:;HQ:Y IJH=J:FF: >BKPBIEBGU

«BfblZpbhggh_ fh^_ebjh\Zgb_ nbabq_kdbo b l»_ogheh]bq
GZf_gh\Zgb^bkpbiebgu

Dh^gZijZ\e_ih^]hlh\db ki_pbZevghklb	27.03.02
GZbf_gh\Zgb_ gZijZ\e_gby ih^]hlh\db ki_pbZevghklb	MijZ\e_gb_ dZq_kl\hf
GZbf_gh\Zgb_ gZijZ\e_gghklb	MijZ\e_gb_ dZq_kl\hf \ ijhba\h^kl_ l_ogheh]bq_kdbo kbkl_fZo
NhjfZ h[mq_gby	hqgyZ

KZg-dl_l_j[m-2022

Ebkl kh]eZkh\Zgby jZ[hq_c ijh]jZffu ^bkpbiebgu

Ijh]jZffm khklZ\be Z

^hp d l g	23.05.22	:fZg ? W
^he`ghklv mq Kl_i_	ih^ibkv ^ZlZ	bgbpbZeu nZfbeb

Ijh]jZffZ h^h[j_gZ gZ aZk_^Z1gbb dZn_^ju ‹

© ª fZy] ijh5/2ndhe ‹

AZ_^mxsbc dZn_^jhc ‹1

^ ¬f g ^hp	23.05.22	: H Kfbjgh\
mq Kl_i_gv a\Z	ih^ibkv ^ZlZ	bgbpbZeu nZfbeb

Hl_lkl_gguc ‹aZ27.03.02(01)

ijhn ^ l g ^hp		? : Njheh\Z
^he`ghklvl_mgvk a\Z	ih^ibkv ^ZlZ	bgbpbZeu nZfbeb

AZf_klbl^_edvZgZ nZdmevl_ihZf‹mhl^bq_kdhc jZ[hl_

^hp d l g		J G P_efk
^he`ghklv mq kl_i_	ih^ibkv ^ZlZ	bgbpbZeu nZfbeb

:gghlZpby

>bkpbiebgZ fblZpbhgghh^_efbjh\Zgb_ nbabq_kdbo b l_og
ijhp_kkh\oh^blh[\jZah\Zl_evgmx ij\hu]kZ_fjm h[jZah\Zjghbyffm
[ZdZeZ\jbZhlZ gZijZ\e_gbx]hlh\db ki_pbZevghklb©MijZ\e_gb
dZq_kl\bfZijZ\e_gbg©MlijZ\e_gb_ dZq_kl\hf _ijghb_a\hh^ekhlbq_kdb
kbkl_fZo>bkpbiebgZ j_Zebahc_{®». dZn_^j
>bkpbiebgZ j_e_gZ gZ nhjfbjh\Zgb_ m \uimkdgbdZ ke_^m
ID- ©Pbnjh\Zy f_ljheh]byª
ID- ©Kihkh[_g ijbf_gylv l_ogheh]bb bkdmkkl_ggh
ijhn_kkbhgZevghc ^_yl_evghklbª
Kh^_j`Zgb_ ^bkpbiebgu ho\Zlu\Z_l djm] \hijhkgh\\Zfk\y
ihkljh_gby b ZgZebaZ ijhkluo bfblZpbhgguo b fZl_fZlbq_kd
^hklZlhqgh ihegh b lhqgh hljZ`Zlv k\hckl\Z b ih_^_gb_ ke
we_f_glh\ kgjh]fh l_ogheh]bq_kdh]h h[hjm^h\Zgby b fZrbghkl
Ij_ih^Z\Zgb_ ^bkpbiebgu ij_^mkfZljb\Z_l ke_^mxsb_
mq_[gh]h ij:hp_ekkZd p b b e Z [h j Z l h j g u _ j Z [
h [m q Z x s _] h k y
Ijh]jZffhc ^bkpbiebgu ij_^mkfhlj_gu ukedh^gmjxhsby_ \b^dms
dhgljhev mki_\Z_fhklb ijhf_`mlyhqgZhyjfZlr^bkhZ_pb_gpbjh\Zggh]h
H[sZy ljm^h_fdhklv hk\h_gby ^bkpbiebgu_lghukolZ_\ebgbpu
qZkh\
Yaud h[mq_gby ih ^jmkpkbd»eb g_

1. l_j_q_gv ieZgbjm_fuo j_amevlZlh\ h[mq_gby ih ^b

1.1. P_eb ij_ih^Z\Zgby ^bkpbiebgu

P_ev ij_ih^Z\Zgby ^bkpbiebgu h[_ki_qb\Z_l ijb\blb_ kkm^_g hkgh\Zfb ihkljh_gby b ZgZebaZ ijhkluo bfblZpbhgguo b fZl iha\hey_l ^hklZlhqgh ihegh b lhqgh hljZ`Zlv k\hckl\Z b dhgkljmdpbhgguo we_f_glh\ kh\j_f_ggh]h l_ogheh]bq_kd fZrbghkljh_gby.

1.2. >bkpbiebgZ ih^bl \ khklZ\ qZklb nhjfbjm_fhc m h[jZah\Zl_evguo hlghr_gbc ijh]jZffu \ukr_]h h[jZah\Zgby HI <H

1.3. l_j_q_gv ieZgbjm_fuo j_amevlZlh\ h[mq_gby ih ^bkpb ieZgbjm_fufb j_amevlZlZfb<hk\h_gby HI

< j_amevlZl_ bamq_gby ^bkpbiebgu h[mqZxsbcky ^he`_ dhfi_l_gpbyfb beb bo qZklyfb b ^bdZlhju ^hklb`_gby ijb_^_gu lZ[ebp_

LZ[ebpZ – l_j_q_gv dhfi_l_gpbc b bg^bdZlhjh\ ^hklb`_gby

DZl_]hjby]jmiiZ dhfi_l_gpbb	Dh^ b gZbf_gh\Zgb_ dhfi_l_gpbb	Dh^ b gZbf_gh\Zgb_ bg^bdZlhjZ ^ dhfi_l_gpbb
Ijhn_kkbhgZevgu_ dhfi_l_gpbb	ID-\u_Pbnjh\Zy f_ljheh]by	ID- < \eZ^_lv gZ\udZfb \u[h kj_^kl\ baf_j_gbc \ lhf qbke_ pbn dhgljhey iZjZf_ljh\ dhgdj_lghc ^_ lj_[h\Zgbyf jZ[hq_]h q_jl_`Z ID- < \eZ^_lv gZ\udZfb jZ[hlu k ijh]jZffguf h[_ki_q_gb_f g_h[oh^ ^ey ijh_^_gby baf_jbl_evguo hi_jZpbc khojZg_gby baf_jbl_evghc bgnhjf ID- < \eZ^_lv gZ\udZfb \u[hjZ l_ogheh]bc baf_j_gbc fbgbfbabjm \f_rZl_evkl\h hi_jZlhjZ
Ijhn_kkbhgZevgu_ dhfi_l_gpbb	ID- Kihkh[_g ijbf_gylv l_ogheh]bb bkdmkkl_ggh]h bgl_ee_dlZ \ ijhn_kkbhgZevghc ^_yl_evghklb	ID- A agZlv f_lh^u bfblZpbhggh] fh^_ebjh\Zgby ID- < \eZ^_lv gZ\udZfb ijbf_g_g bfblZpbhggh]h fh^_ebjh\Zgby nba l_ogheh]bq_kdbo ijhp_kkh\

2. F_klh ^bkpbiebgu \ kljmdlmj_ HI

>bkpbiebgZ hlghkblky d qZklb agZgby, nhjfbjm_fhc mqZklgbdZfb h[jZah\Zl_evguo hlghr_gbc ijb bamq_gbb ke_^mxsbo ^bkpbiebg

«FZl_fZlbdZ :gZeblbq_kdZy]_hf_ljby», b ebg_cgZy Ze]_

«FZl_fZlbdZ FZl_fZlbq_kdbc ZgZeba»,

«F_oZgbdZ»,

«FZl_jbZeh_^_gb_».

AgZgby ihemq_ggu_ ijb bamq_gbb fZl_jbZeZ ^Zgghc kZfhklhyl_evgh_ agZq_gb_ lZd b fh]ml bkihevah\Zlvky ijb b

«F_lh^u b kj_^kl\Z ijhp_kkh\ ijh_dlbjh\Zgby».

3. H[t_f ^bkpbiebgu

>Zggu_ h[h[s_f h[t_f_ ^bkpbiebgu ljm^h_fdhklb hl^_ jZ[hlu ih ^bkpbiebg_ b jZkij_^_e_gb_ wlhc ljm^h_fdhklb ih \b^Zf mq_[ghc jZ[hlu lZ[ebp_

LZ[ebp–ZH[t_f b ljm^h_fdhklv ^bkpbiebgu

<b^ mq_[ghc jZ[hlu	<k_]h	Ljm^h_fdhkl k_f_kljZf
		<
1	2	3
H[sZy ljm^h_fd A? qZk	3/ 108	3/ 108
Ba gh o iqjZZ d l b q _ k	34	34
: m ^ b l h j g u \k_]h aqZ kg y l	51	51
\ lhf qbke_		
e_dpbb E qZk	17	17
ijZdlbq_kdb_ k_fbgZjkdb_ qZk		
eZ[hjZlhjgu_ jZ[hlu EJ	34	34
dmjkh\hc ijh_dl jZ[hlZ D		
wdaZf_g qZk q		
K Z f h k l h y l _ ekv]h ZqyZk	57	57
< b ^ ijhf_Z`lh_lk aZqb ^bnn aZq_l wdaZf_g AZq_l Wda	>bnn AZq	>bnn >bnn AZq

ljbf_qZg^bdZg^b^Zlkdbc wdaZf_g

4. Kh^_j`Zgb_ ^bkpbiebgu

4.1. JZkij_^_e_gb_ ljm^h_fdhklb ^jZkp^b_eZfgb \b^Zf aZgylb JZa^_eu l_fu ^bkpbiebgu ljm^h_fdhklv ijb_^_gu \ lZ[ebp_

LZ[ebp–ZJZa^_eu l_fu ^bkpbiebgu bo ljm^h_fdhklv

JZa^_eu l_fu ^bkpbiebgu	E_dp qZk	lA K qZk	EJ qZk	DI qZk	KJK qZk
K_f_klj					
JZa^_euqbkebl_evgu_ f_lh^u \ j ijhqghklv L_fZ GZijy`_gby b ^_nhjfZpbb \ l\_j^hf l_e_ L_fZ Hkgh\u ihkljh_gby nbabq_5kdhc fh^_eb L_fZ lhkljh_gb_ fZl_fZlbq_kdhc fh^_eb L_fZ Hkgh\gu_ khhlghr_gby f_`^m gZijy`_gbyfb ^_nhjfZpb_c b l_fi_jZlmjhc L_fZ >_nhjfZpbb b kf_s_gby	5	14			15
JZa^_ebiu dhg_qguo we_f_glh\ L_fZ Ebg_cguc mijm]bc we_f_gl FZljbpZ `_kldhklb L_fZ Fh^_eb kl_j`g_\uo kbkl_f L_fZ H[sb_ l_hj_fu ba ijbdeZ^ghc f_oZgbdb L_fZ ;Zehqguc we_f_gl	4		20		14
JZa^_eDjmq_gb_ ijyfhebg_cguo k L_fZ Djmq_gb_ hk_kbff_ljbqguo kl_j`g_c L_fZ :gZeh]bb L_fZ ljbf_g_gb_ ZgZeh]bc	3				14
JZa^_eEZl_fZlbq_kdb_ fh^_eb h[l ieZklbgu L_fZ Kn_jbq_kdZy djm]h\Zy b p5bebg^jbq_kdZy h[hehqdb L_fZ >_nhjfZpby h[hehq_d \	5				14

Blh]h \ k_f_klj_	17		34		57
Blh]	17	0	34	0	57

ijZdlbq_kdZy idZ]hhZ\dexqZ_lky \ g_ihkj_^kl_gghf h[mqZxsbfbky hij_^_e_gguo ljm^h\uo nmgdpbc k\yaZ ijhn_kkbhgZevghc ^_yl_evghklvx

4.2. Kh^_j`Zgb_ jZa^_eh\ b l_f e_dpbhgguo aZgylbc
Kh^_j`Zgb_ jZa^_eh\ b u_aZegydbc ijb_^_gh 4\ lZ[ebp_

LZ[ebp–Z Kh^_j`Zgb_ jZa^_eh_dpbhggh]h pbdeZ

Ghf_j jZa^_	GZa\Zgb_ b kh^_j`Zgb_ jZa^_euhb\ aZlgyflk
1	JZa^_euqbkebl_evgu_ f_lh^u \ jZkq_lZo gZ i L_fZ GZijy`_gby b ^_nhjfZpbb \ l\_j^hf l_e_ L_fZ Hkghj\u_ ghky nbabq_kdhc fh^_eb L_fZ lhkljh_gb_ fZl_fZlbq_kdhc fh^_eb L_fZ Hkgh\gu_ khhlghr_gby f_`^m gZijy`_gbyf l_fi_jZlmjhc L_fZ >_nhjfZpbb b kf_s_gby
2	JZa^_ebiu dhg_qguo we_f_glh\ L_fZ Ebg_cguc mijm]bc bwe_`f_kdhc KZd L_fZ Fh^_eb kl_j`g_\uo kbkl_f L_fZ H[sb_ l_hj_fu ba ijbdeZ^ghc f_oZgbdb L_fZ ;Zehqguc we_f_gl
3	JZa^_eDjmq_gb_ ijyfhebg_cguo kl_j`g_c L_fZ Djmq_gb_ hk_kbff_ljbqguo kl_j`g_c L_fZ :gZeh]bb L_fZ Ijbf_gZ ZgZeh]bc
4	JZa^_eEZl_fZlbq_kdb_ fh^_eb h[hehqdb b ieZl L_fZ Kn_jbq_kdZy djm]h\Zy b pbebg^jbq_kdZy L_fZ >_nhjfZpby h[hehq_d \jZs_gby

4.3. IjZdlbq_kdb_ k_fbgZjkdb_ aZgylby
L_fu ijZdlbq_kdbo aZgylbc b bo ljm^h_fdhklv ijb_^_gu

LZ[ebp–Z IjZdlbq_kdb_ aZgylby b bo ljm^h_fdhklv

‹ i i	L_fu ijZdlbq_kdbo aZgylbc	Ndhbjfu ijZdlbq_kdb aZgylbc	Ljm^h_fdhklv qZk	Bagbo ijZdlbq_kdb ih^]hlh\d qZk	‹ jZa^_ ^bkpbi ebgu
Mq_[guf ieZghf g_ ij_^mkfhlj_gh					
<k_]h					

4.4. EZ[hjZlhjgu_ aZgylby
L_fu eZ[hjZlhjguo aZgylbc b bo ljm^h_fdhklv ijb_^_gu \

LZ[ebp–Z EZ[hjZlhjgu_ aZgylby b bo ljm^h_fdhklv

‹ i i	GZbf_gh\Zgb_ eZ[hjZlhjguo jZ–h]	Ljm^h_fdhklv qZk	Bagbo ijZdlbq_kdb ih^]hlh\d	‹ jZa^_eZ ^bkpb

			qZk	ebgu
K_f_klj				
1	JZkly`_gb_ klmi_gqZlh]h	3		1
2	FZljbpZ `_kldhklb kl_j`g_\h	3		1
3	Lhgdbc q_luj_om]hevguc	4		1
4	Lhekluc q_luj_om]hevguc	3		1
5	ljZdlbq_kdh_ ijbf_g_gb_ dhg_qguo we_dlj_gh\ \ ANSYS	4		2
6	F_lh^bdZ jZ[hlu k ijh]jZf j_r_gbb klZlbq_kdbo ijhqg\h ANSYS	3 klguo aZ^Zq		2
7	lehkdbc ba]b[[Zedb	4		2
8	L_fi_jZlmjgu_ gZijy`_g	3		2
9	lehkdb_ aZ^Zqb	4		2
10	ljhkljZgkl_gZ^uZqb	3		2
<k_]		34		

4.5. Dmjkh\h_ ijh_dlbjh\Zihegu mjkh\hc jZ[hlu
Mq_[guf ieZghf g_ ij_^mkfhlj_gh

4.6. KZfhklhyl_evgZy jZ[hlZ h[mqZxsboky
<b^u kZfhklhyl_evghc jZ[hlu fdh_klvljijb_^_gu \ lZ[ebp_ 7.

LZ[ebp_ 7 – <b^u kZfhklhyl_evghc jZ[hlu b __ ljm^h_fdhklv

<b^ kZfhklhyl_evghc jZ[hlu	<k_] qZk	K_fklj qZk
1	2	3
Bamq_gb_ l_hj_lbq_kdh]h ^bkpbiebgu LH	50	50
Dmjkh\h_ ijh_dlbjh\Zgb_		
JZkq_-ljZnbq_kdb_ aZ^Zgb		
<uiheg_gb_ j_n_jZlZ J		
lh^]hlh\dZ d l_dms_fm dh mki_\Z_fhklb LDM	3	3
>hfZrg__ aZ^Zgb_ >A		
Dhgljhevgu_ jZ[hlu aZhqg		
lh^]hlh\dZ d ijhf_`mlhqgh Zll_klZpbb l:	4	4
<k_]	57	57

5. l_j_q_gv mq_[guf lh^bq_kdh]h h[_ki_q_gby
^ey kZfhklhyl_evghc jZ[hlu h[mqZxsboky ih ^bkpbiebg
Mq_[guf lh^bq_kdb_ fZl_jbZeu ^ey kZfhklhyl_evghc jZ[hlu h[mqZxsboky ih ^bkpbiebgu \
i i 7-11.

6. l_j_q_gv mq_[guo b we_dljhgguo mq_[guo ba^Zgbc
l_j_qgv mq_[guo b we_dljhgguo mq_[guo ba^Zgbc

Rbn/j URL Z^j_k	;b[ebh]jZnbq_kdZy kkuedZ	Dhebq_kl\h wda_f [b[ebhl_d_ djhf_ we_dljhgguo wda_fieyjh\
	;mldZj_\Z G = Dhfivxl_jgh_ \ ijbdeZ^ghc f_oZgbd_ mq_[gh_ ihkh[b_ G = ;mldZj_\Z : A DjZkbevgbdh\ — KZgdl l_l_j[mj] ;=LM <h_gf_o bf > N Mklbgh\Z 2019. — k ISBN 978-5-907054-52-3. — L_dklwe_dljhgguc EZgv we_dljhgguc EZgv we_dljhgguc EZgv we

	ijbf_g_gb_f $16<6 mq_[gh_ i Djhlh\ — J_h_Zh\ hgm J=MIK — 96 k — ISBN 978-5-907494-01-5. — L_dkl we_dljhgguo EZgv we_dljhgguo h_jehghh-qgZy kbkl_fZ URL: KWWSV H ODQERRN FRP ERRN ^ZlZ h[jZs_gby — J_`bf ^hklmiZ ^ey Z\lhjba ihevah\Zl_e_c	

7. l_j_q_gv we_dljhgguo h[jZah\Zl_evgh\uo bgnhjfZpbhgguo

l_j_q_gv we_dljhgguo h[jZah\Zl_evgh\uo bgnhjfZpbhg l_e_dhffmgbdZpbhgghc ©Bgl_jg_lª ijb_^_g \ lZ[ebp_

LZ[ebp 9 – l_j_q_gv we_dljhgguo h[jZah\Zl_evgh\uo bgnhjfZpbhg l_e_dhffmgbdZpbhgghc ©Bgl_jg_lª

URL Z^j_k	GZbf_gh\Zgb_
https://e.lanbook.com/	We_dljhgguo h[jebhl_qgZy kbkl_fZ

8. l_j_q_gv bgnhjfZpbhgguo l_ogheh]bc

8.1. l_j_q_gv ijh]jZffgh]h h[_ki_q_gby h[jZah\Zl_evgh]h ijhp_kkZ ih.^bkpbiebg_

l_j_qgvbkihevam_fh]h ijh]jZffgh]h h[_ki_q_gby LZ[ebp 10 – l_j_q_gv ijh]jZffgh]h h[_ki_q_gby

‹ i i	GZbf_gh\Zgb_
	G_ ij_^mkfhlj_gh

8.2. l_j_q_gv bgnhjfZpb-kgjgZh\hqguo kbkl_fevam_fuo ij hkms_l\e_gbb h[jZah\Zl_evgh]h ijhp_kkZ ih ^bkpbiebg_

l_j_qgvbkihevam_fuo bgnhjfZpb-kgjgZh\hqguo kbkl_fkl^ \ lZ[ebp 11.

LZ[ebp 11 – l_j_q_gv bgnhjfZpb-kgjgZh\hqguo kbkl_f

‹ i i	GZbf_gh\Zgb_
	G_ ij_^mkfhlj_gh

9. FZl_jbZelvgh\ gbq_kdZy [ZaZ

KhklZ\fZl_jbZelvgh\ gbq_kdhc, gZ[auohhbf^ey hkms_l\e_g h[jZah\Zl_evgh]h ijhp_kkZ, ijh_^kbkZ\ \ lZ[ebp 12.

LZ[ebp 12 – KhklZ\fZl_jbZelvgh\ gbq_kdhc [Zau

‹ i i	GZbf_gh\Zgb_ khklZ\ghc qZ-klbgfZ[Zau	Ghf_j Zm^bl ijb g_h[oh^bfh
1	E_dpbhggZy Zm^bl-hjby mdhfie_dlh ki_pbZebabjh\Zgghc mq_[ghc f_[_ZmvXblhjbgcZ-hVlhf ^_fhgkljZpbhggh]h h[hjm^h\ZgbZy ey^gunfb_[gh-ihkh[byfb hb_\Zix_sbfb l_fZlbq_kdb_ beexkljZpbb khhl_lkl\mxsb_ jZ[hqbf mq_[guf ijh]jZ	Nhg^ e_dpbl

	fh^me_c	
2	:m^blhjbb ^ey ijh_^_gby ijZdlbq_l mdhfie_dlh\Zgu ki_pbZebabjh\Zgghc gZ[hjhf ^_fhgkljZ]hbhgfhjm^h\Zgby b gZ]ey^gufb ihkh[byfb h[_ki_qb\Zxsbfb beexkljZpbb khhl_lkl\mxsb_ jZ[hqbf ijh]jZffZf ^bkpbiebg fh^me_c	Nhg^ Zm^bl mq_[ghc f_[_ev mq_[guf
3	lhf_s_gb_ ^ey kZfhklhyl_evgmx ki_pbZebabjh\Zgghc mq_[ghc f_[_evx dhfivxl_jghc l_ogbdhc k \hafh`ghklvx k_lb Bgl_jg_l b h[_ki_q_gh ^hklmihf bgnhjfZpb-hgjZhah\Zl_evgmx kj_^m hj]Z	Nhg^ Zm^bl
4	Mq_[gZy Zm^blhjby ^ey l_dms_]h dhgl Zll_klZ-pbmdhfie_dlh\ZgZ ki_pbZebabjh\Zgghc f_[_evx l_ogbq_kdbfb kj_^kl\Zfb h[mq_gh ^ey ij_^klZ\e_gby mq_[ghc bgnhjfZpbb	Nhg^ Zm^bl

10. Hp_ghqgu^kl\Z ^ey ijh_^_gby ijhf_`mlhqghc Zll_kl

10.1. Khklz\ hp_ghqguo^ey ijh_^_gby ijhf_`mlhqghc Zll_klZ h[mqZxsboky ih ^bkpbiebg_ ijb\_^_g \ lZ[ebp_ LZ[ebp 3 - Khklz\ hp_ghqguo^ey ijh\_^_gby ijhf_`mlhqghc Zll_klZpbb

<b^ ijhf_`mlhqghc Zll_k	l_j_q_gbp_ghqguo kj_^k
>bnn_j_gpbjh\Zgguc aZqzl	Kibkhd \hijhkh\ L_klu

10.2. < dZq_kl_ djbl_jb_\ hp_gdb mjh\gy knhjfbjh\Zg dhfi_l_gpbc h[mqZxsbfbky ijZ[ebp_ LZ[ebp 4 - < l_q_gb_ k_f_kljZ fh`_l bkihe dhfi_lgpbc dhlhjZy ijb_^_gby 100-[ZeevgZy rdZeZ - jhc^hmeyh\hc kbkl_fu Mgb_jkbl_lZ bkihevah\Zgby dhlhjhc mklZgh\e_gu khhl_lkl\mxsbf ehdZe =M:l

LZ[ebp 4 - Djbl_jbb hp_gdb mjh\gy knhjfbjh\Zgghklb dhfi_l_gpb

Hp_gdZ dhfi_l_	OZjZdl_jbklbdZ knhjfbjh\Zgguo dhfi_l_gpbc
5-[ZeevgZy rd	
©hlebqgh ª ©aZql_gh ª	– h[mqZxsbfbky ijZ[ebp_ ^ey m[hdh b \k_klhjhgg_ mk\hb fZl_jbZe – m_j_ggh eh]bqgh ihke_^h\Zl_evgh b]jZfhl – hibjZykv gZ agZgby hkgh\ghc b ^hihegbl_e l_kgh ijb\yau\Z_l mk\h_ggu_ gZmqgu_ iheh`_ ^_yl_evghklvx gZijZ\e_gby – mf_eh h[hkgh\u\Z_l b Zj]mf_glbjm_l \u^\b]Z_ – ^_eZ_l \u\h^u b h[h[s_gby – k\h[gh \eZ^__l kbkl_fhc ki_pbZebabjh\Z
©ohjhrh ª ©aZql_gh ª	– h[mqZxsbfbky ijZ[ebp_ ^h mk\hbe ijh]jZffguc fZl_jb ih kms_kl\m baeZ]Z_l _]h hibjZykv gZ ebl_jZlmju – g_ ^himkdZ_l kms_kl_gguo g_lhqghkl_c – m\yau\Z_l mk\hagguby k ijZdlbq_kdhc ^_yl gZijZ\e_gby – Zj]mf_glbjm_l gZmqgu_ iheh`_gby – ^_eZ_l \u\h^u b h[h[s_gby – \eZ^__l kbkl_fhc ki_pbZebabjh\Zgguo ih

Hp_gdZ dhfi_l_ 5-[Zeevg Zy rd.	OZjZdl_jbklbdZ knhjfbjh\Zgguo dhfi_l_gpbc
©m^h\e_l\hjbl_evgh ©aZql_gh	– h[mqZxsbcky mk\hbe lhevdh hkgh\ghc ijh]jZ ih mks_kl\m baeZ]Z_l _]h hibjZykv gZ agZgb ebl_jZlmju – ^hjmkdZ_l g_kms_kl_ggu_ hrb[db b g_lhqgh – bkiulu\Z_l aZljm^g_gby \ ijZdlbq_kdhf ijbf gZijZ\e_gby – keZ[h Zj]mf_glbjm_l gZmqgu_ iheh`_gby – aZljm^gy_lky \ nhjfmebjh\Zgbb \u\h^h\ b h[h – qZklbqgh \eZ^__l kbkl_fhc ki_pbZebabjh
©g_m^h\e_l\hjbl_evgh ©g_ aZql_gh	– h[mqZxsbcky mk\hbe agZqbl_evghc qZl fZl_jbZeZ – ^hjmkdZ_l kms_kl_ggu_ hrb[db b g_lh iZkkfhlj_gbb ijh[e_f dj_lghf gZijZ\e_gbb – bkiulu\Z_l ljm^ghklb \ ijZdlbq_kdhf ijbf_g_gb – g_ fh`_l Zj]mf_glbjh\Zlv gZmqgu_ iheh`_gby – g_ nhjfmebjm_l \u\h^h\ b h[h[s_gbc

10.3. Lbih\u_ dhgljhevgu_ aZ^Zgby beb bgu_ fZl_jbZeu

<hijhku aZ^Zqb ^ey wdaZf_gZ (15 \Zjb ZglZ\e)

LZ[ebpZ 5 – <hijhku aZ^Zqb ^ey wdaZf_gZ

‹ i i	l_j_q_gv \hijhkh\ aZ^Zq ^ey wdaZf_gZ	Dh^ bg^bdZ
	Mq_[guf ieZghf g_ ij_^mkfhlj_gh	

<hijhku aZ^Zqb ^ey aZq_lZ k^bnn_gu \ lZ[ebp_

LZ[ebpZ 16 – <hijhku aZ^Zqb ^ey aZq_lZ aZq_lZ k ^bnn

‹ i i	l_j_q_gv \hijhkh\ aZ^Zq ^ey aZq_lZ k ^bnn	Dh^ bg^bdZ
1	Dhfihg_glu l_gahjZ gZijy`_gbc m^h\e $1_{21}/1_{11}$ $1_{23}/1_{31}$ = $1_{22}/1_{12}$ Y\ey_lky eb hibku\Z_fh_ lZdbf l_gahjhf gZijy`_ggh_ khklhygb_ ih^h[ghc gZijy`_ggh_ khklhygb_ _keb djhf_ mdZaZgghc kijZ_^eb\h khhlgh $1_{31}/1_{21}$ $1_{33}/1_{32}$ = $1_{12}/1_{22}$	ID- <
2	M[_^bl_kv qlh ^ey bahljhigh]h fZl_jbZeZ ^_nhjfZpbb g_ aZ\bkyl hl ghjfZevguo gZijy`_gbc ijh^hevgu_ ^_nhjfZpbb g_ aZ\bkyl hl dZkZl_evguo gZijy`_gbc	ID- <
3	Ijh_^bl_ ih^jh[guc \u\h^ nhjfmeu ^ey iehlghklb ihl_gpbZevghc wg_j]bb ^_nhjfZpbb l_eZ fZl_jbZe dhlhjh]h h[eZ^Z_l k\hckl\hf ebg_cghc mijm]hklb	ID- <
4	Ihykgbl_ \u[hj f_lh^Z ihkljh_gby hk_kbl aZ^Zgb_	ID- A
5	Ihemqbl_ j_r_gb_ aZ^Zqb h lhekhkl_ \gmlj_ggbf ^Z\e_gb_f	ID- <

l_j_q_gv l_f ^ey dmjkh\h]h ijh_dlZ gby \uihegy_gby dmjkh\hc ij_^klZ\e_gu \ lZ[ebp_

LZ[ebpZ 17 – l_j_q_gv l_f ^ey dmjkh\h]h ijh_dlZ gby \uihegy_gby dmjkh\hc

‹ i i	ljbf_jgu_ l_f dmjkh\h]h ijh_dlZ gby \uihe dmjkh\hc jZ[hlu

	Mq_[guf ieZghf g_ ij_^mkfhlj_gh

<hijhku ^ey ijhy_i^jhf_b`mlhqghc Zll_klZ_b_klbjh_Zgb ij_^klZ\e_gu \ lZ[ebp_

LZ[eb 18 Zljbf_jguc i_j_q_gv ijhy_i^jhf_b`mlhqghc ^ey l_klh\

‹ i i	ljbf_jguc i_j_q_gv ijhy_i^jhf_b`mlhqghc ^ey l_klh\	Dh^ bg^bdZ
	[redacted]	
	[redacted]	
	[redacted]	

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LZ[eb 19 Zl_j_q_gv lhgljhevguo jZ[hl

‹ i i	l_j_q_gv lhgljhevguo jZ[hl
	G_ ij_^mkfhlj_gh

10.4. F_lh^bq_kdb_ fZl_jbZeu hij_^_eyxsb_ ijhp_^m bg^bdZlhjh\ oZjZdl_jbamxsbo wlZiu nhjfbjh\Zgjb`Zlkyhf\_l ehdZevguo ghjfZlb\guo ZdlZo =M:l j_]eZf_glbjmxsbo ih ijh\_^_gby mshdhgljhevguo ki_\Z_fhklb b ijhf_`mlhqghc mdZxsbZoky =M:l

11. F_lh^bq_kdb_ mdZaZgby ^ey h[mqZxsboky ih hk\h_g

11.1. F_lh^bq_kdb_ mdZaZgby ^ey h[mqZxsboky ih hk\h_gbx e_d fZl_jbZeZ.

[redacted]

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nhjfmebjh\dZo

ihemq_gb_ lhqgh]h ihgbfZgby \k_o g_h[oh^bfuo l_jfbg

E_dpbhggfuZd_jbZeh`_l khijh\h`^Zlvky ^_fhgkljZpb_c k
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Kljmdlmjz ij_^hklZ\e_gby e_dpbhggh]h fZl_jbZeZ

ij_^klZ\e_gZ \ i

11.2. F_lh^bq_kdb_ mdZaZgby ^ey hu[mqZxsbgh]h jZ[hjZlhjguo
jZ[hl

< oh^_ \uihegZ[hjZlhjguo jZ[hl h[mqZxsbhe`mjebl[v b
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e_dpbyo

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- \u\h^ kiu\Zxlky blh]b jZ[hlu ijh\h^blky ZgZeba ihemq_g
Lj_[h\Zgby d hnhjfe_gbx hlq_lZ h eZ[hjZlhjghc jZ[hl_
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klZg^Zjl_ =HK-L ©Hlq_l h dZkmeq^h\Zl_evkdhc KZj[mdlmjZ
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http://guap.ru/guap/standart/titl_main.shtml

[redacted]

< oh^_ \uiheg_gby kZfhklhyl_evghc jZ[hlu h[mqZxsbcky
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BKH =M:I http://pro.guap.ru/ https://lms.guap.ru/

[redacted]

L_dmsbc dhgljhev mki_\Z_fhklb ij_^mkfZ
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©hlebqghª ©ohjhrhª ©m^h\©g_l\m^h\eevghª

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