

Kll.I c jx Dbqb ǂ
SCHOOL OF AGRICULTURE AND RURAL DEVELOPMENT
evsjvǂ`k Dǂgy ǂekǂe`vjq

BAE 2303

Lvgi hšcwZ
FARM MACHINARIES

†Kǂm ǂWǂf j cǂgǂU ǂUg

†jLK
W. tǂgt †`šjZ tǂnvǂmb
Kll.kǂ³ I hš ǂefvM
evsjvǂ`k Kll.ǂekǂe`vjq
W. ǂejvm Kǂš evjv
Kll.kǂ³ I hš ǂefvM
evsjvǂ`k Kll.ǂekǂe`vjq
†gt ǂbqvR Dǂxb
evsjvǂ`k cigvYvKll.MǂeIYv BǂYǂUǂUDU

mǂǂv`K
W. tǂgt tǂgtk`ǂ ingvb
Kll.I c jx Dbqb ǂ
evsjvǂ`k Dǂǂy ǂekǂe`vjq
iPǂvǂk jx mǂǂv`K
W. tǂgt †Zǂdvǂj Bm jvg
Kll.I c jx Dbqb ǂ
evsjvǂ`k Dǂǂy ǂekǂe`vjq

mǂǂv`K (ǂǂZǂq mǂ`iY)
W. tǂgt AveyZǂje
Kll.I c jx Dbqb ǂ
evsjvǂ`k Dǂǂy ǂekǂe`vjq

G †KǂmeBǂU †ǂdvǂi KZK ǂbixǂǂǂYi ci evsjvǂ`k Dǂǂy ǂekǂe`vjǂqi Kll.
I c jx Dbqb ǂ Gi Qǂǂǂ`i Rǂ`gyZ nǂqǂQǂ



Lvgvi hšcwZ
FARM MACHINARIES

BAE 2303

Kll.l c jx Dbqb ̄z
SCHOOL OF AGRICULTURE AND RURAL DEVELOPMENT



evsjv#`k D>gy wekwe`"vj q

Lvgvi hšcwZ

(KHAMAR JANTRAPATI)
FARM MACHINARIES

mšuv`bv cil`

m fvcuZ t **W. Aveynbv tgv dviš**
evsjv`k Dbš` ekie`vjq
m`m` t **tnvmBb knx` tgvRvİv`**
evsjv`k cwb Dbqb tevW, XvKv
W. tgv tZvdv¾j Bmjvg
evsjv`k Dbš` ekie`vjq
W. tgv tgvk`y ingvb
evsjv`k Dbš` ekie`vjq
W. Av b g Awgbš ingvb
evsjv`k Dbš` ekie`vjq
tgv mi lqvi tnvmb tPšaj
evsjv`k Dbš` ekie`vjq
W. tgv kn Avjg miKvi
evsjv`k Dbš` ekie`vjq

mweK ZEvavb
Wkb
Kll. l c jx Dbqb`ž
evsjv`k Dbš` ekie`vjq

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Lvgi hšcviZ

FARM MACHINARIES

ÒLvgi hšcviZÓ weG||RGW tcvMv†gi GK||U †KvmeB| G †KvmeB||U
 `†k††Yi Qv††i Dc†h||Mx K†i iPbv Kiv n†q†Q| †KvmeB||Ui we||fb
 BD||b†U Lvgv†i e"eüZ B||Äb I B||Ä†bi AvYy||†K ||m†÷gmgr, cvlqvi
 ||Ujvi I Uv±i, R||g KIY hšcviZ, †ivcY, Avštc||iPhv I km" i††vKviX
 miÄvg I hšcviZ, †mP hšcviZ, km" KZb, c||μqvKiY Ges gy||M I `y
 Lvgv†ii hšcviZ cf||Z. ||elq,†jvi Ici Zv||ĚK I e"env||iK cvV,†jv
 AZ"š mnRfv†e Dc||vcb Kiv n†q†Q|

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mPcÎ

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239

cV wbb`kbv

ÒLvgvi hšcwZÓ tKvmeBvU wekIfvte Kvl. I c jx Dbqb $\bar{z}$ Gi weGwRGW tcvMv $\bar{g}$ i QvÎ $\bar{z}$ `i Rb`
 t jLv nq $\bar{z}$ Q| Avcb Rv $\bar{b}$ b, $\bar{z}$ k $\bar{q}$ Y k $\bar{q}$ Ki mve $\bar{q}$ YK Dc $\bar{w}$ Z tbB| ZvB cv $\bar{z}$ Vi tKv $\bar{z}$ bv KvVb
 weIq thb Avcbvi e $\bar{s}$ z Am $\bar{y}$ av bv nq t $\bar{m}$ $\bar{z}$ K $\bar{w}$ ó ti $\bar{z}$ LB tKvmeBvU t jLv nq $\bar{z}$ Q| tKvmeBvUi Av $\bar{z}$ K
 I Dc $\bar{v}$ cbv ZvB cP $\bar{z}$ jZ cvV $\bar{e}$ B t $\bar{z}$ K wKQv wfb ai $\bar{z}$ bi| th $\bar{z}$ nZzmivm $\bar{z}$ i w $\bar{q}$ Ki m $\bar{v}$ nvh` QvovB
 tKvmeBvU Avcbv $\bar{z}$ K w $\bar{b}$ R c $\bar{z}$ o e $\bar{s}$ z n $\bar{e}$, ZvB GvU Kx f $\bar{v}$ te co $\bar{z}$ eb c $\bar{z}$ gB Zv tR $\bar{z}$ b wbb| G $\bar{z}$
 tKvmeBvU co $\bar{z}$ I e $\bar{s}$ z Avcbvi m $\bar{y}$ av n $\bar{e}$ |

eBvUi i $\bar{c}$ z iLv

ÒLvgvi hšcwZÓ tKvmeBvU mvZvU BDv $\bar{b}$ zU wef $\bar{z}$ | c $\bar{z}$ vU BDv $\bar{b}$ zU GKv $\bar{w}$ aK cV i $\bar{z}$ q $\bar{z}$ Q| cV msL $\bar{v}$
 w $\bar{b}$ aviY Kiv nq $\bar{z}$ Q c $\bar{z}$ vU BDv $\bar{b}$ zUi weIq $\bar{z}$ i Ici w $\bar{b}$ fi K $\bar{z}$ i| BDv $\bar{b}$ zUi cV $\bar{z}$, j $\bar{v}$ $\bar{z}$ K Avj $\bar{v}$ $\bar{z}$ K $\bar{z}$ i
 mvRv $\bar{z}$ bv n $\bar{z}$ j I G $\bar{z}$ `i g $\bar{z}$ a` GKvU thvMm $\bar{z}$ i $\bar{z}$ q $\bar{z}$ Q|

BDv $\bar{b}$ zUi f $\bar{z}$ gKv

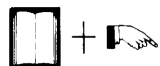
c $\bar{z}$ vU BDv $\bar{b}$ zUi i $\bar{z}$ zB i $\bar{z}$ q $\bar{z}$ Q GKvU f $\bar{z}$ gKv| f $\bar{z}$ gKvq BDv $\bar{b}$ zUi weIq $\bar{z}$ i D $\bar{z}$ Îk` Ges $\bar{z}$, i $\bar{z}$ ms $\bar{z}$ $\bar{q}$ $\bar{z}$ c
 Z $\bar{z}$ j aiv nq $\bar{z}$ Q| BDv $\bar{b}$ zUi $\bar{z}$ Kx Kx weIq w $\bar{b}$ zq Av $\bar{z}$ jvPbv Kiv nq $\bar{z}$ Q ms $\bar{z}$ $\bar{q}$ $\bar{z}$ c Zv i I D $\bar{z}$ jL i $\bar{z}$ q $\bar{z}$ Q| G $\bar{z}$
 Avcb BDv $\bar{b}$ zUi i $\bar{z}$ zB tR $\bar{z}$ b hv $\bar{z}$ Qb cv $\bar{z}$ Vi g $\bar{z}$ Av $\bar{z}$ jvP $\bar{m}$ P Kx?

cv $\bar{z}$ Vi D $\bar{z}$ Îk`

j $\bar{q}$ K $\bar{z}$ eb c $\bar{z}$ vU cv $\bar{z}$ Vi i $\bar{z}$ zB GK ev GKv $\bar{w}$ aK m $\bar{y}$ w $\bar{z}$ ó D $\bar{z}$ Îk` t $\bar{z}$ qv Av $\bar{z}$ Q| c $\bar{z}$ vU D $\bar{z}$ Îk $\bar{z}$ K tK $\bar{z}$
 K $\bar{z}$ iB cv $\bar{z}$ Vi weIq $\bar{z}$ mnRf $\bar{v}$ te eYbv Kiv nq $\bar{z}$ Q| cV t $\bar{z}$ l cv $\bar{z}$ Vi D $\bar{z}$ Îk $\bar{z}$, j $\bar{v}$ ARb Kiv m $\bar{z}$ e nq $\bar{z}$ Q
 Kx bv Zv w $\bar{b}$ R w $\bar{b}$ RB g $\bar{z}$ $\bar{z}$ qv K $\bar{z}$ eb| Gi Rb` cV t $\bar{z}$ l $\bar{z}$ g $\bar{z}$ $\bar{z}$ qv ck i $\bar{z}$ q $\bar{z}$ Q| G $\bar{z}$ Avcb cVvU
 KZUK $\bar{z}$ e $\bar{s}$ z cv $\bar{z}$ i $\bar{z}$ jb Zv w $\bar{b}$ aviY Ki $\bar{z}$ cv $\bar{z}$ eb|

AvBK $\bar{z}$ bi e $\bar{z}$ envi

cv $\bar{z}$ Vi weIq $\bar{z}$, j $\bar{v}$ GK $\bar{z}$ ó $\bar{z}$ e $\bar{z}$ s tbqv i Rb` c $\bar{z}$ qvRb Ab $\bar{z}$ m $\bar{z}$ i tKvmeBvUi we $\bar{z}$ fb RvqMvq we $\bar{z}$ fb
 ai $\bar{z}$ bi c $\bar{z}$ xK ev AvBKb e $\bar{z}$ envi Kiv nq $\bar{z}$ Q, hv t $\bar{z}$ L Avcb mn $\bar{z}$ RB weIq $\bar{z}$ i Dc $\bar{v}$ cbv Ges Avcbv i
 KiYq Kx Zv e $\bar{s}$ z cv $\bar{z}$ eb| w $\bar{b}$ z G tKvmeB $\bar{z}$ q e $\bar{z}$ eüz we $\bar{z}$ fb ai $\bar{z}$ bi AvBK $\bar{z}$ bi A $\bar{z}$ w $\bar{b}$ z`k Kiv n $\bar{z}$ jv-

 = cob I j $\bar{q}$ Kiv

 = Ave $\bar{z}$ k $\bar{z}$ K cV

 = Q $\bar{z}$ e t $\bar{z}$ Lj



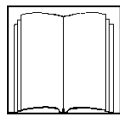
= *Abkxb/Povš gj'vqb*



= *cv#VvEi gj'vqb*



= *DĖigvjv*



= *Z_mf*



e· jLb

*cv#Vi , iȳc¥kYxq Ask#K Avil AvKIYxq K#i c`k#bi Rb" gv#S gv#SB Òe· jLb#iÓ gva"tg
Ztj aiv n#q#Q| c#ZU Òe· jLbÓ g#b#hM `#q cob Ges g#b ivL#Z tPóv Kib|*

Abkxb

*Av#b cv#U fv#jvf#e e#Z cv#Qb #K bv Zv hvPvB Kivi Rb" cv#Vi gv#S tKv#bv tKv#bv RvqMvq
t`qv i#q#Q Abkxb| Abkxb, #jv Avcbv#K mgvav Ki#Z n#e| Gme Abkxb Avcbvi Áb I `YZv
e#x#Z mnvqZv Ki#e|*

migg

*c#ZU cv#VB migg t`qv Av#Q| migg c#o Av#b #b#ó cv#Vi #elqe[—] m#ú#K AvZ mn#RB av#Yv
#b#Z cv#eb|*

cv#VvEi gj'vqb

*c#ZU cv#Vi t#i Av#b KZUKze#Z t#i#Qb Zv hvPvB#qi Rb" i#q#Q cv#VvEi gj'vqb| cv#U
fv#jvf#e tevSvi ci cv#VvEi gj'vq#bi ck, #jvi DĖi t`qvi tPóv Kib| AZci Avcbvi t`qv DĖi
BD#bU t#i t`qv DĖi#i m#_ #g#j#q #bb| me, #jv DĖi m#VK n#j cieZx cv# i#yKib, Ab_vq
cv#U c#ivq cob|*

Povš gj'vqb

*c#Z BD#b#Ui t#i i#q#Q Povš- gj'vqb| G#Z m#YB I iPbv#g#K ck Av#Q| G ck, #jvi DĖi
^Z#i Kivi tPóv Kib, hv Avcbv#K cix#vq fv#jv d#vdj Ki#Z mn#h" Ki#e| G#Y#î Abvb"
Z_m#fi m#h" #b#Z cv#ib| GQvov c#qvR#b Avcbvi #UDU#i m#_ I K_v ej#Z cv#ib| BD#b#Ui
me, #jv cv# fv#jvf#e co#j Povš gj'vq#bi ck, #jv mgvav#b tKv#bv Am#eav n#e bv|*

BDWBU 1
Lvgvi k³ BÄb

BDwbU 1 Lvgvi k³ BÄb

G BD**w**bU w**e**f b ai**#**i B**A****Ä**b mau#K Av#jvPbv Kiv n#q#Q| G BD**w**bUuU#Z tgvU 6wU cvV i#q#Q| c_g cv#V i#q#Q B**A****Ä**bi tkYwefvM Ges Gi μ gweKv#ki B**Z**nvm| $\emptyset$ Zxq cv#V B**A****Ä**bi g-j Kgcv#Z w**t**q Av#jvPbv Kiv n#q#Q| ZZxq I PZZ cv#V i#q#Q h_v μ g W#Rj I t#cUvj B**A****Ä**bi w**e**f b Kv

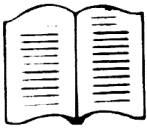
me#kl ev cÂg cvWU nj e'enwiK m#úKZ| G cv#v wefb ai#bi mva#iY Uz#m Gi
c#i#PiZ I G#`i e'envi m#úK Av#jvPbv Kiv n#q#Q|

c_vV 1.1 B_WÄ_‡bi †k_WY_Wef_{vM} I μg_WeK_{v‡}ki B_WZn_{vM}

G c v V † k ‡ I A v c w b —



- $B|\ddot{A}\#b_i\ \mu g\ \mathbb{w}E\mathbb{K}\#k_i\ B|\mathbb{Z}n\mathbb{m}\ eYb_v\ Ki\mathbb{Z}\ Z\ c\mathbb{v}i\#e_b|$
- $B|\ddot{A}\#b_i\ ms\dot{A}_v\ \mathbb{J}L\mathbb{Z}\ c\mathbb{v}i\#e_b|$
- $B|\ddot{A}b\ I\ tg\mathbb{K}\#b_i\ c_v\text{K}''\ Ki\mathbb{Z}\ Z\ c\mathbb{v}i\#e_b|$
- $B|\ddot{A}\#b_i\ t\mathbb{K}\mathbb{Y}\mathbb{e}f\mathbb{W}_M,\ \mathbb{J}j\mathbb{v}i\ bvg\ ej\mathbb{Z}\ I\ \mathbb{J}L\mathbb{Z}\ c\mathbb{v}i\#e_b|$



B₁₁Ä_‡b_i μg₁₁eK_{v‡}k_i B₁₁Z_nv_m

c₁ exi me wKoyB m₁oi B₁Znm Av₁Q | tZgwb B₁Ä₁bi t₁†îÊ µg weKv₁ki GK₁U B₁Znm
i†q₁Q | G Avayk h₁M B₁Ä₁bi we₁fbg₁KvhKw₁iZv I mdjZv GK₁†b Aw₁RZ nqib | Zv
h₁M h₁Mš₁ii mvabv Avi w₁bôv₁B dmj | Aw₁Kv₁tj gvb₁y Av₁Zi†v I K†gi c†qv₁R†b †₁evûi
gvs₁k†ck₁i k₁³ I Dci w₁bfi₁k₁j †Qj | cieZ₁Kv₁tj K₁ck₁Kj ev c₁y₁i Aw₁e₁vi g₁ve mf₁Zv†K
c₁vb K†i bZ₁ M₁Z†eM | cv₁†ii mv†₁ cv₁†ii N†Y Av₁†bi t†jw₁nb Aw₁M w₁kL₁v t†L
c₁gZ f₁xZ- mš₁ n†j₁I cieZ₁†Z gvb₁y Av₁†K w₁bqš₁Y K†i k₁³ Drcv₁†b e₁envi K†i |
gvb₁y †Zvi I e₁envi Ki†Z †v†K bZ₁-bZ₁ hš₁cw₁Z | G me hš₁cw₁Z AbeiZ Pvj†bvi Rb₁
c†qv₁Rb t†L₁v t†q k₁³ I Dr†mi | gvb₁y Zvi gvs₁k†ck₁i k₁³ i cv₁kv₁w₁k c†i k₁³ †K Kv†R
jw₁M†q†Q | w₁Kb c†ik₁³ I gvb₁y₁i µgeag₁v †g₁Zv ev k₁³ i Pw₁n₁v c†Y Ki†Z cv†iwb | w₁VK
†mB g₁†Z Zvc B₁Ä₁bi Aw₁e₁Kvi k₁³ i RM†Z GK be w₁M†š₁i mPb₁v K†i |

cv_#ii mv#_ cv_#ii Nl#Y
 Av_#bi t#j#jnvb A#M #kLv
 t^#L c_gZ fxZ- mš~
 n#j l cieZx#Z gvby
 Av_ b#K #bqšY K#i k#³
 Drcv_#b e#envi K#i |

†Rgm Iqv†Ui †im†cv†KllUs
ev0úXq BllÄ†bi Avne Klv†ii
gva†tg gvlbe m†fZv c`vcY
K†i hwlŠK h†M Ges mPbv
nq †kí wec†ei |

weÁvbx tmc`v`j 1698 Lpvtã mec_g ev@úxq BvÄb D`v`eb K`ib| «Kš Zv «Qj î`v`Uc`v`
cieZ`Z tRgm IqvU ÷xg ev ev@úxq BvÄ`bi DbvZ mvab K`i AvaybK t`im`c`v`KvUs ev@úxq
BvÄ`bi Avwe`Kvi K`ib| tRgm IqvUi t`im`c`v`KvUs ev@úxq BvÄ`bi Avwe`Kv`ii gva`g
gvbe mf`Zv c`vcY K`i hv`ŠK hv`M Ges mPbv nq `kí `ec`ei| Bst`iR weÁvbx v`÷`fbkvb
1814 mv`j mv\_K ev@úxq t`ij BvÄb %Z`i K`i thvMvthv`Mi t`t`î AvaybK t`ij e`e`vi
tMvovcEb K`ib|

K₁L₁ I c j x Dbqb $\overline{\dot{q}}$

AŠ`<sub>vn</sub> B<sub>1</sub>Äb<sub>1</sub>K (IC engine) e`eüZ R_{vj}W_{bi} Dci Wf₁Ä K₁i`₁W₁M f₁M K₁i_v n₁q₁Q -
(1) t₁c₁U₁j B₁Äb (Petrol engine) t R_{vj}W₁b Wnm₁te t₁c₁U₁j e`eüZ n₁q|
(2) W₁R₁j B₁Äb (Diesel engine) t R_{vj}W₁b Wnm₁te W₁R₁j e`eüZ n₁q|
K₁L₁.d₁g m₁v₁iYZ AŠ`<sub>vn</sub> B<sub>1</sub>Äb e`eüZ n₁q|

W₁P₁ 1 GK₁U AŠ`<sub>vn</sub> B<sub>1</sub>Äb<sub>1</sub> `nb c₁x₁Z

W₁P₁ 2 GK₁U e₁n`<sub>vn</sub> B<sub>1</sub>Äb<sub>1</sub> `nb c₁x₁Z

e₁n`_{vn} B₁Äb (External Combustion engine)

G cK₁i B₁Äb₁ `nb W<sub>1</sub>mq<sub>1</sub> g<sub>1</sub> B<sub>1</sub>Äb<sub>1</sub> e<sub>1</sub>B<sub>1</sub>i m<sub>1</sub>ú<sub>1</sub>b n<sub>1</sub>q Ges `n₁b₁ d₁j Drcb Z₁vc₁K
B₁Äb₁ t₁fZ₁i K₁hK₁i c`<sub>1</sub>W<sub>1</sub> mie<sub>1</sub>vn K<sub>1</sub>i<sub>v</sub> n<sub>1</sub>q| thgb- e<sub>1</sub>W<sub>1</sub>ú<sub>1</sub>xq B<sub>1</sub>Äb GK<sub>1</sub>U e<sub>1</sub>n`_{vn} B₁Äb|
K₁iY G t₁W₁Ä B₁Äb₁ e₁B₁i P₁j₁Z K₁q₁j₁ c₁W₁q₁ th Z₁vc Drcb K₁i_v n₁q, Z₁W₁ t₁q eq₁j₁v₁i
c₁W₁b₁K e₁W₁ú₁ c₁W₁iYZ K₁i_v n₁q| c₁i G e₁W₁ú₁K g₁ B₁Äb₁ c₁q₁M K₁i h₁W₁ŠK k₁³ Drcb K₁i_v
n₁q| eZg₁v₁b G cK₁i B₁Äb₁ e`e₁nv₁i L₁g m₁x₁gZ|

2| g₁ Kgc₁x₁Z Ab₁W₁q₁ B₁Äb₁K 4-t₁÷₁K m₁B₁K₁j B₁Äb (4-stroke cycle engine) /
2-t₁÷₁K m₁B₁K₁j B₁Äb (2-Stroke cycle engine) -G`₁W₁W₁ f₁M K₁i_v n₁q₁Q|

4-t₁÷₁K m₁B₁K₁j B₁Äb (4-stroke cycle engine)

G cK₁i B₁Äb₁ μ₁vsK k₁vd₁U₁i (Crankshaft) `P<sub>1</sub> N<sub>1</sub>W<sub>1</sub>bi d<sub>1</sub>j W<sub>1</sub>c÷<sub>1</sub>b (Piston) `P₁e₁v₁i
Ic₁i Ges `P₁e₁v₁i W₁b₁P P₁W₁jZ n₁q Kg c₁x₁Z m₁ú₁b n₁q| A₁vr ci ci P₁vi₁U t₁÷₁K m₁ú₁b
n₁lq₁vi d₁j G Pμ₁U c₁W₁ic₁W₁n₁q| G₁Z μ₁vsK k₁vd₁U₁i AveZ₁bi N₁W₁qbg₁v₁b-720°|

2-t₁÷₁K m₁B₁K₁j B₁Äb (2-Stroke cycle engine)

G cK₁i B₁Äb₁ μ₁vsK k₁vd₁U₁i GK N₁W₁bi d₁j W₁c÷₁b GK₁e₁vi Ic₁i Ges GK₁e₁vi W₁b₁P
P₁W₁jZ n₁q Kg c₁x₁Z₁U m₁ú₁b n₁q| A₁vr ci ci `W₁U t₁÷₁K m₁ú₁b n₁lq₁vi d₁j G Pμ₁U
c₁W₁ic₁W₁n₁q| G₁Z μ₁vsK k₁vd₁U₁i AveZ₁b N₁W₁qbg₁v₁b - 360°|

3| Rvjvbi c34jb (Ignition) Abjvq BÄbK üvK Bmbkb BÄb (Spark Ignition engine) I Kg+cmb Bmbkb BÄb (Compression Ignition engine) -G `jvM fvm Kiv nqQ|

üvK Bmbkb BÄb (Spark Ignition engine)

G cKvi BÄb (SI engine) Zij RvjvbiK evüvKvi ciYZ Kti b`ó AbjvZ evqj mv\_ wgvKZ Kti BÄb wvjÜvii fvj tcvUi ga` `q tbqv nq| Gici Zv `e`yZK üvK `q c34jZ nq kv³ Drcb Kti| tcvj, M'vwmjb cfZ. Rvjvbi wmvte e`eüZ nq| `e`yZK üvK I KvejiUi t`L G BÄb tPbv hvq|

Kg+cmb Bmbkb BÄb (Compression Ignition engine)

G cKvi BÄb (CI engine) c_g Rvjvbi Kti D"P Pvc evZvmK msKZ Kiv nq| D"P Pvc d+j msKZ evZvmi Zvcgv cvq 600°C nq| G Ae_vq msKZ evZvmi Dci 105 tK/R/eM tmt wgt Pvc Zij Rvjvbi t`c Kiv nq| d+j Zij Rvjvbi R+j I+v Ges Zvc Drcb Kti kv<sup>3</sup> i cvS-iZ nq| Gti t` RvjvbiK dzqj BbRku+i gva`g wvjÜvii ctek Kivbv nq| G BÄb `e`yZK üvK, KvejiUi vK bv | Zte BbR+i t`L G BÄb tPbv hvq|

G Qvov BÄb Ab`vb` tkYie fvm, t jv wbi|c -

4| MZiei Dci wfi Kti -

- (K) i BÄb (Stationary engine)
- (L) Pw jZ BÄb (Automotive engine)

5| wvjÜvii mrvibv (Cylinder Position) Abjvq -

- (K) f;mgvšivj BÄb (Horizontal engine)
- (L) Dj BÄb (Vertical engine)
- (M) tiWqvj BÄb (Radial engine)
- (N) "V" AvKzi BÄb ('V' type engine)

6| wvjÜvii msL`vi Dci wfi Kti -

- (K) GK wvjÜvi wekó BÄb (Single cylinder engine)
- (L) eü wvjÜvi wekó BÄb (Multi - cylinder engine)

7| üxW (Speed) Gi Dci wfi Kti -

- (K) b` üxW BÄb (Low speed engine) upto 350 r.p.m
- (L) ga`g üxW BÄb (Medium speed engine) 350-1000 r.p.m
- (M) D"P üxW BÄb (High speed engine) Above 1000 r.p.m

(r.p.m= Revolution per minute)



migg t gibe mf`Zv weKvki avc avc mgvšiq Avayb BÄb D`weZ nqQ| Rvjvbi `nb, gj Kgc×Z, MZaviv, wvjÜvii Ae`vb I msL`v BZ`w` i Dci wfi Kti BÄb wefb ai+bi nqZ cvti|



cvWĖi gǂvqb 1.1

mVK DĖ†ii cvk UK Pý (√) ǂb|

1. †K AvaybK ev@úxq BĭĀb Avĭe@vi K†ib ?

- K. †mcǂvǂj
- L. ǂbǂKvjvm AǂUv
- M. †Rgm IqvU
- N. ǂ÷ǂfbkvb

2. AvaybK 4-ǂ÷vK †cǂUvj BĭĀb †K D™veb K†ib ?

- K. ǂ÷ǂfbkvb
- L. iǂj d ǂWǂRj
- M. †mcǂvǂj
- N. ǂbǂKvjvm AǂUv

3. mv_K ev@úxq †ij BĭĀb†K %Zǂi K†i ?

- K. †mcǂvǂj
- L. ǂbǂKvjvm AǂUv
- M. ǂ÷ǂfbkvb
- N. iǂj d ǂWǂRj

4. BĭĀb nǂ"Q Ggb GKǂU gvaǂg hv-

- K. ǂe`ǂyZK kǂ³ǂK hvǂŠK kǂ³ǂZ i|cvŠi K†i |
- L. Rvjǂbi Zvc kǂ³ǂK hvǂŠK kǂ³ǂZ i|cvŠi K†i |
- M. hvǂŠK kǂ³ǂK Zvc kǂ³ǂZ i|cvŠi K†i |
- N. hvǂŠK kǂ³ǂK ǂe`ǂyZK kǂ³ǂZ i|cvŠi K†i |

5. evBǂi †_ǂK kǂ³ †hvMvb ǂǂj †gǂkb ǂK K†i ?

- K. RvjǂbǂK cǂǂq kǂ³ Drcv`b K†i |
- L. hv ǂbǂR ǂbǂRB kǂ³ Drcv`b KiǂZ cvǂi |
- M. hv †_ǂK Avgiv hvǂŠK mǂeav cvB |
- N. hv evBǂi †_ǂK kǂ³ †hvMvb QvovB AbeiZ PjǂZ cvǂi |

6. KvǂKi c`vǂ\_i Zvc cǂqvm I Rvjǂb `nǂbi Dci ǂfǂĖ K†i BĭĀb†K cavbZ KqǂU fvǂM Kiv nq?

- K. AŠ`vnx BĭĀb I eǂn`vnx BĭĀb
- L. †cǂUvj BĭĀb I ǂWǂRj BĭĀb |

- M. 2- $\dagger \div vK B\ddot{A}b$ / 4- $\dagger \div vK B\ddot{A}b$
- N. $\neg \acute{u}vK BM\ddot{b}bkvb$ / $Kg\dagger cmb BM\ddot{b}kb B\ddot{A}b$
7. $Rvjv\ddot{b}\dagger K c\frac{3}{4}j\dagger bi$ $c\times\ddot{Z}i Dci$ $\parallel f\ddot{v}\ddot{E} K\dagger i B\ddot{A}b Kq f\ddot{v}\dagger M f\ddot{v}M Kiv n\dagger q\dagger Q$?
- K. 2- $\dagger \div vK$ / 4- $\dagger \div vK B\ddot{A}b$
- L. $\neg \acute{u}vK BM\ddot{b}bkvb$ / $Kg\dagger cmb BM\ddot{b}kb B\ddot{A}b$ |
- M. $mgv\acute{S}ivj$, $Dj\ddot{a}$, $\dagger i\parallel Wqvj$, / $\acute{O}\ddot{V}\acute{O}$ $AvK\ddot{Z}$
- N. $A\acute{S}\`vn\ddot{x}$  /  $e\parallel n\`vn\ddot{x} B\ddot{A}b$ |

cV 2 BÄbi gj Kg c×Z



G cV tkI Avcb —

- BÄbi gj Kg c×Z eYbv KiZ cviēb|
- 2- t÷vK BÄb I 4- t÷vK BÄbi Kgc×Z I cv_K ʹ jLZ cviēb|
- BÄbi weifb avtc msNvUZ NUbv, t jv jLZ I ejZ cviēb|



Avgiv Rvb, BÄb hwiŠK k³i Drm| Kb Avgv`i g#b ck RvMv ֊ fweK BÄb Kfvē P#j ? Avevi Zv t\_#K Avgiv k<sup>3</sup>B ev cvB Kfvē? BÄbi hwiŠK k<sup>3</sup>i Drm Rvjvb (tctUvj, W#Rj ev Ab ֊ tKvb M֊vmxq Rvjvb)| BÄb eēüZ Rvjvb `n#bi d#j m jÜvii fZi cPÜ Zvc k³ Drcb nq| G Zvc ֊ q m jÜvii fZi M֊vmxq c`v_i m acmviYi d#j m nq cPÜ Pvc| chy Pvc i μqvq BÄbi vc÷b m jÜvii fZi I Vv-bvgv K#i| Avevi vc÷bi m v_ BÄbi μ֊vsKk֊vdu (Crankshaft) mshy ֊ v#K| vc÷bi I Vv-bvgv d#j BÄbi μ֊vsKk֊vdu NyZ ֊ v#K Ges μ֊vsKk֊vdUi m v_ mshz dBÜBj (Flywheel) t_#K hwiŠK k³ Drcb nq| G t_#K Avgiv ejZ c v i, BÄbi Ask, t jv weifb μqv d#j B Avgiv hwiŠK k³ cvB|

m jÜvii fZi vc÷b mtev֊P Ae֊vb t_#K meibae Ae֊vb thZ th ֊ iZ Aizug K#i ZvKB t÷vK ej|

G m v_ Avgiv t÷vK ev avc #R#b tbB| m jÜvii fZi vc÷b mtev֊P Ae֊vb t_#K (T.D.C.= Top dead centre) meibae Ae֊vb (B.D.C.= Bottom dead centre) thZ th ֊ iZ Aizug K#i ZvKB t÷vK ej| G#K L ֊ q m PZ Kiv nq Ges igt igt ev tmt igt ֊ q cKvK Kiv nq |

Rvjvb `n#bi d#j Zvc I Pvc n#Z hwiŠK k³ Drcb nIqvi mg֊ Kgc×Z 4U avtc PμvK#i (Cyclic order) moub nq| G ֊ μ ev mB#Kj mgvß nIqvi G c×Z Abbqx BÄbK ֊ f v M f v M Kiv nq|

(K) 4-t÷vK mB#Kj BÄbi gj Kg c×Z t

4- t÷vK BÄb cI Z Pvi t÷v#K GKei d#j ֊ » K#i GKei k³ Drcb K#i|

GKuU 4 t÷vK BÄb Zvi mg֊ c μqv vc÷bi PviU t÷vK Ges μ֊vsK k֊vdUi ֊ evi Nyb mgqi gta֊ moub K#i | A_vr 4- t÷vK BÄb cI Z Pvi t÷v#K GKei d#j ֊ » K#i GKei k³ Drcb K#i| G#Z μ֊vsK k֊vdUi AveZ#bi Nyqbgvb 720°|

G BÄbi msK PZ evqyZ (W#Rj BÄbi t#i) A_ev msK PZ evqyRvjvb ֊ gk#b (tctUvj BÄbi t#i) Av_b Rvjv#j M֊v#mi AvqZb cPZ c ֊ g v Y teo hvq| G cPÜ Pvc vc÷b#K ֊ b#Pi ֊ #K b ֊ g t q ֊ q| ֊ cob KZK.MpxZ k³ Kv#bKuUs i#Wi gva֊g μ֊vsK k֊vdUi ֊ vbiš iZ nq | Gfvte ֊ cob i I Vv-bvgv M#Z μ֊vsK k֊vdUi Nyb M#Z iZ i|cvš iZ nq| μ֊vsK k֊vdUi hy dBÜBj (Flywheel) t_#K k³#K cvIqvi UvY ֊ gkb m t o g i gva֊g c tqvRbxq Kv h m o u v ֊ bi Rb ֊ b t q hvIqv nq | GUv 4- t÷vK BÄbi gjb×Z|

G ai#bi BÄb mg֊ Kg c×Z PviU avtc PμvK#i mgvß nq| avc PviU n#֊Q -

- (1) tkIY avc (Suction Stroke)
- (2) ms#KvPb avc (Compression stroke)
- (3) k³ avc (Power stroke)
- (4) ֊ b ֊ kb avc (Exhaust stroke)

Gevi Avm# Avgiv G PviU avtc i Kgc×Z ֊ b t q Av#jvPbv K#i |

¶PÎ 3 GKU Pvi †÷vK BliÄþbi Kvhc×UZ

1| tkv/b avc (Suction Stroke)

Pv†ci G cv_K" tnZævBþi
†_†K evqy(W†Rj BliÄþbi
†¶†Î) ev evqyl Rvjvbi
¶gkY (†c†Uvj BliÄþbi †¶†Î)
†Lvjv c†ek c†_ ¶mijÛþi
c†ek K†i |

tkv/b avc Avia nevi mg†q ¶c÷bU ¶mijÛþi †fZi cvq m†ev" P⁻v†b (T.C.D.) _v†K Ges BbþjU fvjU Ljy hvq | d†j evBþi †_†K ¶mijÛþi †fZi evqy(W†Rj BliÄþbi †¶†Î) A_{ev} evqyl Rvjvbi ¶gkY (†c†Uvj BliÄþbi †¶†Î) c†ek K†i | G mgq ¶b@vkb fvj f (Exhaust valve) eÜ _v†K | ¶c÷b U,¶W,¶m (T.D.C.) †_†K ¶e,¶W,¶m (B.D.C.) Gi ¶_†K th†Z _v†K | d†j ¶mijÛþi †fZi kbZvi m¶ó nq Ges ¶mijÛþi †fZi evqy Pv c evBþi Pv A†c¶¶v K†g hvq | Pv†ci G cv_K" tnZævBþi †_†K evqy(W†Rj BliÄþbi †¶†Î) ev evqyl Rvjvbi ¶gkY (†c†Uvj BliÄþbi †¶†Î) †Lvjv c†ek c†_ ¶mijÛþi c†ek K†i | ¶c÷bU meibæ Ae⁻vb (B.D.C.) cvi n†q cþivq Ic†i (TDC) D†V Avmvi ce gyz chš G c¶µqv Pj†Z _v†K | ¶c÷b hLb TDC †_†K BDC †Z †cšQvq ZLb GKU tkvIY avc (Suction stroke) m¶úb nq | G mgq BbþjU fvj fU eÜ n†q hvq | ¶c÷bU BDC †Z †cšQvi mv†_ mv†_ G av†ci mgvB NþU |

2| ms†KvPb avc (Compression stroke)

¶W†Rj BliÄþbi cRjb Zvc
2000°C Gi Pv 55-60
†K¶R/eM †mtigt ¶Kb †c†Uvj
BliÄþbi †¶†Î cRjb Zvc
1200°C Ges Pv 20
†K¶R/eM †mtigt |

tkv/b avc †kl nevi mv†_ mv†_ ms†KvPb avc iinyq Ges ¶c÷b meibæ Ae⁻vb (BDC) †_†K m†ev" P Ae⁻v†b (TDC) D†V AvmZ _v†K | ms†KvPb av†c BbþjU fvj f I ¶bKvkb fvj f (Exhaust valve) DfqB eÜ _v†K | G Ae⁻vq evqy(W†Rj BliÄþbi †¶†Î) ev Rvjvbi ¶gkZ evqy(†c†Uvj BliÄþbi †¶†Î) ¶mijÛþi †fZi msKæZ nIqvi d†j AZ¶aK DËB nq | ¶c÷b ¶mijÛþi m†ev" P⁻v†b (TDC) IVvi ¶VK ce gyz chš G c¶µqv Pj†Z _v†K Ges cPÛ Pv†c evqye Rvjvbi ¶gkZ evqymsKæZ n†Z _v†K | ¶c÷b m†ev" P Ae⁻v†b (TDC) †cšQvi ci G avc m¶úb nq | ¶W†Rj BliÄþbi cRjb Zvc 2000°C Gi Pv 55-60 †K¶R/eM †mtigt ¶Kb †c†Uvj BliÄþbi †¶†Î cRjb Zvc 1200°C Ges Pv 20 †K¶R/eM †mtigt | Z†e †c†Uvj BliÄþbi †¶†Î ms†KvPb Pv 7-10 †K¶R/eM †mtigt Ges ¶W†Rj BliÄþbi †¶†Î 40-45 †K¶R/eM †mtigt n†q _v†K |

3 | k₁³ a/c (Power stroke)

msKvPb avci cvq tkli
w³k w³c÷b hLb m³ev³P
Ae³v³b tcšQv³Z hv³Q wVK
ZLbB k₁³ a/c i i³ nq |

k₁³ a/c PjvKvjxb mgq Bb³jU fvj f I w³b³Kvkb fvj f $\bar{q}$ Uv eÜ_vK | msKvPb avci
(Compression stroke) cvq tkli w³k w³c÷b hLb m³ev³P Ae³v³b (T.D.C.) tcšQv³Z
hv³Q wVK ZLbB k₁³ a/c i i³nq | ZLb Bb³R±i (w³Rj B³Ä³bi t³q³Î) w³jÜv³i i fZi
msK³Z I cPÜ D³EB evq³Z D³P P³v³c f³c AvK³i w³Rj Rvjw³b Bb³R± K³i A³ev³ÜvK
cvM(tc³Uvj B³Ä³bi t³q³Î) w³jÜv³i msK³Z evq³Rvjw³b w³gk³Y $\bar{e}$ $\bar{y}$ ZK $\bar{u}$ vK (Electric
spark) Drcb K³i |

w³Rj B³Ä³bi t³q³Î msK³Z evZ³mi cPÜ Z³v³c (Heat of compression) Ges tc³Uvj
B³Ä³bi t³q³Î $\bar{e}$ $\bar{y}$ ZK $\bar{u}$ vK (Electrical spark) Rvjw³b³K cR³jZ K³i | G c³4jb
c³μqv³K BM³bkb (Ignition) e³j | BM³bkb³bi d³j Av³i cPÜ Z³v³c I P³v³c i m³ó nq | D³
cPÜ P³v³c i d³j w³c÷b m³ev³P Ae³v³ (T.D.C.) t³_vK meib³ Ae³v³b (BDC) Gi w³k t³b³g
Av³m³Z _vK | G c³μqv³K k₁³ a/c (Power stroke) e³j | G k₁³ a/c Z³ck₁³ h³w³ŠK
k₁³ ³Z i³c³v³Š³iZ nq Ges w³cób KZK.M³p³Z k₁³ K³v³bK³Us i³Wi gva³g μ³vsK k³vd³U
tcšQv³ |

GLv³b D³jL³ th, tc³Uvj I w³Rj B³Ä³b msKvPb P³v³c mvaviYZ 250-300⁰C Ges 600⁰C
(t³jw³nZ Z³v³c)

4 | w³b³w³kb a/c (Exhaust stroke)

w³b³w³kb avc Bb³jU fvj fU
eÜ_vK |

k₁³ avci (Power stroke) tkli w³k w³b³w³kb fvj fU L³j hvq | w³c÷b meib³
Ae³v³b (BDC) t³_vK m³ev³P _vb (TDC) IV³Z _vK Ges Ea³g³ w³c÷b³bi P³v³c $\bar{e}$ »
nIqv M³vm GMRó fvj f ev w³b³Kvkb fvj f w³q³ tei n³q hvq | G avc Bb³jU fvj fU eÜ_v
_vK | w³cób m³ev³P _vb (TDC) tcšQ³j G avc m³óv³ nq Ges w³b³Kvkb fvj f eÜ_v n³q
hvq |

Dc³i³v³ P³viU avc m³óv³ nevi mgq μ³vsK k³vd³U (Crankshaft) gv³Î $\bar{e}$ evi N³ji |

Gfv³e 4 t³÷vK m³vB³Kj B³Ä³bi g³j Kv³hμg P³μ³Kv³i P³j³Z _vK |

2-³÷vK m³vB³Kj B³Ä³bi g³j Kg c³x³Z

G ai³bi B³Ä³b mvaviYZ
c³tek I w³bMgb fvj f _vK
bv |

w³ØN³Z P³μ B³Ä³bi Kgc³x³Z (tkv³IY, msKvPb, k₁³ I w³bMgb avc) | w³c÷b³bi $\bar{e}$ $\bar{p}$ ³÷vK
A³_vr μ³vsK k³vd³Ui GK AveZ³b mgv³β nq | G ai³bi B³Ä³b mvaviYZ c³tek I w³bMgb
fvj f _vK bv | w³jÜv³i i M³v³qi w³Q³ c³_v ³jv c³tek I w³bMgb Øvi w³n³m³te Kv³R K³i Ges
w³c÷b cv³Î w³q³ G³_v ³jv w³bq³ŠZ nq | c³tek Øvi w³bMgb Øv³i i w³KQ³ w³b³P jvM³v³bv _vK | G
cK³vi B³Ä³b A³tbK t³q³Î GKg³ fvj f i gva³g c³tek Øvi³K w³bq³ŠY K³iv nq | GU³
mvaviYZ μ³vsK t³K³Ri M³v³q m³ib³te³w³KZ _vK |

w³ØN³Z P³μ B³Ä³bi t³q³Î tkv³IY I msKvPb avc thgb GKB mg³q t³ZgbB k₁³ I w³bMgb
avc GKB m³v³ msN³UZ n³q μ³vsKk³vd³Ui GK AveZ³b GK³U gv³Î k₁³ a/c Drcb K³i |
m³z³ivs w³ØN³Z P³μ B³Ä³b Z³zbv³g³K fv³e nv³jKv Ges $\bar{e}$ w³k Kg³ $\bar{q}$ | Gi Kgc³x³Z PZ³ØZ P³μ
B³Ä³bi t³P³q w³fbZi |
2-³÷vK B³Ä³b w³c÷b w³bP t³_vK Ic³i DV³j $\bar{e}$ Uv Kv³R K³i -

- 1| ms#KvPb avc (Compression Stroke)
- 2| tkvIY avc (Suction Stroke)

Avevi ||c÷b I ci t_#K ||b#P bvg#j `jlv KvR K#i-

- 1| kv³ avc (Power Stroke)
- 2| ||b@vkb avc (Exhaust Stroke)

ms#KvPb avc I #kvIY avc

†Lv jv c#ek c#_ ci i Kvi
evqy(W#Rj B||Ä#bi †¶†Î)
ev Rvj||b-evqy#gkY
(†c†Uvj B||Ä#bi †¶†Î)
μ`vsK †KB#R c#ek K#i |

||c÷b hLb me||b# Ae v#b (B.D.C.) _v#K ZLb c#ek c_||U (Inlet port) eÜ _v#K Ges
`v#f||Äs ev UvYdvi †cvU I ||b@vkb †cvU `jlv †Lv jv _v#K | ||c÷b hLb me||b# _vb †_#K
m#ev"P _v#b DV#Z _v#K ZLb †kvIb avc Avia nq | G Ae vq μ`vsK †KB#Ri †fZ#ii evhy
Pvc evqyÜ#j i evqy Pvc A#c¶v K#g Av#m | d#j c#ek c_||U L#j hvq | †Lv jv c#ek c#_
ci i Kvi evqy(W#Rj B||Ä#bi †¶†Î) ev Rvj||b-evqy#gkY (†c†Uvj B||Ä#bi †¶†Î) μ`vsK
†KB#R c#ek K#i | ||c÷b||U AvI Dc#i DV#j `K`v#f||Äs ev UvYdvi †cvU I ||bMgb c_
`jlv eÜ n#g hvq | d#j ||c÷b#bi Dc#i evqyev#gkY hv ceeZx †÷v#K μ`vsK †KBR †_#K
UvYdvi †cv#Ui gva#g cRjb c#Kvô ev ||m#jÜv#i c#ek K#i msK#Z n#Z _v#K | GLvb
†_#KB ms#KvPb i iynq Ges ||c÷b m#ev"P _v#b IV chš G c||μqv Pj#Z _v#K | ms#KvP#bi
d#j cPÜ Pvc I Zv#c i m#ô nq |

||PÎ 4 GK||U 2-#÷vK mvB#Kj B||Ä#bi Kgc×||Z

K.†kvIY I ms#KvPb NvZ, L. kv³ NvZ, M. ||bMgb NvZ, N. _úvK cvM, O. ||m#jÜvi (cRjb
c#Kvô), P. ||cób, Q. mÄviY Øvi, R. μ`vsK†KR, S. c#ek Øvi, T. ||bMgb Øvi |

kv³ avc I ||b@vkb avc

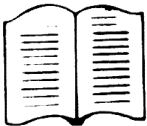
`» M`vm AvqZ#b te#o hvq
Ges ||c÷b#K cPÜ te#M
||b#Pi `#K av°v †`q | d#j
||c÷b ||b#Pi `#K bvg#Z
_v#K |

||c÷b m#ev"P _v#b †cŠQ#bvi ||VK ce-gy#Z Bb#R±i msK#Z I D#ß evqyZ ||W#Rj Bb#R±
K#i (||W#Rj B||Ä#bi †¶†Î) A_ev _úvK cvM msK#Z evqyRvj||b ||gk#Y _úvK c`vb
K#i(†c†Uvj B||Ä#bi †¶†Î) | G Ae vq Rvj||b c#||jZ n#g ||etüviY NUq | `» M`vm
AvqZ#b te#o hvq Ges ||c÷b#K cPÜ te#M ||b#Pi `#K av°v †`q | d#j ||c÷b ||b#Pi `#K
bvg#Z _v#K | G c||μqvU kv³ avc | ||c÷b hLb AvI I ||b#P b#g Ges `v#f||Äs I ||bMgb
c_`jlv L#j hvq | ZLb ||bMgb Øvi `#q †cvov M`vm tei n#Z i iYK#i | GKB mv#_ ||c÷b||U
||b#P bvgvi Kv#Y μ`vsK†KB#R Pvc te#o hvq Ges evqyev Rvj||b I evqy#gkY `K`v#f||Äs
c_`#q ||m#jÜv#i c#ek Ki#Z _v#K |

4-ǂóvK I 2-ǂóvK mṽBǂKj BṽÄǂbi Kg c×Z mṽúǂK Rṽbjvg| Gevi G ǂṽ BṽÄǂbi cṽ_K
ǂRǂb ǂbB-

4-ǂ÷vK I 2-ǂ÷vK BṽÄǂbi cṽ_K

	4-ǂ÷vK mṽBǂKj BṽÄb	2-ǂ÷vK mṽBǂKj BṽÄb
1	ǂc÷ǂbi cṽZ PviU ǂ÷vǂKi Rb̄ GKeṽi kṽ ³ Drcb nq	1 ǂc÷ǂbi cṽZ ǂṽ ǂ÷vǂKi Rb̄ GKeṽi kṽ ³ Drcb nq
2	μṽsK kṽdǂUi cṽZ ǂ AveZǂb GKeṽi kṽ ³ Drcb nq	2 μṽsK kṽdǂUi cǂZ̄K AveZǂb GKeṽi kṽ ³ Drcb nq
3	mgṽb AvKṽi i BṽÄb 2-ǂ÷vK BṽÄǂbi AǂaK kṽ ³ Drcb Kǂi	3 mgṽb AvKṽi i BṽÄb 4-ǂ÷vK BṽÄǂbi ǂǂ, Y kṽ ³ Drcb Kǂi
4	Zvcxq ǂǂZṽ ǂeṽk dǂj BṽÄb ǂeṽk DĚß nq bv	4 Zvcxq ǂǂZṽ Kg dǂj BṽÄb ǂeṽk DĚß nq
5	4-ǂ÷vK BṽÄb fviṽ hṽbevnǂb ēeüZ nq thgbt evm, UṽK, Uṽ±i, †Ub Ges ÷xgvi BZ̄ṽ	5 G cKṽi BṽÄb nṽjKṽ hṽbevnǂb ēeüZ nq thgb- gUi mṽBǂKj BZ̄ṽ
6	G BṽÄǂb cǂek I ǂbMgb fṽj f ṽvǂK	6 G BṽÄǂb cǂek I ǂbMgb fṽj f ṽvǂK bv
7	mṽeb̄ fṽj f ṽvKṽq AēeüZ Rṽjṽb †cṽovMṽṽmi mṽṽ tei nǂZ cṽi bv dǂj Rṽjṽb LiP Kg	7 AēeüZ Rṽjṽb †cṽov Mṽṽmi mṽṽ tei nǂq hṽq dǂj Rṽjṽb LiP ǂeṽk
8	Kg MṽZǂZ ǂb̄eevǂ PjǂZ cṽi Zǂe kǂǂi Dǂ̄K ǂeṽk	8 Kg MṽZǂZ PjǂZ Amṽeav nq Zǂe kǂǂi Dǂ̄K Kg
9	dṽB ũBj AǂcǂṽKZ.eo	9 dṽB-ũBj AǂcǂṽKZ.†QvU
10	GKK Ak kṽ ³ i Rb̄ BṽÄǂbi AvǂcṽǂK IRb ǂeṽk	10 GKK Akkṽ ³ i Rb̄ BṽÄǂbi AvǂcṽǂK IRb Kg



mṽigg t Rṽjṽb ǂnǂbi dǂj Zvc I Pvc nǂZ hṽŠK kṽ³ Drcb neṽi Pμ ev mṽBǂKǂji
Dci ǂfṽĚ Kǂi BṽÄǂK 4-ǂ÷vK I 2-ǂ÷vK mṽBǂKj BṽÄǂb fṽM Kiv nǂqǂQ| 4-
ǂ÷vK mṽBǂKj BṽÄǂbi gǂ Kgc×Z 4ṽU avǂc (†kvIY, msǂKṽPb I ǂbṽkb avc)
mṽúb nq| Avṽ 2-ǂ÷vK mṽBǂKj BṽÄǂbi gǂ Kgc×Z ǂṽ avǂc (msǂKṽPb I
†kvIY avc Ges kṽ³ I ǂbṽkb avc) mṽúb nq|



cvWĖi gj`vqb 1.2

mVK DĖĭi i cvk UK Pý (√) `b|

1. 4-†÷vK mvB†Kj BĭÄ†bi cμqv Kx fvte mǎúb nq ?

- K) μc÷†bi Pvi †÷vK Ges μ`vsK k`vd†Ui GKevi N†bi d†j
- L) μc÷†bi Pvi †÷vK Ges μ`vsK k`vd†Ui `gvi N†bi d†j
- M) μc÷†bi `j†÷vK Ges μ`vsK k`vd†Ui Pvievi N†bi d†j
- N) μc÷†bi GK †÷vK Ges μ`vsK k`vd†Ui Pvievi N†bi d†j

2. 2-†÷vK mvB†Kj BĭÄ†bi cμqv Kx fvte mǎúb nq ?

- K) μc÷†bi `j†÷vK Ges μ`vsK k`vd†Ui `jevi N†bi d†j
- L) μc÷†bi GK †÷vK Ges μ`vsK k`vd†Ui `jevi N†bi d†j
- M) μc÷†bi `j†÷vK Ges μ`vsK k`vd†Ui GKevi N†bi d†j
- N) μc÷†bi `j†÷vK Ges μ`vsK k`vd†Ui `jevi N†bi d†j

3. GK †÷vK ej†Z WK tevSiq ?

- K) Bb†jU fvj f `†q evqye evqygkZ Rvjvbi c†ek Kiv
- L) mμjŮv†i i †fZi μc÷†bi GKevi Iv ev bigvi mgq AμZμš `†Z
- M) Bb†R±†i i W†Rj †c ev `úvK M†Mi ^e`jyZK `úvK mμó Kiv
- N) EaŸgk μc÷†bi P†c `» nIqv M`vm μb@vkb fvj f `†q tei nIqv

4. W†Rj BĭÄ†bi ††† Bb†R±†i i KvR Kx ?

- K) mμjŮv†i i msKμZ evhy Rvjvbi μgk†Y ^e`jyZK `úvK mμó Kiv
- L) msKμZ I cPŮ DIß evqjZ D`P P†c W†Rj †c AvKv†i Bb†R± Kiv
- M) EaŸgk μc÷†bi P†c `» nIqv M`vm μb@vkb Kiv
- N) evqye evqygkZ Rvjvbi c†ek Kiv†bv

5. †c†Uvj BĭÄ†bi ††† c†vK M†Mi KvR Kx ?

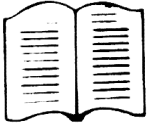
- K) EaŸgk μc÷†b P†c `» nIqv M`vm μb@vkb Kiv
- L) mμjŮv†i i msKμZ evqy Rvjvbi μgk†Y ^e`jyZK `úvK mμó Kiv
- M) msKμZ I cPŮ DĖß evqjZ D`P P†c W†Rj †c Kiv

cV 1.3 WtRj BÄbi cavb KvKix Askmgñ



G cW tkñI Avcb —

- WtRj BÄbi KvKix Ask,ñjvi big ejñZ cviñeb|
- KvKix Ask,ñjvi KvR ñjLñZ cviñeb|
- WtRj BÄbi KvKix Ask,ñjvi ,iž eYbv KiñZ cviñeb|



avZe c`vñ\_i %Zñi wefb cKvi hšvsk ñbñq BÄb MñVZ| BÄbi cñZñU hšvsñki Avjv`v Avjv`v bvg I ñbñ`ó KvR iñqñQ| ðZgñbfvñe WtRj BÄbi ðñññI wefb hšvsñki cñK bvg I myññ`ó KvR iñqñQ| G ðñññ Avgiv WtRj BÄbi cavb KvKix Ask,ñjv ñbñq AvñjvPbv Kie|

GKñU WtRj BÄbi cavb KvKix Ask,ñjvi cñññPñZ -

ññjñvi (Cylinder)

ññjñvi BÄbi kñ³i ðKñ`ñj| Gi ðfZñii ðh Asñk `nb ñmqñ mñúb nq, ZññK cññjb cñKññ eñj| Gi ðfZñiB ñcññbi DVñ bvgñi dñj Rvññbi `nb ñmqñ kñ³ Drcñ nq| ññjñvi mñavñYZ XvñB ðjvñvi nq| ðKñb ðKñb ðñññ AññKZñ kñ³ I ðññRññññ Rbñ XvñB ðjvñvi mñññ Kg IRñbi ðñññgñg, ñbñKj Ges gñjeñWbñg ðhñM Kiv nq|

ñPñ 5 ññjñvimñ ññjñvi eK

ǂc÷b (Piston)

ǂc÷b*i* IV bvgvi d†j Rvjǂb `n†b
 k³ Dr**cb** nq Ges μ^{vs}K k^{vd}†U
 ǂbvš*i* nq| ǂc÷b*i* GK cǂš Ave×
 Ges Aci cǂš Kv†bKǂUs i†oi mǂ_ hǂ
 _v†K hv gǂ fǂte PjvPj Ki†Z cǂ*i*|
 ǂc÷b mǂaviYZ A^vjǂbqǂg, XvjvB
 †jvrv I B^úvZ ǂ`†q %Zǂ*i* Kiv nq|
 ǂc÷b*i* Ic†*ii* Ask†K μvDb
 (Crown) Ges ǂb†Pi Ask†K ǂ^ıiU
 e†j|

ǂPĤ 6 GKǂU ǂc÷b

ǂc÷b ǂis (Piston ring)

ǂc÷b*i* e^ıvm ǂmǂjŮv†*ii* e^ıv†mi †P†q Kg _v†K| hv†Z ǂmǂjŮv†*ii* g†a^ı ǂc÷b mn†R IV-
 bvgv Ki†Z cǂ*i*| ǂc÷b I ǂmǂjŮvi e^ıv†mi G cv_K^ı†K ǂKqv†iŸ e†j| ǂc÷b I ǂmǂjŮv†*ii*
 g†a^ı mǂVK mǂshvM ǂvcb, M^ıvmxq Pvc msi ǂY, ǂc÷b*i* I ǂmǂjŮv†i †`qvj n†Z Zvc ǂbvš*i*
 Ges ǂmǂjŮv†*ii* †`qvj (Cylinder Wall)
 ^Zjv³ KiY Ki†Z ǂc÷b*i* Mv†q Lv†Pi †fZi
 ǂis emv†bv _v†K| mǂaviYZ ǂǂai†b*i* ǂc÷b
 ǂis e^ıenvi Kiv nq| Ic†*ii* (Nearest the
 Piston Head) ǂis ǂıUv me^ıv ǂmǂjŮv†*ii*
 †`qv†j AıeiZ Pvc c†qvM K†i| ZvB
 G,†jv†K mǂ†KvPb ǂis (Compression
 Control Ring) e†j| ǂb†Pi ǂis,†jv†K
 A†qj ǂis (Oil control Ring) e†j| GUv
 ǂmǂjŮv†*ii* †`qvj†K ^Zjv³ iv†L Ges
 AıZǂi³ A†qj†K μ^{vs}K†KB†m ǂb†q Av†m|
 ǂc÷b 3 n†Z 7ǂU

ǂPĤ 7 ǂeǂfb ǂc÷b ǂis

ǂis _vK†Z cǂ*i*| cǂZ 200 ǂgtǂgt ǂc÷b e^ıv†mi Rb^ı ǂc÷b ǂis Gi dıvKi cııgvb 1
 ǂgtǂgt| ǂc÷b ǂis mǂaviYZ XvjvB †jvrv I B^úvZ Gjǂ ǂ`†q %Zǂ*i* Kiv nq| A†qj ǂis ǂq
 n†j gıe†ji LiP te†o hvq Ges mv^ıv taııv tei nq|

ǂc÷b ǂcb (Piston Pin)

ǂPĤ 1.6 G ǂc÷b ǂcb †`Lv†bv n†q†Q| ǂc÷b ǂcb
 Kv†bKǂUs iW Ges ǂc÷b†K mǂshvM K†i| GUv
 ǂZbfv†e KvR K†i|

- 1| ǂcb ǂc÷b ǂvqǂ Ges Kv†bKǂUs i†W gǂ †_†K|
- 2| ǂcb Kv†bKǂUs i†W ǂvqǂ Ges ǂc÷b gǂ †_†K|
- 3| ǂcb ǂc÷b Ges Kv†bKǂUs i†W ǂıUv†ZB gǂ †_†K|

ǂPĤ 8 ǂc÷b ǂcb

AvaybK BllÄtb tk÷liU AwaKZi e`envi Kiv nq| G÷K dñUs WRvBb (Floating design)
e÷j|

Kv÷bKñUs iW (Connecting Rod) t

Kv÷bKñUs iW WwvKvi,
†MvjvKvi, eMvKvi, AvqZvKvi
ev ñeg UvBc n÷Z cv÷i| GUv
Wc dñRW ñ÷÷ji %Zñi|

GUv ñc÷÷bi Ici c`Ë M`vñmi Pvc ñc÷÷b
ñc÷÷bi gva`tg μ`vsK k`vd÷U mÄñiz K÷i|
Gi Ic÷ii †QvU Ask (Small end
bearing) ñc÷÷bi mñ Ges ñb÷Pi eo
Ask (Big end bearing) μ`vsK k`vd÷Ui
mñ Ges mshy` ñv÷K| Kv÷bKñUs i÷Wi gva`tg
ñc÷÷bi Iv-bvñvi MñZ μ`vsKk`vd÷Ui
Nyb MñZ÷Z i`cvñiz nq| 4-÷÷vK BllÄtb
Kv÷bKñUs iW ci ci (Alternately)
ms÷KvPb I Uv÷bi ñelq ñKb 2-÷÷vK BllÄtb
GUv gvñ ms÷KvP÷bi ñelq| Kv÷bKñUs iW
ñWwvKvi, †MvjvKvi, eMvKvi, AvqZvKvi ev ñeg UvBc n÷Z cv÷i| GUv Wc dñRW ñ÷÷ji
(Drop forged steel) %Zñi|

1. ñj GÛ ñeqñis
(ek)
2. ñj GÛ
3. Kv÷bKñUs iW
eë
4. iW
5. ñeM -GÛ
6. Iqññi
7. bvU
8. Kv÷bKñUs iW
ñeqñis

μ`vsKk`vdU (Crank shaft)

GUv †dñRW I Kv÷ B`ñvZ
ñ`÷q %Zñi| G÷K BllÄtb
†giyÛ ejv nq| μ`vsK
k`vd÷U 2-5ñU †gBb ñeqñis
ñv÷K|

μ`vsKk`vdU Kv÷bKñUs i÷Wi gva`tg cvñ kñ<sup>3</sup> Nybñi gva`tg dñBûB÷j teë cyñZ (Belt-
Pully) Ges kñ³ mÄñibkñj `÷Û (P.T.O.) MñZ c`vb K÷i| μ`vs÷Ki th As÷k †gBb
ñeqñis mshy` ñv÷K G÷K μ`vsK Rvñvj Ges th Ask ñeM GÛ ñeqñis mshy` ñv÷K, Zv÷K
μ`vsK ñcb e÷j| μ`vsK Rvñvj I μ`vsK ñc÷÷bi gvñSi jñv †jññ `Û÷K μ`vsK I÷qe
(Crank web) ev e`ñjý I÷qU (Balance Weight) e÷j| μ`vs÷Ki GK cvñš UvBñgs
ñcñbqb Ges Aci cvñš dñBûBj mshy` ñv÷K| GUv †dñRW I Kv÷ B`ñvZ ñ`÷q %Zñi| G÷K
BllÄtbñi †giyÛ ejv nq| μ`vsK k`vd÷U 2-5ñU †gBb ñeqñis ñv÷K|

ñPñ 10 μ`vsKk`vdU

d₁B₁B₁j (Fly wheel)

B₁Ä₁b₁i A₁K₁Z- cK₁Z Ges
 m₁j₁Ü₁i i msL₁vi Dci
 d₁B₁B₁j i A₁K₁Z. bfi
 K₁i | d₁B₁B₁j B₁Ä₁b₁i tevSv
 enb Ges M₁Z evov₁Z m₁nvh₁"
 K₁i |

d₁B₁B₁j i kãMZ A₁ n₁jv Doš- P₁K₁v | K₁b
 cK₁Zc₁¶ GU₁ X₁vjvB t₁jvni Z₁i GK₁U fvi₁x
 P₁K₁v e₁kl h₁v μ₁vsKk₁vd₁Ui t₁cQ₁b₁i cv₁š
 `pf₁vte msh₁y t₁₃K μ₁vsKk₁vd₁Ui mv₁₃
 N₁i | B₁Ä₁b₁i iagv₁ k₁³ av₁c k₁³ Drcb
 nq Ges evK₁ Zb₁U b₁¶q av₁cK P₁vjv₁Z
 d₁B₁B₁j k₁³ mÄ₁q K₁i iv₁L Ges mgqgZ
 GU₁ c₁qvM K₁i | B₁Ä₁b₁i A₁K₁Z- cK₁Z Ges
 m₁j₁Ü₁i i msL₁vi Dci d₁B₁B₁j i A₁K₁Z.
 bfi K₁i | d₁B₁B₁j B₁Ä₁b₁i tevSv enb Ges
 M₁Z evov₁Z m₁nvh₁" K₁i | Kg m₁j₁Ü₁i e₁ko B₁Ä₁b₁i d₁B₁B₁j A₁K₁v₁i eo Ges t₁ek msL₁"K
 m₁j₁Ü₁i B₁Ä₁b₁i d₁B₁B₁j i A₁K₁v₁i t₁QvU nq | K₁viY H B₁Ä₁b₁i Kg WM₁x₁ Zd₁v₁Z k₁³ Drcb
 nq | d₁B₁ B₁j Gi K₁vR₁, t₁jv n₁"Q -

¶P₁ 11 d₁B₁B₁j

- 1 | B₁Ä₁b₁i b₁¶q t₁÷vK₁, t₁jv₁K P₁vjv₁Z m₁nvh₁" Kiv |
- 2 | A₁Z₁i₁³ K₁aub t₁iva K₁i B₁Ä₁b₁i M₁Zi mvgÄm₁" i¶v Kiv |
- 3 | Gi M₁Z RoZvq (Inertia of motion) B₁Ä₁b₁K P₁vjy₁ eÜ Ki₁Z m₁nvh₁" Kiv |
- 4 | K₁vP c₁iP₁vjbvq m₁nvh₁" Kiv |

K₁vgk₁vdU (Cam Shaft)

4-₁t₁÷vK B₁Ä₁b₁ e₁K K₁vgk₁vdU μ₁vsKk₁vd₁Ui mv₁₃ Mqv₁i ev t₁PBb t₁üv₁KU Gi ms₁hv₁t₁M
 mgvšiv₁j fv₁te hy₁ v₁₃K | GU₁ N₁Yb M₁Z₁K ^iLK M₁Z₁Z i|cvš₁iZ K₁i | Gi M₁v₁q

1. c₁ iW
2. t₁U₁cU
3. iK₁vi Avg
4. K₁vU₁i
5. ü₁s i₁t₁Ub₁vi
6. fv₁j f ü₁s
7. GMR ÷ fv₁j f
8. Bb₁t₁UK fv₁j f
9. K₁vg
10. K₁vg k₁vdU

¶P₁ 12 K₁vg k₁vdU I fv₁j f

K`v†gi mi:Ask†K †Uv
(Toe) Ges we`Z †bPz
Ask†K †nj (Heal) e†j |

KZK,†jv `ZŠ K`vg †jve _v†K hv Bb†jU I GMR÷ fvjf, d†j c†ú,j†K†Us A†qj
c†ú Ges BM†bkb †m†÷g c†iPvjbv K†i | K`vgk`vd†Ui †W†K†Z Ask†K K`vg e†j | c†Z`K
fvj†fi Rb` GK†U A\_vr c†Z†U †m†j†U†ii Rb` 2†U K†i K`vg _v†K | 4-†÷vK B†Ä†bi
K`vgk`vdU μ`vsKk`vd†Ui Aa M†Z†Z N†i A_vr GK†U Pμ mgvβ Ki†Z μ`vsKk`vdU N†je
`†jevi †Kb K`vg k`vdU N†je GK†vi | K`v†gi mi:Ask†K †Uv (Toe) Ges we`Z †bPzAsk†K
†nj (Heal) e†j | K`vgk`vd†Ui N†jebi d†j fvjf c†k i†Wi av°vq DVv-bvgv K†i |
K`vgk`vdU †cUv I XvjvB B`úvZ Ges XvjvB †jvrv †`†q †Z†i Kiv nq |

fvj f mgn (Valves)

fvjf c†iPvjbv Rb` iKvi
Avg, iKvi k`vdU, c†k i†U,
U`†cU I K`vgk`vd†Ui
c†qvRb nq |

4-†÷vK B†Ä†bi c†Z†U †m†j†U†ii Rb` `†Uv K†i fvjf _v†K | Gi GK†U†K c†ek fvjf e†j
hv evq†K †m†j†U†i c†ek Ki†Z m†vnh` K†i | Avi Aci†U†K †bMgb fvjf e†j, hv m†vnh`
†m†j†U†ii †fZ†ii `» M`vm †ei n†q hvq | Uv†i I A†U†g†evBj B†Ä†b U`†cU RvZxq fvjf
e`eüZ nq | m†v†iYZ c†ek fvjf †bMgb fvj†fi †P†q AvK†i eo nq | fvjf m†v†iYZ
B†Ä†bi gv_vq Avevi KL†bv B†Ä†b e†K †m†j†U†ii c†k jvM†bv _v†K | fvjf c†iPvjbv Rb`
iKvi Avg, iKvi k`vdU, c†k i†U, U`†cU I K`vgk`vd†Ui c†qvRb nq | μ`vsKk`vd†Ui
AvB†Wqvj †c†bqb †`†q K`vgk`vdU†K N†j†q Pμbv†i †b†ó mg†q fvjf L†j Ges eÜ K†i
B†Ä†bi Kg c×†Z m†úb K†i | G†K fvjf U†B†gs e†j | μ`vsK k`vdU I K`vgk`vd†Ui g†a`
AveZb mgZ†i Rb` †c†bq†bi m†v†_ †c†bq†bi m†shvM Kiv nq |

†P† 13 fvj f Acv†i†Us g`vK†bRg

1. iKvi Avg, 2. †ús †i†U†vi, 3. fvjf †ús, 4. †m†j†U†i †nW, 5. fvjf, 6. c†k iW, 7.
†m†j†U†i eK, 8. †U†cU, 9. K`vg, 10. K`vg k`vdU

K₁L₁ I c j x Dbqb $\overline{\text{q}}$

UvBigs **Mqvi** (Timing gear)

UvBigs **Mqvi** Kvg-k^ˈvdU I
 μ ^ˈvsK k^ˈvd^ˈUi mgš^ˈqi
 gva^ˈtg K^ˈvg-k^ˈvdU c^ˈtek I
Mgb fvj f L^ˈy^ˈz I eÜ
 Ki^ˈz m^ˈvn^ˈh^ˈ K^ˈi |

Kvg-k^ˈvd^ˈUi **Mqvi** μ ^ˈvsK k^ˈvd^ˈUi **Mqv^ˈii** tP^ˈq $\overline{\text{q}}$,Y $\overline{\text{v}}$ z $\overline{\text{v}}$ zK | m^ˈz^ˈivs μ ^ˈvsK
 k^ˈvd^ˈUi GK N^ˈy^ˈbi d^ˈj K^ˈvg-k^ˈvdU Aa N^ˈy^ˈb m^ˈú^ˈb K^ˈi | 4-^ˈ÷^ˈvK B^ˈÄ^ˈbi μ ^ˈvsK k^ˈvd^ˈUi
 $\overline{\text{q}}$ N^ˈy^ˈbi d^ˈj $\overline{\text{c}}$ ÷^ˈb P^ˈri evi I V^ˈv-b^ˈvg^ˈ K^ˈi Ges μ ^ˈvsK^ˈvdU GK^ˈevi AveZb m^ˈú^ˈb K^ˈi |
 UvBigs **Mqvi** Kvg-k^ˈvdU I μ ^ˈvsK k^ˈvd^ˈUi mgš^ˈqi gva^ˈtg K^ˈvg-k^ˈvdU c^ˈtek I **Mgb**
 fvj f L^ˈy^ˈz I eÜ Ki^ˈz m^ˈvn^ˈh^ˈ K^ˈi | GU^ˈv X^ˈvj^ˈvB t^ˈj^ˈvn^ˈ I t^ˈcU^ˈv B^ˈú^ˈz^ˈi %Z^ˈi |

K. iK^ˈi Av^ˈg
 L. fvj f
 M. fvj f K^ˈU
 N. fvj f
 O. c^ˈk iW
 U. U^ˈv^ˈz^ˈcU
 V. K^ˈvg
 W. K^ˈvg k^ˈvdU
 X. μ ^ˈvsK k^ˈvdU
 Y. UvBigs **Mqvi**

P^ˈ14 UvBigs **Mqvi**, 4-^ˈ÷^ˈvK B^ˈÄ^ˈbi μ ^ˈvsK k^ˈvdU I fvj f P^ˈvj^ˈb^ˈ K^ˈj^ˈv^ˈK^ˈš^ˈk^ˈj

eqwis mgr (Bearings)

B^ˈÄ^ˈbi me^ˈ, t^ˈj^ˈv N^ˈy^ˈqgv^ˈb
 k^ˈvdU Gi N^ˈIY^ˈ t^ˈj **eqwis**
 e^ˈeüZ nq |

B^ˈÄ^ˈbi me^ˈ, t^ˈj^ˈv N^ˈy^ˈqgv^ˈb k^ˈvdU Gi N^ˈIY^ˈ t^ˈj **eqwis** e^ˈeüZ nq | G **eqwis**, t^ˈj^ˈv big avZ^ˈz
 %Z^ˈi e^ˈt^ˈj **eqwis** Gi k^ˈvdU N^ˈy^ˈbK^ˈv t^ˈj **eqwis** **b^ˈR** ¶^ˈq c^ˈvß n^ˈq k^ˈvdU^ˈK i ¶^ˈv K^ˈi | Z^ˈvg^ˈ,
 m^ˈxm^ˈv, t^ˈev^ˈÂ, t^ˈnvq^ˈBU t^ˈgU^ˈvj c^ˈf^ˈz. ¶^ˈq **eqwis** %Z^ˈi K^ˈi nq |

P^ˈ15 t^ˈgB^ˈb **eqwis mgr**

weqwis e`envi i DžĪk

- 1| NŸbkxj Ask, žjvžK aviy Kži h_v`vžb ivLv|
- 2| NŸbkxj Ask, žjvi Dci chyž Pvc I av°v enb Kiv|
- 3| NIYRıbz evav I Zıžci gvĪv Kgıbv|

WžRj BıÄžb mıavıYZ ıbžewYZ weqwis e`eüZ nq|

μ`vsK k`vdžUi μ`vsžK
Rıbvžj G weqwis e`envi Kiv
nq|

(1) tgBb weqwis- tgBb weqwisžK KLb KLbI μ`vsK k`vdU weqwis, Rıbvj weqwis A_ev
c`vtı>U weqwis ejv nq| μ`vsK k`vdžUi μ`vsžK Rıbvžj G weqwis e`envi Kiv nq| tgBb
weqwis žıv Asžk wef³ _vžK Ges weqwis Kıžci gvažg G, žjvžK μ`vsžK Rıbvžji Dci
vcb Kiv nq|

KıvžKıUs ižWi epr cıžŠ G
weqwis e`envi Kiv nq|

(2) KıvžKıUs iW weqwis - GžK weM GŪ weqwis G ejv nq| KıvžKıUs ižWi epr cıžŠ- G
weqwis e`envi Kiv nq| tgBb weqwis Gi gZ G weqwis žıv Asžk wef<sup>3</sup> | μ`vsK ıcžbi
Dci KıvžKıUs iW weqwis vcb Kži KıvžKıUs ižWi epr cıžšK μ`vsK ıcžbi mıv_ hy
Kiv nq|

žj GŪ weqwis KıvžKıUs
ižWi žžcvš ev žj GžŪ
e`envi Kiv nq|

(3) žj GŪ weqwis - žj GŪ weqwis KıvžKıUs ižWi žžcvš ev žj GžŪ e`envi Kiv nq|
mıavıYZ KıvžKıUs ižWi žžcvš ek e`envi Kiv nq| ıcžb ıcžbK ekı žfZi Xžq
GžK KıvžKıUs ižWi žžcvš vcb Kiv nq|

mıavıYZ K`vg k`vdžU žıvjvi
ev ej weqwis e`envi Kiv
nq|

(4) K`vg k`vdU - weqwis K`vg-k`vdıU weqwis Gi gvažg K`vg k`vdUžK ııııjŪvi ežKi
gžā ııııvcb Kiv nq| mıavıYZ K`vg k`vdžU žıvjvi ev ej weqwis e`envi Kiv nq|

BbžRži (Injector)

ııııjŪvi žfZi AıZ DžP
Pıžc msKžZ I Lž DĒB
evqžZ BbžRži Rıjııb
mieıvı KžıI

ııııjŪvi žfZi AıZ DžP Pıžc msKžZ I Lž DĒB evqžZ BbžRži Rıjııb mieıvı Kžı, hv
msžM msžM cžıjZ I wežvııZ nq| G wežvııY ıcžbK cej kı³žZ av°v ž`q| GKıU
BbžRžıi gž Ask, žjv nž"Q -

- 1ı bRj (Nozzle)
- 2ı K`vc bıU (Cap nut)
- 3ı ı`úŪj (Spindle)
- 4ı Kgžcmb ı`cs (Compression spring)
- 5ı GWRı÷s žzŪ bıU ev GWRı÷s ııııg (Adjusting screw and nut or adjusting
shims)
- 6ı ıjK Ad cıBc (Leak off pipe)
- 7ı džj BbžjU (Fuel inlet)

- AłZ D”P Pvc BbR±i Rvjwb mieivn Kiv|

PI 1.18 Rjvbi Dci Pvc cčqM I
mieivn (Feeding)ciÄvii Daŷg
†÷včK wefb Ae_vb

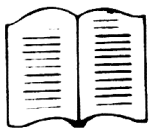
- BłÄb mvBčKčji GKłU wbi`ó mgčq BbR±i Rvjwb mieivn I Pvc cčqM Kči|
Kčackb †÷včKi wVK †kl chčq DIB I msKčZ evčZ Rvjwb wbičK KičZ
nq| wVK G gčZB mieivn jvBčb D”PPvc Rvjwb mieivn Kiv|
- BłÄbi Dci chŷ tevSv Abŷq MfYčii mvnčh” BbRKUči mieivnKZ.Rvjvbi
ciŷgYčK Kgček Kči BłÄbi MčZčK wqšY Kiv|

ciÄvčK 40 nčZ 45
†KłR/eM čmtigt Gi †Pčq
ček Pvc BbRKUčK
Rvjwb mieivn KičZ nq|

AłZ D”P Pvc BbRKUč Rvjwb mieivn Kči| BbRKXi hLb Kčkb †Pvc Rvjwb wbičK
Kči ZLb Kčkb †Pvc evčAłZ D”PPvc (cič 40 nčZ 45 †KłR/eM čmtigt) msčKwPZ
_včK| G Ae_vq BbRKUči mieivnKZ.Rvjvbi Dci 40 nčZ 45 †KłR/eM čmt wgt
Aččv Kg nčj BbR±i Kčkb †Pvc Rvjwb wbičK KičZ cvči bv| ZvB ciÄvčK 40
nčZ 45 †KłR/eM čmtigt Gi †Pčq ček Pvc BbRKUčK Rvjwb mieivn KičZ nq| G
ciÄvčb čab Ask,čjv nčjv c-vÄvi I evčij| c-vÄvčii †K` eivei wbičPi wčK`i`N”
GKłU wQ`\_včK| Gi evBčii PviwčK LuR KvUv \_včK| G LuR I †Kč`i wQ` Ävi GKłU
wQč`i mvnčh” hŷ \_včK| evčičji MčqI`čv Øvi ÄvQ| evg nvčZi wčKi ØviU Wb
nvčZi ØviUi mčgb” Icči _včb Kiv _včK| evg nvčZi ØviUB čab Rvjwb mieivnKiv
c_Ges Wb nvčZi ØviU nčjv wčúj Ičq| KčdčUi Nŷbi dčj Rvjwb mieivni mgq
ciÄviU Icčii wčK DVčZ _včK| evčičji čfZi ciÄvčii LvčRi Ae_vb wbyq Kči wK
ciŷgY Rvjwb cič avč mieivn nče|

wbqšK ičWi mečPčq evčgi
Ges mečPčq Wčbi Ae_vb
ciÄvčb ček Ges Kg Rvjwb
mieivni wbičK|

ciÄviU wBP †_čK Icči Ilevi cče cček Øvi I evBčvm c_ †Lvčv _včK Ges Rvjwb Gi
Icčii RvčM cčKči| ciÄvi Icči Ilevi mgq`čv ØviB eÜ nčZ _včK Ges evčičji
čfZčii Pvc evčZ _včK| G Pvc dčj čwčfvix fvčf Lčj hvq Ges Rvjwb bRčj ček
Kči| AZtci c-vÄvi wbičPi wčK bvgčZ _včK Ges Gi LuR evBčvčmi Ges †Kč`i wčKi
msčM mshŷ nčq hvq| Rvjwb evBčvm wčq čei nevi dčj čfZčii Pvc Kčg hvq I BłÄb
Rvjwb mieivn eÜ nčq hvq| BłÄb wK ciŷgY Rvjwb mieivn nče Zv wbfč Kči KZ mgq
ci ciÄvčii †KšYK LuR evBčvčmi mvč_ hŷ _včK| GKłU wbqšK ičWi mvnčh” ciÄvčii
wbičPi evčK I wčwbq Nŷčq Rvjwb mieivni mgq I ciŷgY wbačY Kiv hvq| wbqšK
ičWi mečPčq evčgi Ges mečPčq Wčbi Ae_vb ciÄvčb ček Ges Kg Rvjwb mieivni
wbičK|



mvigg t GKłU wWčRj BłÄb wmwjŮvi, wč÷b, wč÷b is, wč÷b wčb, KvčbKłUs iW,
μ”vsKk”vdU, K”vgk”vdU dčBčBj, wefb aičbi fvj, UvBigs wMqvi, weqv is,
BbR±i, Rvjwb ciÄvč BZ”w` wefb Ask MłVZ| G,čjvi cičZvči Ävevi c„K
c„K KvR I ,iž ičqčQ|



K₁L. I c j x Dbqb $\bar{q}$

cv#V $\ddot{E}$ i g $\dot{f}$ 'vqb 1.3

m₁VK D $\ddot{E}$ †i i cv#k $\mathbb{U}K$ $\mathbb{P}\acute{y}$ ($\sqrt{\quad}$) $\mathbb{I}$ `b|

1. $\mathbb{I}c \div \#b$ $\dot{g}ai \#bi$ $\mathbb{I}is$ emv#bvi KviY Kx ?

K) $\mathbb{I}c \div b \#K$ AjsKZ.Kiv

L) $\mathbb{I}c \div \#bi$ L $\dot{v}$ tRi MZ fivU Kiv

M) $\mathbb{I}c \div b$ I $\mathbb{I}m\mathbb{I}j\hat{U}\dot{f}ii$ e $\ddot{v}$ #mi $\mathbb{I}Kqv\#i\acute{Y}$ eRvq $\dot{t}i\#L$ Pvc msi $\mathbb{I}Y$, Zvc $\bar{v}bv\dot{S}i$ I $\hat{Z}jv^3KiY$ Kiv

N) $\mathbb{I}c \div b$ I $\mathbb{I}m\mathbb{I}j\hat{U}\dot{f}ii$ g $\#a$ NI $\dot{f}Yi$ g $\dot{v}a\#g$ D $\mathbb{P}$ Zvc Drcb Kiv

2. B $\mathbb{I}\ddot{A}\#bi$ $\dot{t}gi\dot{y}\hat{U}$ $\#Kvb\mathbb{U}$?

K) d $\dot{v}$ B $\hat{U}$ Bj

L) $\mu\ddot{v}SKk\dot{v}dU$

M) K $\dot{v}gk\dot{v}dU$

N) $\mathbb{I}m\mathbb{I}j\hat{U}vi$

3. $\dot{t}Kvb\mathbb{U}$ $\mu\ddot{v}SK$ k $\dot{v}d\#Ui$ Ask bq ?

K) $\mu\ddot{v}SK$ R $\dot{v}bvj$

L) K $\dot{v}gk\dot{v}dU$

M) $\mu\ddot{v}SK$ $\mathbb{I}cb$

N) e $\ddot{v}\dot{f}j\acute{Y}$ I $\#qU$

4. $\dot{t}Kvb\mathbb{U}$ d $\dot{v}B$ - $\hat{U}B\dot{f}ji$ K $\dot{v}R$ bq ?

K) B $\mathbb{I}\ddot{A}\#bi$ $\mathbb{I}b\mathbb{I}\mathbb{I}q$ $\dot{f} \div vK$, $\dot{f}jv\#K$ P $\dot{v}jv\#Z$ m $\dot{v}nv\mathbb{I}$ Kiv

L) B $\mathbb{I}\ddot{A}\#bi$ A $\mathbb{I}Z\mathbb{I}^3$ K $\acute{a}ub$ $\dot{f}iva$ K $\dot{f}i$ M $\mathbb{I}Zi$ m $\dot{v}g\ddot{A}m$ i $\mathbb{I}v$ Kiv

M) e $\dot{v}qycev\#ni$ g $\dot{v}a\#g$ B $\mathbb{I}\ddot{A}\#K$ k $\dot{v}Zj$ i $\dot{v}Lv$

N) M $\mathbb{I}Z$ RoZvq B $\mathbb{I}\ddot{A}\#K$ P $\dot{v}jyI$ e $\ddot{U}$ Ki $\dot{f}Z$ m $\dot{v}nv\mathbb{I}$ Kiv

5. U $\dot{v}B\mathbb{I}gs$ $\mathbb{I}Mqv\#ii$ K $\dot{v}R$ Kx ?

K) R $\dot{v}jv\mathbb{I}b$ mie $\dot{v}\#ni$ mgq $\mathbb{I}b\dot{f}\`k$ Kiv

L) $\hat{Z}jv^3Ki\dot{f}Yi$ mgq $\mathbb{I}b\dot{f}\`k$ Kiv

M) B $\mathbb{I}\ddot{A}\#bi$ $\dot{t}Kvb$ $\mu\mathbb{U}$ $\mathbb{I}b\dot{f}\`k$ Kiv

N) K $\dot{v}g$ -k $\dot{v}dU$ I $\mu\ddot{v}SK$ k $\dot{v}d\#U$ mg $\dot{S}\dot{f}qi$ g $\dot{v}a\#g$ K $\dot{v}g$ k $\dot{v}dU$ c $\#ek$ I $\mathbb{I}bMgb$ f $\dot{v}j\dot{f}$ $\#Lvjv$ I e $\ddot{U}$ Kiv

6. †KvbU †eqwis Gi KvR bq?

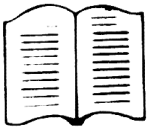
- K) N†bkxj Ask, †jv†K aviy K†i h_v†b ivLv
- L) B†Ä†bi †Zj, Rvjvb I cvb aviy Kiv
- M) N†bkxj Ask, †jvi Dci chy Pvc I av°v enb Kiv
- N) NIYR†YZ evav I Zv†ci gv†v Kgv†bv

cV 4 †c†Uvj B†Ä†bi cavb KvHKix Askmgñ

G cW †k†I Avcb —



- †c†Uvj B†Ä†bi KvHKix Ask, †jvi bvg ej†Z cvi†eb|
- †c†Uvj B†Ä†b KvHKix Ask, †jvi, iž eYbv Ki†Z cvi†eb|
- †c†Uvj B†Ä†bi KvHKix Ask, †jvi KvR †jL†Z cvi†eb|



mKj B†Ä†bi g† Kgc×Z I Mvb cvq GK| †Kb Rvjvb mieiv†ni †††††W†Rj I †c†Uvj B†Ä†bi g†a" cv_K" i†q†Q| †c†Uvj B†Ä†b Kve†iU†ii minv†h" ev†úv†qZ Rvjvbi mv†_ evqy †g†KZ K†i †m†jU†i mieiv†n Kiv nq| †c†Uvj B†Ä†b msK†Z evqy Rvjvbi †gKY ^e`yZK †úv†K c†jZ Kivi Rb" †úvK cvM e"eüZ nq| †c†Uvj B†Ä†b Kve†iUi Av†Q †Kb Bb†R†i †bB| †c†Uvj B†Ä†bi cavb KvHKix Ask, †jv n†"Q †b†i†c-

K) Pjbxj cavb KvHKix Askmgñ

- 1| †C÷b (Piston)
- 2| †C÷b †is (Piston Ring)
- 3| †C÷b †Cb (Piston Pin)
- 4| Kv†bK†Us io (Connecting Rod)
- 5| μ†sK k†vdU (Crankshaft)
- 6| dvB ûBj (Fly wheel)
- 7| K†vg k†vdU (Cam shaft)
- 8| fvj f mgñ (Valves)

L) †eqwis mgñ (Bearings)

- 1| †gBb †eqwis
- 2| Kv†bK†Us iû †eqwis ev †eM Gû †eqwis
- 3| †j Gû †eqwis

M) Uv†gs †Mqv† (Timing gear)

†c†Uvj B†Ä†bi Dc†i D†j- †LZ cavb KvHKix Ask, †jvi eYbv Av†g†v cW 1.3 G †_†K †R†b †b†Zv cW†i| Kv†Y †c†Uvj I †W†Rj B†Ä†bi ††††† G hšisk, †jv GKB ai†bi n†q _v†K|

G, ǂjv Qvov I ǂcǂUvj Bǂǂb iǂqǂQ-

N) KveǂǂUi (Carburator)

ǂcǂUvj Bǂǂb KveǂǂUi evqy Rvjwb ǂgkY ǂmǂjǂǂi mieivn Kǂi | GKǂU mǂaviY KveǂǂUi ǂbǂǂv³ Ask, ǂjv ǂbǂq MǂVZ |

- 1 | ǂbWj fvjf (Needle valve) t GUv KveǂǂUi ǂZjvavi nǂZ Rvjwb ǂdǂU ǂPǂǂi mieivn I ǂbqǂY Kǂi |
- 2 | ǂdǂU ǂPǂǂi (Float chamber) t ǂdǂU ǂPǂǂi ǂfZi Rvjwb (Petrol) Rgv ǂǂK Ges ǂdǂUi (Float) mǂvǂh ǂbqǂZ nq |
- 3 | ǂdǂU (Foat) t ǂdǂU Gi KǂR nǂjv ǂbWj fvjfǂK KvǂKix Kǂi Rvjwb cǂek cǂK ǂbqǂY Kiv | ǂdǂU ǂPǂǂi Rvjwbi cǂigvY Kǂg ǂMǂj ǂdǂU ǂbǂP ǂbǂg Avǂm Ges G Aeǂvq ǂdǂU ǂjfvǂU ǂbWj fvjfǂK Lǂj ǂǂq | dǂj UǂvsK nǂZ Rvjwb ǂdǂU ǂPǂǂi cǂek KiǂZ ǂǂK | ǂdǂU ǂPǂǂi Rvjwbi cǂigvY ǂǂo hǂevi mǂǂ mǂǂ ǂdǂU I cǂi DVǂZ ǂǂK | ǂdǂU GKǂU ǂbǂǂó Aeǂǂb cǂǂǂi ci ǂdǂU ǂjfvǂU ǂbWj fvjfǂK eǂ Kǂi ǂǂq | G Aeǂvq Rvjwb Avi ǂdǂU ǂPǂǂi cǂek KiǂZ cǂi bǂ |
- 4 | ǂPǂK (Choke) t GUv GK cKvi fvjf | G ǂǂq Gqvi ǂKbvi (Air cleaner) nǂZ KveǂǂUi evqy cǂek cǂK ǂbqǂY Kiv nq | ǂPǂK fvjfǂU hZ ǂǂk ǂLvǂv ǂKǂe evqy cevǂni cǂigvY ZZ ǂǂo hǂǂ |

ǂdǂU Gi KǂR nǂjv ǂbWj fvjfǂK KvǂKix Kǂi Rvjwb cǂek cǂK ǂbqǂY Kiv |

KveǂǂUi evqy cǂek cǂK ǂbqǂY Kiv nq |

1. Gqvi ǂKbvi nǂZ cǂǂǂi evZǂm
2. cǂǂǂi evqy
3. ǂPǂK
4. ǂfbPǂi
5. ǂRU
6. ǂdǂU
7. ǂbWj fvjf
8. Rvjwb cǂek cǂ
9. ǂdǂU ǂjfvǂ
10. ǂdǂU ǂPǂǂi
11. evqy Rvjwbi ǂgkY
12. ǂUj
13. evqy Rvjwbi ǂgkY (Kǂkb ǂPǂǂi)

ǂPǂ 1.19 GKǂU mǂaviY KveǂǂUi

KveǂǂUi bǂji ǂfZǂii th Asǂki eǂǂm meǂPǂq Kg ǂm AskǂK ǂfbPǂi eǂj |

- 5 | ǂfbPǂi (Venturi) t KveǂǂUi bǂji ǂfZǂii th Asǂki eǂǂm meǂPǂq Kg ǂm AskǂK ǂfbPǂi eǂj | ǂfbPǂi AǂǂǂU ǂǂk miǂ dǂj G cǂǂ evqy cevǂnZ nevi mgq Gi MǂZǂem evǂo ǂKb Pǂc Kǂg evqyǂjxq Pǂcǂi ǂbǂP ǂbǂg hǂq |

ǂfbPǂi ǂVK mǂgǂb ǂRǂUi Aeǂǂb | ǂRǂU cevǂnZ RvjwbǂZ evqyǂjxq Pǂc KǂR Kǂi |

- 6 | ǂRU (Jet) t ǂfbPǂi ǂVK mǂgǂb ǂRǂUi Aeǂǂb | ǂRǂU cevǂnZ RvjwbǂZ evqyǂjxq Pǂc KǂR Kǂi | ǂKb Gi ǂVK mǂgǂb Aǂǂǂ ǂfbPǂi Aǂǂǂi evqy Pǂc evqyǂjxq Pǂc Aǂcǂǂ Kg ǂǂK | Ziǂ ǂRU cǂǂ nǂZ Rvjwb ǂfbPǂiǂZ cevǂnZ nǂZ ǂǂK | ǂfbPǂi Aǂǂǂi evqy cevǂni Pǂc DǂP MǂZi cǂǂǂ Rvjwb KYv, ǂjv ǂfsǂM evǂǂxq AvKvi aviY Kǂi Ges evqy mǂǂ ǂgǂkZ nq |

KvejUi nZ mjiŭi evq
I Rvjwb gkYi cevnK
bqšY K+i |

7| ₣_vU (Throat) t Pk Gi gZ ₣_vU I GK cKvi fvj f | GUv KvejUi nZ mjiŭi
evqyl Rvjwb gkYi cevnK bqšY K+i | ₣_vU fvj f hZB Ljy t`qv hvte KvejUi
nZ mjiŭi evq Rvjwb gkYi cigvY ZZB teo hvte |

KveյiU֊ii KvR

- 1| ԽմյjU֊i c֊qRb֊xq evq֊ Rvj֊bi ԽgkY mieivn Kiv|
- 2| Rvj֊bi KY֊,֊j֊K ֊fs֊M ev֊úxqKvi Kiv|
- 3| ev֊úxq Rvj֊b֊K Խb֊ ֊ó Ab֊v֊Z (mvaiYZ 15 f֊M IR֊bi evq֊ mv֊_ 1 f֊M IR֊bi Rvj֊b) evq֊ mv֊_ Խg֊kZ Kiv|
- 4| c֊qRb Ab֊v֊x Rvj֊bi Խgk֊Yi mieivn ev Ab֊v֊Z֊K K֊g֊q ev ev֊o֊q B֊Á֊bi M֊Z֊K Խbq֊SY Kiv|

֊úvK c֊M (Spark plug)

֊úvK c֊M cRjb c֊Kv֊ô ms֊Kv֊PZ I DĖB evq֊Rvj֊bi Խgk֊Y ֊e֊֊y֊ZK ֊úvK m֊ó K֊i k֊³ Drcb K֊i| ֊úvK c֊M mvaiYZ ֊mj G֊֊m֊j, MvDŪ B֊jK֊UvW, ֊m֊Uvi B֊jK֊UvW, ֊cv֊m֊j Bbm֊jUi, Zvg֊v M֊vm֊KU -G Ask,֊j֊v Խb֊q M֊VZ|

1. Uv֊gb֊j
2. ֊Kvi Bbm֊jUi
G֊֊m֊j
3. G֊֊m֊j
4. ֊mj G֊֊m֊j
5. ֊mĖ֊v B֊jK֊UvW
6. MvDŪ B֊jK֊UvW

ԽPĤ 20 GK֊U ֊úvK c֊M (j֊֊֊Q֊֊)

nvjK֊ B֊Á֊bi Rb֊ nU c֊M
e֊eüZ nq| ԽKb ֊K֊i c֊M
֊c֊Uv֊ B֊Á֊b e֊eüZ nq|

֊úvK c֊M Խefb Zvcg֊v֊i Rb֊ Dc֊h֊Mx| G Zvcg֊v֊i c֊ig֊Y Խb֊fi K֊i ֊úvK c֊M M֊vm֊K֊Ui g֊a֊֊g ֊K֊֊xq B֊jK֊Uv֊Wi Խb֊ c֊v֊֊i (cRjb c֊Kv֊ô) ֊֊Zi Dci| ֊K֊i ֊úvK c֊M֊i Zvc c֊ien֊Yi ֊֊Z Kg| nvjK֊ B֊Á֊bi Rb֊ nU c֊M e֊eüZ nq| ԽKb ֊K֊i c֊M ֊c֊Uv֊ B֊Á֊b e֊eüZ nq|

֊úvK c֊M hv֊Z ֊e֊k Mig bv
nq ev R֊j bv hvq ֊m֊֊֊K
mZK ֊vK֊ c֊qRb|

֊B֊ B֊jK֊Uv֊Wi g֊a֊eZ֊ ֊֊Z֊K ֊úvK M֊vc e֊j| G M֊vc ֊e֊k n֊j ֊úvK c֊M fv֊jfv֊e KvR K֊i bv| mvaiYZ GU֊v 0.50 ֊֊K 0.85 ֊mt Խgt n֊q ֊v֊K| evB֊ii B֊jK֊UvW evK֊v K֊i ֊úvK c֊M֊i M֊vc Խbq֊SY Kiv nq| A֊bK mgq ֊úvK A֊bq֊gZ nq| mvaiYZ GU֊v gq֊j֊v I f֊vsm֊v ev dv֊Uv ֊cvK c֊v֊Mi Rb֊ msN֊UZ n֊Z c֊v֊i| ֊K֊v ֊K֊v mgq ֊úvK M֊v֊ci g֊a֊֊ K֊eb Rgv n֊Z c֊v֊i| ZvB e֊env֊ii ci GU֊v c֊i֊v֊i Kiv ֊iK֊i| ֊úvK c֊M hv֊Z ֊e֊k Mig bv nq ev R֊j bv hvq ֊m֊֊֊K mZK ֊vK֊ c֊qRb|



mvigg t ֊c֊Uv֊ B֊Á֊b KveյiU֊ii m֊v֊֊h֊ ev֊úv֊qZ Rvj֊bi mv֊_ evq֊g֊kZ K֊i ԽմյjU֊i mieivn Kiv nq| ֊c֊Uv֊ B֊Á֊b Խefb Ask Խb֊q M֊VZ| ֊hgb - Pjb֊k֊j cavb Kv֊hK֊i Ask, Խefb ai֊bi Խeq֊is, UvB֊is ԽMq֊v, KveյiUi I ֊úvK c֊M |



cvVĚi gf`vqb 1.4

mVK DĚi i cvk UK Pý (√) `b|

1. KvejiUti tdlvUi Kiv Kx ?

- K) KvejiUti evqycevn bbqšY Kiv
- L) KvejiUti bbWj fvj fK KihKix Kti Rvjvb ctek c_K bbqšY Kiv
- M) KvejiUti tZj cevn bbqšY Kiv
- N) kxZjxKiY cvbi e`envi bbqšY Kiv

2. KvejiUti _U Gi Kiv Kx ?

- K) KvejiUti bbWj fvj fK KihKix Kti Rvjvb ctek c_K bbqšY Kiv
- L) KvejiUti evqycevn bbqšY Kiv
- M) KvejiUi nZ mmjŮti evqyl Rvjvb gkYi cevnK bbqšY Kiv
- N) KvejiUti tZtji cevn bbqšY Kiv

3. tKivU KvejiUti i Kiv bq ?

- K) mmjŮti evqyRvjvbi gkY mieivn Kiv|
- L) Rvjvbi KYv, tjtK tfsM evúxqKvi Kiv|
- M) evúxq RvjvbK bb`ó AbvtZ (15 fvM IRtbi evqy mv_ 1 fvM IRtbi Rvjvb) evqy mv_ gkZ Kiv|
- N) KvejiUti tZtji cevn bbqšY Kiv|

4. tKivU úK cvMi Kiv ?

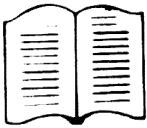
- K) KvejiUti bbWj fvj fK KihKix Kti Rvjvb ctek c_K bbqšY Kiv|
- L) KvejiUi nZ mmjŮti evqyl Rvjvb gkYi cevnK bbqšY Kiv
- M) Rvjvbi KYv, tjtK tfsM evlcxqKvi Kiv|
- N) cRjb cKvô msKpZ I DĚB evqyRvjvbi gkY e`yZK úK m_ó Kti k³ Drcb Kiv|

cV 1.5 W#Rj I t#Uvj B#Ä#bi cV_K

G cV t#k#I Av#b —



- W#Rj I t#Uvj B#Ä#bi cV_K ej#Z cvi#eb |
- W#Rj I t#Uvj B#Ä#bi Zvcxq ֿֿֿ jL#Z cvi#eb |
- W#Rj I t#Uvj B#Ä#bi Rvj#b LiP #baviY Ki#Z cvi#eb |
- t#Uvj I W#Rj B#Ä#bi K#kb Abg#Z, Zvc I P#ci c#igY #jL#Z cvi#eb |



(1) W#Rj B#Äb ev K#ackb ev BM#kb B#Äb - W#Rj B#Äb #mjÜ#i i #fZi ev#K AZŠ D”PP#c (40-45 t#R/eM #mt#gt) msK#Z Kiv nq| D”P P#ci d#j msK#Z evZ#mi Zvc t#to cvq t#winZZB ev 600⁰ t#j#mqvm nq| G Aeֿֿֿ A#KZi D”P P#ci W#Rj Rvj#b evÜvK#i Abg#tek (Inject) K#i#q tֿֿֿ nq| msK#Z evZ#mi D”P Z#c G Rvj#b Zrֿֿֿ c#jZ n#q hvq|

t#Uvj ev ÜvK BM#kb B#Äb Kve#iUi #bֿֿó Abg#Z t#Uvj I ev#y #gkY #Zi K#i Ges B#Äb #mjÜ#i Zv MnY I msK#Z K#i | #Kb msK#Z #gk#Yi P#ci W#Rj B#Ä#bi gZ D”P nq bv| ÜvK cv#Mi #m#hֿֿ msK#Z #gk#Y B#jK#UK ÜvK Drch Kiv nq| Üv#Ki d#j t#Uvj I evq# #gkY c#jZ n#q I#V| W#Rj I t#Uvj B#Ä#bi #eֿֿֿ Z Z#bv g#K Av#jPbv #b#ֿֿ cֿֿֿ Kiv n#jv t

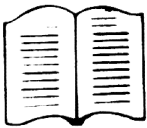
(2) t#Uvj ev ÜvK BM#kb B#Äb - t#Uvj ev ÜvK BM#kb B#Äb Kve#iUi #bֿֿó Abg#Z t#Uvj I ev#y #gkY #Zi K#i Ges B#Äb #mjÜ#i Zv MnY I msK#Z K#i | #Kb msK#Z #gk#Yi P#ci W#Rj B#Ä#bi gZ D”P nq bv| ÜvK cv#Mi #m#hֿֿ msK#Z #gk#Y B#jK#UK ÜvK Drch Kiv nq| Üv#Ki d#j t#Uvj I evq# #gkY c#jZ n#q I#V| W#Rj I t#Uvj B#Ä#bi #eֿֿֿ Z Z#bv g#K Av#jPbv #b#ֿֿ cֿֿֿ Kiv n#jv t

W#Rj I t#Uvj B#Ä#bi Z#vg#K Av#jPbv

W#Rj B#Äb	t#Uvj B#Äb
1 #mjÜ#i İay evZvm MnY K#i Ges Kve#iUi c#qvRb #bB	1 #mjÜ#i Rvj#b (t#Uvj) I evZ#mi #gkY MnY K#i Kve#iUi t#Uvj I evZ#mi #gkY #Zi K#i
2 msK#Z evZ#m c#j#bi Rbֿֿ Bb#R#i gvaֿֿֿg Rvj#b Bb#R# Kiv nq	2 msK#Z #gk#b #eֿֿֿZK ÜvK cvM c#jZ Kiv nq
3 Rvj#b #m#te W#Rj eֿֿֿZ nq	3 Rvj#b #m#te t#Uvj eֿֿֿZ nq
4 evZvm I Rvj#bi Abg#Z #bֿֿó bq	4 evZvm I Rvj#bi Abg#Z #baviYZ ag Ges Zv 15t1
5 ֿֿnb Kv#Ri Rbֿֿ #eֿֿֿr ev #eֿֿֿyZK d#j#Mi c#qvRb nq bv	5 ֿֿnb Kv#Ri Rbֿֿ #eֿֿֿr ev #eֿֿֿyZK ù#j#Mi c#qvRb nq
6 ms#KvPb Abg#Z 14t1 n#Z 20t1	6 ms#KvPb Abg#Z 4t1 n#Z 8t1
7 ms#KvPb P#ci 40 n#Z 45 t#R/eM #mt #gt	7 ms#KvPb P#ci 7 n#Z 10 t#R/eM #mt#gt
8 ms#KvPb Zvc cvq 600 ⁰ C (t#winZ ZB)	8 ms#KvPb Zvc 200 ⁰ C n#Z 300 ⁰ C
9 Zvcxq ֿֿֿZv 32-38%	9 Zvcxq ֿֿֿZv 25-32%
10 c#j#bi P#ci 50 n#Z 60 t#R/eM t#m#UigUi	10 c#j#bi P#ci cvq 20 t#R/eM t#m#UigUi

W#Rj B#Äb	t#Uvj B#Äb
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11 c34j#bi mgq cPž Zvc Drcb nq Ges Zvr¶bK Zvc cvq 2000°C	11 c34j#bi mgq ZžbvjK Kg Zvc Drcb nq Zvr¶bK Zvc cvq 1200°C
12 Rvjvb LiP Kg Ges `vg I Kg Rvjvb LiP 170-220 Mvg/ic, Gm,N>Uv	12 Rvjvb Li#Pi nvi #ek Ges Rvjvbi `vgI #ek LiP 220-330 Mvg/ic.Gm.N>Uv
13 i¶bv#e¶Y I tgingZ A#c¶KZ.R¶Uj	13 i¶bv#e¶Y I tgingZ ZžbvjK fv#e mnR
14 ¶W#Rj B¶Ä#b b¶Ks mgm`v Kg	14 b¶Ks mgm`v #ek
15 B¶Äb A#c¶KZ.eo AvKv#ii Ges fvix	15 B¶Äb A#c¶KZ.†QvU AvKv#ii Ges nvjKv



mvigg t ¶W#Rj B¶Ä#b ¶mijŮv#ii †fZi evqK AZ`š D`P P†c msKžZ Kiv nq| Rvjvb
¶n#m#e e`eüZ nq ¶W#Rj| Avi †c†Uvj B¶Ä#bi †¶†Î KvejiUi ¶b¶ó Abv†Z
†c†Uvj I evqy¶gkY ^Z¶i K†i Ges ¶mijŮvi Zv Mm I ms†Kv¶PZ K†i| Rvjvb
¶n#m#e e`eüZ nq †c†Uvj|



c_v†V_iĒi g_f˘vqb 1.5

m₁VK DĒ†i i c_v†k $\mathbb{U}K$ $\mathbb{P}\acute{y}$ ($\sqrt{}$) $\mathbb{V}^b|$

1. $\mathbb{W}^{\dagger}Rj$ B₁Ä_†b A_v†Q K_x ?

K) $\overline{\dot{u}}vK$ c_vM

L) K_ve_†j_iU_i

M) B_b†R_±i

N) B_Mkbk_b $\mathbb{m}^{\dagger}\acute{o}g$

2. $\dagger c^{\dagger}Uvj$ B₁Ä_†b K_x A_v†Q?

K) K_ve_†j_iU_i

L) B_b†R_±i

M) $\overline{\dot{u}}vK$ c_vM

N) $d_{\dot{z}}j$ c_vú

3. $\dagger c^{\dagger}Uvj$ B₁Ä_†b e_vq_y† R_vj_vbi $\mathbb{g}k^{\dagger}Yi$ A_b†Z KZ ?

K) 14 t 1 n_†Z 20 t 1

L) ae Ges Z_v 15 t 1

M) 4 t 1 n_†Z 8 t 1

N) 32-38%

4. $\mathbb{W}^{\dagger}Rj$ B₁Ä_†bi R_vj_vbi c_vi_gvY KZ ?

K) 220 - 330 M_vg/†c.Gm.-N_vU_v

L) 50-60 †K_vR/eM †m_vU_vgU_vi

M) 170-220 M_vg / †c.Gm.N_vU_v

N) 20 †K_vR/eM †m_vU_vgX_vi

5. $\dagger c^{\dagger}Uvj$ B₁Ä_†bi R_vj_vbi c_vi_gvY KZ ?

K) 170-220 M_vg/†c.Gm.N_vU_v

L) 50-60 †K_vR/ eM †m_vU_vgU_vi

M) 20 †K_vR/eM †m_vU_vgU_vi

N) 220 -330 M_vg/ †c.Gm.N_vU_v

6. $\mathbb{W}^{\dagger}Rj$ I †c_v†Uvj B₁Ä_†bi Z_vc_xq `†Z_v n_†Q KZ ?

K) 600°C Ges 1200°C

L) 2000°C Ges 1200°C

- M) 32-38% Ges 25-32%
- N) 170-220 Mig/c.Gm.N>Uv

Uaj f c+qU tiÂ	cvšš i t fZ+ii w`+K 12U LuR (Notches) ev c+qU _v+K  Zvi th +KvbU w`+q bvU+K Atkto ai+Z cv+i -í c+im+i GwU+K +Nviw+Z tek Dc+hvMx
GWRv- +÷ej I+cb GÜ tiÂ	G cKvi ti+Âi 1wU +Pvqvj+K mwi+q th +Kvb mvB+Ri bvU+K Avkto aiv hvq
wj fvi +Rv tiÂ	G cKvi ti+Â GWRv+÷ej +Pvqvj Av+Q, hv w`+q +Kvb wKQyAtkto aiv Ges tm Ae-vq jKW (Locked) K+i iVLv hvq GKB m+ G+K ti+Â, K'vau cvqvi ev fvBm wntm+e e"envi Kiv hvq
wU- m+KU tiÂ	Gi MVb Bs+iRx T Gi gZ Gi tLvjv cvšš i MZU w+fb AvK+Zi n+Z cv+i thgb PZ+Kvb, Ió +Kvb, Aó +Kvb -í c+im+i thLv+ Ab" mvaviY ti+Â KvR Kiv hvq bv, tm t+í+í GUv e"eüZ nq gv_vq Aev-Z n+v+Üj+K Ny+q Kv m+uv`b Kiv nq

wcb-	gvSLv+b wQ` hy eo
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ûK f̄úbv̄i †iÂ	†Mvj bv̄U†K A†K†o aivi Rb̄ ḠU ēeüZ nq Gi cb U bv̄U†i Q†`i g†ā X̄K KvR K†i
†n†jv †mU ǀǃz †iÂ	GUv T m†K†Ui cvq Abȳc †hLv†b m†K†U KvR Kiv hvh bv, †mLv†b KvR Kiv nq
Ad†mU m†KU †iÂ	G †iÂ m†KU UvBc ev I†cb GŪ UvB†ci ntZ cv†i bvU ev tev̄ UvBU bv nIqv chŠ GUv miv†bv̄i `iKvi c†o bv
īv̄†PU †iÂ	Gi gv̄_v̄i m†KU †nW ǀǃz Ió†Kvbx AvK̄Zi n†q _v†K G†K †n´ K (Hex key) ev G†jb (Allen) †iÂ I e†j
†÷c †iÂ	GUv †Pv̄MK̄Zi cvUm†K ev cvBc Gi c†t`k A¶ b †i†L KvR K†i
cvBc †iÂ	GWRv†÷ej †Pvqv̄j `†q †MvjvKvi cvBc ev †Pv̄½vK̄Zi

UK tiÂ	cvUm#K AtKto a#i KvR Kiv nq bvU#K #Nviv#Z GUv e"eüZ nq Gi n"v#Ü#j "vcZ k3 vb#`k Wqvj ev f"j ntZ c#qvRbxq k3i c#igvY Rvbv h1q
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cvqvm (Pliers)

cvqvm nt"Q GKK Uzji (Tool) eû ePibK b1g| GUv eû ÷vB#j wefb Kv#Ri Dc#hWx K#i
%Zvi Kiv nq| cvqvm#K KL#bv ti#Âi c#ietZ e"envi Kiv D#PZ bq|

wefb ai#bi cvqv#mi b1g, Q#e, c#i#P#Z I e"envi

cvqv#mi Q#e b1g ú#c R#q>U cvqvm b#Wj tbvR cvqv#i	c#i#P#Z I e"envi n1Z "q aiv h1q bv Ggb tQvU #KQy#Mvj `Ü, cvBc BZ"v Av#to ai#Z Bnv e"eüZ nq </p> <p>G Bg#cvqv#mi nvjKv t#b1R ev tPqvj Av#Q  GUv e"yZK t#i I ti#Wl t#igvZ Ki#Z we#kl K#i Ack ev msKxY #ž hšvsk (#Mvj `Ü, cvBc ev Zvi) vcb ev mi#Z e"eüZ nq
--	---

vjb#gbm mvBW KvUs	Gi tPqv#ji cv#Š KvUs teWm (blades)
----------------------------------	---

cvqi	AvQ GUv Zvi KvU#Z, AvKto ai#Z I evKv#Z e'eüZ nq GUv GK cKvi we#kI ai#bi cvqm Lg gm,Yfv#e ^e`yZK Zvi KvU#Z I dWj Z#Z e'eüZ nq
Wqv#Mbv- jm	

we#b ai#bi nvZoi bvg, Qie, cvi#Piz I e'envi

U#mi bvg	Qie	cvi#Piz I e'envi
mdU n`gvi		G ai#bi nvZoi mg gv_v mWjW mxmv, Kcvi, teUeU w`#q ^Zwi GUv big avZe KvhsK#K gm,Y Ki#Z ev ewin"K Acv#ik#b e'eüZ nq
cvi÷K #dmW mdU n`gvi		G ai#bi nvZoi gv_vi #kI cvš- cvi÷K ev A#kwaZ PigoV w`#q AveZ _v#K  GUv g`v#jUm bv#gI cvi#PZ GUvI big avZ#K gm,Y Ki#Z e'eüZ nq

ej-||cb
n`vgvi

GUv k³ Kveb
÷xj ||`tq %Zvi
Ges c`v_#K
||b||ó #kc Ges
mvBR ||`tZ
e`eüZ nq| Gi
dvU †dB†P
mvaivY Kv†R
Ges †MvjvKvi
||e`xb I LvR
KvU†Z e`eüZ
nq|

†÷BU
||cb
n`vgvi

Gi n`v†Ü†ji
mgvšivj ||cb-
GÜ i†q†Q| GUv
||e`xY, avZe
c`v†_ Mfxifvte
`vM KvU†Z
e`eüZ nq|

µm ||cb
n`vgvi

GUv ||e`xY, avZy
j_{av} Ki†Z I
avZ†Z `vM
KvU†Z e`eüZ
nq|

K-
n`vgvi

GUv ||`tq QZ†ii
KvR Kiv nq|

||e||fb ai†bi ~||z||Bfvi Gi bvg, Qie, c||i||PiZ I e`envi

KivZ GK we#kl ai#bi n`vU Uzm (Hand tool) hv v`#q avZe c`v_ (metal) KvUv Qvov I
eûgla KvR Kiv hvq| GuU GKvU tdg (Frame) v`#q MvVZ hvi tkl cv#š vK#ci (clip)
mvin#h" KvUs teW (Blade) hy _v#K|

Kiv#Zi teW cvZjv ÷x#ji %Zvi hvi cyz cvq 0.027 BvÂ Ges ck-Zv 0.5 BvÂ| Guv
weifb ^`#N`i, 6 n#Z 12 BvÂ chš n#Z cv#i| Gi aviv#jv cv#š LvB KvUv `v# Av#Q| Gi
`jcv#ši M#Zi tK>` n#Z ^`N" cwigvc Kiv nq| mKj Kiv#Z GKB ai#bi teW e`envi Kiv
nq bv| cvZ BvÂ#Z mvariYZ 14 n#Z 32 vU `v# _v#K|

vPÎ GKvU KivZ

vPÎ GKvU n`vK#mv



KuL.I c jx Dbqb ̄q̄

cv#VvĚi gf'vqb 1.6

mVK DĚ†ii cv#k UK Pý (√) 'b|

1. tKvb †iÂ†K GKB mv†_ †iÂ, K'vú, cvqvi ev fvBm †n†m†e e'envi Kiv hvq ?

K) GWRv†÷ej I†cb GŮ †iÂ|

L) Uqj f c†q>U †iÂ|

M) Wej G†ŮW †iÂ|

N) †j fvi †Rv †iÂ

2. tKvb cKvi †iÂ †q GKU †Pqvj†K m†i†q th tKvb mvB†Ri bvU†K AvK†o aiv hvq ?

K) Xqj f c†q>U †iÂ|

L) GWRv†÷ej †iÂ|

M) †i†PW †iÂ|

N) †U-m†KU †iÂ|

3. Ack̄ ev msKxȲ v†b †ÿ hšvsk̄ vcb ev miv†Z †Kvb cvqvi e'eüZ nq ?

K) †úc R†q>U cvqvi

L) †bWj †bvR cvqvi

M) †j †b†gbm mvBW KvUs cvqvi

N) Wq†Mbvjm

4. c`v\_†K †b`ó tkc (Shape) Ges mBR †Z †Kvb ai†bi n'vgvi e'eüZ nq ?

K) ej-†cb n'vgvi

L) †÷BU †cb n'vgvi

M) mdU n'''gvi

N) cv÷K †dBPW mdU n'vgvi

5. KivZ †e†W cZ BvÂ†Z m†aviYZ `vZi msL'v KZ ?

K) 0.027 n†Z 0.50 †U

L) 14 n†Z 32 †U

M) 50-60 †U

N) 6 n†Z 12†U|



Ppš gj'vqb

iPbv gjK ck

- 1| t÷vK ej†Z ‖K †ev†Sb ?
- 2| 4-†÷vK I 2-†÷vK m‖B†Kj B‖Ä†bi Kgc×‖Z eYbv Ki†|
- 3| BM‖bkb ‖K ?
- 4| 4-†÷vK I 2-†÷vK m‖B†Kj B‖Ä†bi cv_K'', †jv ‖K ?
- 5| ‖W†Rj B‖Ä†bi ca‖b Kv‖Kix Ask, †jvi b‖g ‖jLb?
- 6| dvBûB†ji KvR ‖K ?
- 7| Bb†R±†ii KvR ‖K ?
- 8| 7úvK cvM ‖K ?
- 9| K‖ey†U†ii KvR ‖K ?
- 10| ‖W†Rj I †c†Uj B‖Ä†bi cv_K'' ‖K ?



DËigjv

BD‖bU-1

c†WËi gj'vqb 1.1

- 1) M 2) N 3) M 4) L 5) M 6) K 7) L

c†WËi gj'vqb 1.2

- 1) L 2) M 3) L 4) L 5) L

c†WËi gj'vqb 1.3

- 1) M 2) L 3) L 4) M 5) N 6) L 7) M

c†WËi gj'vqb 1.4

- 1) L 2) M 3) N 4) N

c†WËi gj'vqb 1.5

- 1) N 2) L 3) L 4) M 5) N 6) M

c†WËi gj'vqb 1.6

- 1) N 2) L 3) L 4) K 5) L

BilÄbtK teik kxZj Ki+j
Gi Kh`qZv Ktg hvq|
ZvB, BilÄbtK GKU ubl`ó
ZvcgvÎv chš kxZj Ki+j
nq|

Avevi BilÄbtK teik kxZj Ki+j Gi Kh`qZv Ktg hvq| ZvB, BilÄbtK GKU ubl`ó
ZvcgvÎv chš kxZj Ki+j nq| G ubl`ó ZvcgvÎvK KhKix ZvcgvÎv (Working
temperature) e+j| msKivPb Kxkb cμqvq mō tgvU Zvci 30-35 kZisk Zvc`y K+i
I fvi mUs (Over Heating) RlbZ Kvi+y BilÄbi hšvsk, +jv qZi nvZ t_K i qvi Rb",
jg A+q+j i agtK AqL tiL jye+KUs m+g+K Kgqg iLv i Rb" Ges th tKvb
AvenIqvq, +jvW KÜk+ b I ú+W BilÄbtK GKU AcieZZ (Constant) KhKix
ZvcgvÎvq tiL mtev" P Zvcxq` qZvq GtK ciPvjZ KivB BilÄb kxZjKi+y i Dtk"

BilÄb kxZjKi+y i c+qRbxqZv

- BilÄbi Kh m+u`+bi Rb" mVK ZvcgvÎv eRvq iLv|
- `nb Ktq` n+bi d+j Drcb AZi³ Zvc AcmyiY Kiv|
- Rvjvbi ceRjb Ges BilÄbtK e+üviY n+Z i qv Kiv|
- BilÄbi hšvsk i gta" mVK Zjv³ KiY (Lubrication) eRvq iLv|

BilÄb kxZjKi+y i gjbZ

AZlaK WÜv I AZi³
Mig`jvB BilÄbi Rb"
qZKviK|

BilÄb kxZjKiY cxiZi gjbZ n+Q- BilÄbi RvKtU ciigZ WÜv cwb ev eqymieivni
gva+g BilÄbtK WÜv iLv| AZlaK WÜv I AZi³ Mig`jvB BilÄbi Rb" qZKviK|
mviYZ kxZjKiY cxiZi gva+g tctUvj BilÄb ZvcgvÎv 71°C n+Z 80°C Ges WtRj
BilÄbi ZvcgvÎv 88°C n+Z 90°C Gi gta" bqšZ n+q vK| kxZjKiY cxiZiZ cwb
cevni DòZv ctek c+ 35°C n+Z 45°C Ges engyL 70°C n+Z 80°C n+q vK|

BilÄb kxZjKiY cxiZmgv

BilÄbtK eifbfvte kxZjKiY Kiv hvq| Avm+ Avgiv BilÄb kxZjKi+y i cxiZ, +jv tR+ b
tbB|

BilÄbtK cavbZ eqykxZjKiY cxiZ (Air cooling system) Ges cwb kxZjKiY cxiZ
(Water cooling system) -G`cxiZiZ kxZj Kiv hvq|

K) eqykxZjKiY cxiZ (Air cooling system)

G cxiZiZ cej eqycevn
mviYi tn+Wi PZtK
cevniZ Kiv nq|

G cxiZiZ cej eqycevn mviYi tn+Wi PZtK cevniZ Kiv nq| mviYi PZtK
e+nfvtM gvtQi cLvbi b+vq AmsL" db (Fins) ev ie %Zi K+i mviYi Ktj s mvi+dm
Giqv (Cooling surface area) evovb Kiv nq| G db, +jv Zvc m+ievn avZvni %Zi |
d+j mviYi ZvcgvÎv GtZ ciievnZ nq Ges db, +jv cPz cigv+ b tLv jv evZv+mi
msú+k Gtm mviYi kxZj nq| BilÄbi msú+k kxZj eqyMig n+q EaMvgx nq Ges
kxZj eqyZv c+y K+i | tKvb tKvb BilÄb cZ" q eqymAvj+bi Rb" μvsk kvd+Ui GK
cvtš d'vb ev tevqi mshy vK, hv eqyciPvjvni gva+g db, +jvK kxZj K+i BilÄbtK
AiaK DòZv n+Z i qv K+i |

mviY eqykxZjKiY cxiZ
e+üZ nq - gUi mvtKj,
+bi e+üZ nvjKv
BilÄb, +jvZ KQmsL"K
Mvxi BilÄb, D+ovRvniRi
BilÄb Ges tQvU ai+bi k³
cKt |

mviY eqykxZjKiY cxiZ e+üZ nq - gUi mvtKj, +bi e+üZ nvjKv BilÄb, +jvZ
KQmsL"K Mvxi BilÄb, D+ovRvniRi BilÄb Ges tQvU ai+bi k³ cKt | gUi mvtKj
I +bi t+q Gt i m+ MvZ`tq chvB evZv cqv| AvaybK Kvj KQyU+bi G

Lvgvi hšcviZ

K₁/I I c j x Dbqb $\bar{q}$

c $\times$ U Z e $\bar{e}$ üZ n $\dagger$ Q| G c $\times$ U Zi Zvc c $\parallel$ ie $\parallel$ nZv $\parallel$ bfi K $\dagger$ i $\parallel$ dbm Gi mvi $\dagger$ dm G $\parallel$ iqv (Fins surface area), B $\parallel$ Ä $\dagger$ bi M $\parallel$ Z I W $\hat{U}$ v e $\parallel$ Z $\dagger$ mi c $\parallel$ igvY Ges $\parallel$ dbm (Fins) I e $\parallel$ Z $\dagger$ mi Zvcg $\hat{v}$ i $\hat{v}$ i Dci| e $\parallel$ qyK $\times$ Zj $\times$ KiY B $\parallel$ Äb c $\parallel$ ib k $\times$ Zj $\times$ KiY B $\parallel$ Äb A $\dagger$ c $\parallel$ v Mig $_v$ $\dagger$ K Ges fvi $\times$ %Zj $\vee$ ³KviK $\dagger$ Zj $\`$ iKvi nq|

$\parallel$ P $\hat{I}$ 2.1 e $\parallel$ qyK $\times$ Zj B $\parallel$ Äb

e $\parallel$ qyK $\times$ Zj $\times$ KiY c $\times$ U Z e $\bar{e}$ n $\dagger$ i $\parallel$ KQym $\parallel$ ea' I Am $\parallel$ ea' i $\dagger$ q $\dagger$ Q| Av $\parallel$ m $\parallel$ g, Av $\dagger$ j $\vee$ Pbv i gva $\bar{\dagger}$ g Avgi $\vee$ Zv $\dagger$ R $\dagger$ b $\dagger$ bB|

m $\parallel$ ea'

- MVb cK $\parallel$ Z m i j
- IR $\dagger$ b n $\vee$ jK $\vee$ Ges AvK $\vee$ $\dagger$ i $\dagger$ Q $\vee$ U| G $\dagger$ Z c $\parallel$ ib k $\times$ Zj $\times$ KiY B $\parallel$ Ä $\dagger$ bi gZ Iq $\vee$ U $\vee$ i R $\bar{\vee}$ $\dagger$ KU (Water Jackets), $\dagger$ i $\parallel$ W $\dagger$ qUi (Radiator) m $\vee$ K $\dagger$ j $\parallel$ Us c $\vee$ ρ $\hat{u}$ (Circulating pump) Ges k $\times$ Zj c $\parallel$ bi c $\dagger$ qvRb c $\dagger$ o b $\vee$ |
- %Z $\parallel$ i $\dagger$ Z LiP Kg Ges i $\parallel$ Y $\vee$ $\dagger$ e $\parallel$ $\dagger$ Y $\dagger$ Zgb hZ $\parallel$ b $\dagger$ Z nq b $\vee$ |
- G c $\times$ U Z $\dagger$ Z c $\parallel$ ib e $\bar{e}$ üZ nq b $\vee$ e $\dagger$ j L $\parallel$ g V $\hat{U}$ v Aven $\vee$ Iq $\vee$ q eid Rg $\vee$ i m ρ $\vee$ b $\vee$ $\dagger$ bB Ges $\dagger$ K $\vee$ b G $\parallel$ $\vee$ U $\parallel$ d $\dagger$ Ri (Antri Freez) c $\dagger$ qvRb nq b $\vee$ |
- G c $\times$ U Z $\dagger$ Z h $\vee$ $\parallel$ S $\hat{K}$ $\hat{I}$ $\parallel$ U L $\parallel$ g Kg $\dagger$ $\`$ L $\vee$ h $\vee$ q|

Am $\parallel$ ea'

- B $\parallel$ Ä $\dagger$ bi mKj Ask mgvb f $\vee$ $\dagger$ e k $\times$ Zj nq b $\vee$ | d $\dagger$ j $\parallel$ m $\parallel$ j $\hat{U}$ $\vee$ i I $\parallel$ m $\parallel$ j $\hat{U}$ $\vee$ i $\dagger$ n $\dagger$ Wi $\parallel$ eK $\parallel$ Z NU $\dagger$ Z c $\vee$ i|

- cvLvi e`envi Ges IqvUvi R`vKv bV _vKvq G ai#bi BÄb tMvjgvcY e`Njy kã KiZ cv#i |
- eû mmi jÛvi (Multi cylinder) eekó BÄb#bi t#t#t mjeaRbK bq |
- evqykZjKiY c×Z cvb kxZjxKiY c×Z A#c#v Kg `# |

L) cvb kxZjxKiY c×Z (Water cooling system)

BÄb Awi i³ DËB Ges KvKix ZvcgvÎv bqšY K#i cY Kg `#Zv t#Z cvb kxZjxKiY c×Z e`envi Kiv nq | cvb kxZjxKiY c×Zi msÁv Avgiv b#v³ fv#e #`Z cwi | th c×Z#Z BÄb#bi DËB Ask, #jv#Z (mmi jÛvi jvBbvi I cRjb tPav#ii PZ#K) kxZj cvbi cev eRvq #i#L BÄb#K kxZj iLv nq, Z#K cvb kxZjxKiY c×Z ejv nq |

cvb kxZjxKiY c×Z#Z mmi jÛvi tnW I e#Ki #fZi cvb cev#ni iv`\_v#K | G#K IqvUvi R`vKv ejv nq | c#j#bi D`P P#ci cfv#e IqvUvi R`vKv#U cvb DIB nq | G DËB cvb#K #iW#qUi kxZj K#i Avevi IqvUvi R`vKv#U cvv#bv nq | mg` c#μqW e#fb fv#e maúb nq |

cvb kxZjxKiY c×Z#K b#j#LZ PviU fvM fvM Kiv hvq |

- 1 mivmvi cvb kxZjxKiY c×Z (Non - Return Water Cooling system)
- 2 _v#gv-mvBdY cvb kxZjxKiY c×Z (Thermo-syphone water cooling system)
- 3 I#cb tnvcvi cvb kxZjxKiY c×Z (Open Hopper water cooling system)
- 4 cv#ú ev t#vm mvK#jkb cvb kxZjxKiY c×Z (Pump or Force circulation water cooling system)

Avmb Av#jvPbvi gva`tg Avgiv G, #jvi Kv c×Z maú#K AewZ nB |

1) mivmvi cvb kxZjxKiY c×Z (Non-Return water cooling system)

thLv#b cP# cvb gIRy
Av#Q tmLv#b G c×Z e`envi
Kiv nq |

G c×Z#Z cvb#K mivmvi BÄb#bi mmi jÛvi cvv#bv nq Ges Mig cvb mivmvi tei K#i t`qv nq | G#t#t Mig cvb cbivq kxZj K#i e`envi Kiv nq bv | thLv#b cP# cvb gIRy Av#Q tmLv#b G c×Z e`envi Kiv nq | í nm cvIqv#ii (H.P.) t#P cv#ú hy BÄb n#`Q G c×Zi GKU D`vniY |

2) _v#gv-mvBdY cvb kxZjxKiY c×Z (Thermo-syphone water coling system)

DËB cvb maúmv#Yi gva`tg
nvjKv n#q Ic#ii #`K hvq |
Acic#t kxZj cvb fvix
nIqvq b#Pi #`K t#g Av#m |
Av#m |

DËB cvb maúmv#Yi gva`tg nvjKv n#q Ic#ii #`K hvq | Acic#t kxZj cvb fvix nIqvq b#Pi #`K t#g Av#m | G Z#I Dci #f# K#i \_v#gv-mvBdY cvb kxZjxKiY c×Z Kv maúv`b K#i |

_v#gv-mvBdY cvb kxZjxKiY c×Z b#j#LZ Ask, #jv b#q MvZ t

- #iW#qUi (Radiator) t cvb avib K#i | Gi Ic#ii As#k Mig cvb Ges b#Pi As#k vÛv cvb _v#K | gvSLv#b tQvU tQvU #Q` \_v#K | hv tXD#qi gZ Ges G#K c`v#mR e#j | hvi g#a` #`q cvb Avmvi mgq kxZj nq |

K₁/I c jx Dbqb ⁻q̄

- d^{vb} (Fan) t t i W t q U t i i c w b t K k x Z j K i v R b d^{vb} e^{en}vi K i v n q | m v a v i Y Z t i W t q U t i i g a e i v e i G K c v t k G U v e^{en}vi K i v n q |
- t n v R c v B c (Hose pipe) t t i W t q U i n t Z B i A b e t K c w b M g b M g b i c t K t n v R c v B c e t j |
- I q v U v i R v t K U (Water jacket) t m m j U v i e K A v r m m j U v i i e n i v e i t Y i m v t G K U k b v b, h v P v i c v t k A v e x v t K | G t K I q v U v i R v t K U e t j | m v a v i Y Z k x Z j c w b G R v t K t U i g a v t q M g b K t i G e s m m j U v i i e n i v e i Y k x Z j K t i |

K. t i W t q U i,
L. t n v R c v B c,
M. d^{vb},
N. m m j U v i,
O. I q v U v i R v t K U,
P. t U g c v t i P v i t M R

W P I 2.2 v t g v - m v B d Y c x Z

K i h c Y m j

c w b m A v j t b i R b G
c x Z t Z t K v b c v a u
e^{en} v t i i c t q v R b n q b v |

c t g I q v U v i R v t K t U i g a k x Z j c w b t n v R c v B t c i g v a t g c t e k K i v t b v n q | G c w b D E B m m j U v i t n W I B i A b e t K i Z v c t k v I Y K t i D E B n q | D E B c w b m a u m v i t Y i g v a t g n v j K v n t q I c t i i v t K D V t Z v t K | A Z t c i G D E B c w b I q v U v i R v t K t U i t i W t q U t i i t n v R c v B t c i g v a t g m v B d i b s (Syphoning) m u q v i d t j t i W t q U t i A v t m | t m L v t b e v q y c w i t e v Z b t j i g a v t q c e v n Z n q G e s d^{vb} v t q c e v n g v b e v Z t m i m v n v t h I t i W t q U t i i g a v e i K i Y c m u q v i m v n v t h D E B c w b k x Z j n q | k x Z j n I q v i d t j I R t b f v i x c w b t i W t q U t i i b e f v t M i c v t m R v t q t i W t q U t i i b t P i A s t k P t j A v t m | c w b m A v j t b i R b G c x Z t Z t K v b c v a u e^{en} v t i i c t q v R b n q b v | h L b n v j K v c w b R v t K U n t Z t i W t q U t i P t j A v t m Z L b R v t K t U i b v Z v i m u o n q | G i b v Z v i K v i t Y t i W t q U t i i b t P i A s t k R g v K Z . k x Z j c w b t n v R c v B t c i g v a t g c b i v q I q v U v i R v t K U c t e k K t i | B n v c b i v q D E B n q G e s t i W t q U t i k x Z j n t Z v t K | G f v t e G c m u q v U c h v q m t g P j t Z v t K | G c x Z U v t i I A b v b v q x f v t e A e v b i Z B i A b e e u Z n q |

v t g v - m v B d Y c w b k x Z j K i Y c x Z e^{en} v t i i K Q y m y e a v I A m y e a v i t q t Q | A v m y A v t j v P b v i g v a t g A v g i v Z v t R t b t b B | G c x Z i m y e a v I A m y e a v t j v b a i c t

m y e a v

- G c x Z m K j f v i x B i A b e e u Z n q |
- G t Z m m j U v i i Z v c g v i v G K U v b v o m x g v q e R v q v t K |
- c w b A v Z v v U v n q G e s A i c i g v Y c w b i c t q v R b n q |
- c v a u v K v i d t j c w b i c e v n v q x v t K |

A m y e a v

- G c x Z K Q y R U j |

- *tiWtqUi* m³ c_vBc ev *db* bó n_j G c_xZ †Zgb K_{ih}K_i f_{ig}K_v cvjb Ki†Z cv†i b_v|

I†cb †nvc†i kxZjxKiY c_xZ (Open Hopper water cooling system) t

G c_xZ _v†g_vm_vBdb kxZjxKiY c_xZi Abj†c K_{vh} m_áú_v b K†i| *I†cb †nvc†i* kxZjxKiY c_xZ†Z m_mj_Uvi Ges m_mj_Uvi †n†Wi P_{vi} i_v†K IqvUvi R_v†KU _v†K| GK_U D_áj *iRvfi* (Hopper) n†Z c_vb IqvUvi R_v†K†Ui i_v†K c_{ev}nZ nq| IqvUvi R_v†K†Ui c_vb D_Ėß n†q m_áú_vi†Yi g_{va}†g n_jK_v n†q *iRvfi* (Hopper) i_v†K c_{ev}nZ nq| †mLv†b d_žš c_vb ev_ú n†Z _v†K| ev_ú Z_{vi} ev_úxq m_žZ_vc†K (537 Kcal) H d_žš c_vb n†Z MnY K†i| d†j d_žš c_vb kxZj nq| G c_xZ†Z c_vb AbeiZ ev_ú n†Z _v†K e†j *KQY* ci ci *iRvfi* ev †nvc†i (Hopper) c_vb th_vM Ki†Z nq| G c_xZi m_vm_i e_{envi} eZg_v†b †bB ej†jB P†j|

K. †nvc†i,
L. m_mj_Uvi,
M. i_vc ÷ b,
N. IqvUvi R_v†KU

†PĖ 2.3 I†cb †nvc†i kxZjxKiY c_xZ

4| c_vú ev †d_vmW m_vKzjkb c_vb kxZjxKiY c_xZ (Pump or Forced circulation water cooling system):

G c_xZ_U me†P†q †e_{ik} K_{ih}K_i Ges Pjš B_Ė†b e_{ev}üZ nq|

c_vú ev †d_vmW m_vKzjkb c_xZ†Z B_Ė†b kxZj K_{ivi} R_b† th hš e_{envi} K_{iv} nq, Z_{vi} M_vb _v†g_vm_vBdb h†š_i c_vq Abj†c| Z†e G c_xZ *KQY* DbZ Ges G†Z *KQY*†Z_i ³ Ask †_v L_v h_vq| G c_xZ_U me†P†q †e_{ik} K_{ih}K_i Ges Pjš B_Ė†b e_{ev}üZ nq| M_vox, (Cars) U_†m (Tracts) U_†im (Tractors) BZ_v† B_Ė†b kxZjxKi†Y G c_xZ e_{ev}üZ nq|

K. *tiWtqUi*
†cm_vi K_vc
L. _v†g_vUvi,
M. _v†g_v ÷ v_U

†PĖ 2.4 c_vú ev †d_vmW m_vKzjkb c_vb kxZjxKiY c_xZ

G c_xZ†Z i_b†_v ³ Ask, †j_{vi} K_{ih}K_{vi} Z_{vi} g_{va}†g B_Ė†b kxZj nq -

- IqvUvi* c_vú (Water pump)
- d_vb* (Fan)
- tiWtqUi* Ges †cm_vi K_vc (Radiator and pressure cap)

L_vg_{vi} hšc_vZ

K₁/I c jx Dbqb $\bar{q}$

- iv) d^{vb} teë (Fan belt)
- v) Iq^{Uvi} R^{vb}KU (Water jacket)
- vi) $\bar{v} \div \bar{v}U f v j f$ (Thermostat valve)
- vii) t^Uúv^tiP^{vi} tMR (Temperature gauge)
- viii) tⁿvR c^vBc (Hose pipe):

Iq^{Uvi} c^vú (water pump)

c^vb^tK B^üÄb e^tK t^ciY
Kivi Rb^ü Iq^{Uvi}
t^mU^üdDM^j c^vú e^üenvi
Kiv nq|

c^vb^tK B^üÄb e^tK t^ciY Kivi Rb^ü Iq^{Uvi} t^mU^üdDM^j (centrifugal) c^vú e^üenvi Kiv
nq| GU^v k^xZj c^vb Mg^tbi tⁿvR c^vB^tcⁱ g^a t^mj^üvi e^tKi mvg^tb $\bar{v}$ ^tK| G c^vú b^tav³
Ask, t^jv b^tq M^vZ|

- 1| e^W (Body or casing)
- 2| Bg^tcj^üvi (Impeller or Rotor)
- 3| k^üdU (Shaft)
- 4| $\bar{v}$ eq^vis (Bearing or Bush)
- 5| Iq^{Uvi} c^vú m^j (Water pump seal)
- 6| c^y (Pulley)

tⁱW^tqU^tii b^tPi As^tki m^t c^vú m^vKkb m^vBW (Suction side) h^y $\bar{v}$ ^tK| k^ü³
 μ ^üsKk^üd^tUi (Crankshaft) t^klvsk n^tZ c^yi g^a t^g c^vú $\bar{u}$ ^üt^j (Pump spindle)
U^vY^dvi (Transfer) nq|

d^{vb} (Fan)

m^vavⁱYZ d^{vb} c^vú c^yi m^t tⁿvi| $\bar{v}$ KQyB^üÄb Aveⁱ d^{vb} mⁱv^mi μ ^üsKk^üdU Gi
m^t h^y $\bar{v}$ ^tK| GU^v $\bar{y}$ ^vte B^üÄb^tK k^xZj K^ti|

- g^y e^vZ^m tⁱW^tqU^ti ce^vn K^ti Gi k^xZj^xKiY e^üo^tq t^üq|
- $\bar{v}$ eⁱx e^vZ^m B^üÄbⁱ e^vB^tii As^tk ce^vn K^ti k^xZj^xKi^tYi $\bar{v}$ ^üZ^v e^üo^tq t^üq|

tⁱW^tqUi (Radiator)

B^üÄb c^üÄ Mig c^vb k^xZj
Kivi D^ti^tk^ü tⁱW^tqUi
e^üüZ nq|

B^üÄb c^üÄ Mig c^vb k^xZj Kivi D^ti^tk^ü tⁱW^tqUi e^üüZ nq| Gi cav^b $\bar{v}$ Zb^üU Ask n^tjv
D^pz^üv^sK (Upper tank), $\bar{v}$ bPz^üv^sK (Lower tank) I $\bar{v}$ UDem (Tubes)| B^üÄb c^üÄ Mig
c^vb D^pz^üv^sK n^tZ $\bar{v}$ UD^tei g^a t^g $\bar{v}$ b^tP P^tj Av^tm| $\bar{v}$ UD^tei PZ^ü^tKi $\bar{v}$ db Mig c^vb n^tZ
Z^vc MnY K^ti| A^üZ^vi³ c^vb I e^vú n^tZ i^üvi Rb^ü GK^üU I f^vi t^dv c^vBc (Over flow
pipe) D^pz^üv^sKi m^t h^y $\bar{v}$ ^tK|

$\hat{P} 2.5$ GKU maviY tiWqUi

tiWqUi Zb cKvi -

- 1 $\square$ MjW UDe tiWqUi (Gilled tube radiator)
- 2 $\square$ UDeYvi tiWqUi (Tubular radiator)
- 3 $\square$ nvib K α ev tmjYvi tiWqUi (Honey comb or cellular radiator)

$\div$ U fvj f (Thermostate valve)

D $\bar{E}\beta$ Ae $\bar{v}q$ $\div$ U
 fvj f e $\bar{U}$ $\div$ K Ges c ν $\acute{u}$
 m $\bar{m}$ j $\bar{U}$ vi eK I tn $\bar{W}$ c ν ib
 m $\hat{A}$ jb K $\bar{i}$ |

GUv GK cKvi tPK (Check) fvj f, hv Z $\bar{v}$ ci cfv $\bar{e}$ L $\bar{y}$ j Ges e $\bar{U}$ nq| G fvj f B $\bar{A}$ $\bar{b}$ i
 c ν ib e $\bar{m}$ Mg $\bar{b}$ (Water outlet) $\bar{v}$ cb Kiv $\div$ K| D $\bar{E}\beta$ Ae $\bar{v}q$ $\div$ U fvj f e $\bar{U}$ $\div$ K
 Ges c ν $\acute{u}$ m $\bar{m}$ j $\bar{U}$ vi eK I tn $\bar{W}$ c ν ib m $\hat{A}$ jb K $\bar{i}$ | $\bar{v}$ f $\bar{v}$ eK Zvcgv $\hat{v}q$ $\div$ U fvj f L $\bar{y}$ j
 hvq Ges Mig c ν ib tiWqUi c $\bar{e}$ k K $\bar{i}$ |

$\hat{P} 2.6$ $\div$ U fvj f

GKU Av $\bar{k}$ $\div$ U fvj f 70 $^{\circ}$ C n $\bar{Z}$ 75 $^{\circ}$ C Zvcgv $\hat{v}q$ L $\bar{y}$ j Ges 82 $^{\circ}$ C Zvcgv $\hat{v}q$
 c $\bar{Y}$ f $\bar{v}$ e L $\bar{y}$ j |

$\div$ U fvj f Zb cKvi t

- 1 $\square$ e $\bar{e}$ j $\bar{v}$ UvBC (Bellow type)
- 2 $\square$ ev $\bar{q}$ $\bar{v}$ gU $\bar{v}$ jK UvBC (Bimetalic type)
- 3 $\square$ c $\bar{e}$ jU UvBC (Pellet type)

Uv $\bar{i}$, tgvUiMv $\bar{o}$ x BZ $\bar{v}$ B $\bar{A}$ $\bar{b}$ G c $\times$ Z $\bar{Z}$ k $\bar{v}$ Zj Kiv nq|

c ν $\acute{u}$ ev t $\bar{d}$ v $\bar{m}$ W m $\bar{K}$ zjkb k $\bar{v}$ Zj $\bar{K}$ iY c $\times$ Zi m $\bar{y}$ ea $\bar{v}$ -Am $\bar{y}$ ea $\bar{v}$, $\bar{e}$ j $\bar{v}$ $\bar{b}$ $\bar{a}$ i|c t

m $\bar{y}$ ea $\bar{v}$

- mKj cKvi fvix B $\bar{A}$ $\bar{b}$ e $\bar{e}$ nv $\bar{i}$ Kiv hvq|
- B $\bar{A}$ $\bar{b}$ i Zvcgv $\hat{v}$ $\bar{b}$ $\bar{i}$ $\acute{o}$ m $\bar{x}$ gvi g $\bar{a}$ i $\bar{v}$ L $\bar{v}$ hvq|

K_{ll} I c j_x Dbqb ⁻č

- c_{mb}i ce_{vn} a_g i_{vL}v h_{vq}|
- c_{mb} A_{ll}Z ⁻ž V_Ův nq, c_{ll}ig_v†Y Kg j_v†M Ges _{ll}e` cRbK bq|

Am_{jeav}

- G c_{xll}Z AZ[”]š e[”]qeûj I R_{ll}Uj|
- †i_{ll}W_†qU_†i i m_{ll}† c_vBc bó n_†q †M†j G c_{xll}Z †Zgb K_{vh}Ki f_{ll}gK_v i_{vL}†Z c_v†i b_v|
- c_vœú P_vj_v†b_vi Rb[”] A_{ll}Z_{ll}i ³ k_{ll}³ i c_†q_vRb nq|



m_vigg t B_{ll}Äb KZ_K m_ó Z_vcgv_{ll}v GK_{ll}U _{ll}b_{ll}[”]ó m_xgvq †i_†L B_{ll}Äb_†K me_vlaK Kg_{ll}g i_{vL}vB
n_†”Q B_{ll}Äb k_xZj_xKi_†Yi D_†Īk[”]| evq_yk_xZj_xKiY I c_{mb} k_xZj_xKiY-G ⁻ž c_{xll}Z_†Z
B_{ll}Äb k_xZj Ki_v nq| c_{mb} k_xZj_xKiY c_{xll}Z A_vev i A_†bK cK_vi n_†q ₋v_†K|



cvWĖi gj`qb 2.1

mVK DĖi i cvk VK Pý (√) `b|

1. BĖb kxZjxKiY c×Z Kx ?

- K) Rvjvbi gqjv-AveRbv cĭi⁻Kvi Kiv|
- L) BĖb i NIYkxj Aski ga'eZx⁻v⁻b AvWvjv⁻i eRvq t⁺iL q ev D⁺P Zv⁺c R⁺j hvIqv t⁻K i q⁺v Kiv|
- M) evúxq Rvjvbi K mVK Abxv⁺Z evqy m⁺v⁻ g⁺kZ Kiv|
- N) BĖb K cĭi⁻Kvi cĭi⁺Qb K⁺i AaK `b Kg q⁺g ivLv|

2. tKvbU BĖb kxZjxKiYi D⁺ik⁺ bq ?

- K) I fvi mUs RbZ KviY BĖb hšvsk mgn⁺K q⁺Z n⁺Z i q⁺v, jye⁺KUs m⁺÷g⁺K Kg q⁺g t⁺iL AcieZZ Zvcgv⁺Îvq m⁺ev⁺P Zvcxq `q⁺Zvq BĖb cĭi Pvjbv Kiv|
- L) Rvjvbi ceRjb I BĖb K e⁺ùviY n⁺Z i q⁺v Kiv|
- M) Rvjvbi gqjv-AveRbv cĭi⁺vi Kiv|
- N) `nb K<sup>+</sup>q<sup>+</sup> `n⁺bi d⁺j Drcb A⁺Zi³ Zvc AcmiY Kiv|

3. t⁺c⁺Uvj I W⁺Rj BĖb i t⁺q⁺ĥ cRj⁺bi ms⁺KvPb Zvcgv⁺Îv KZ ?

- K) 1200°C I 2000°C
- L) 1750°C I 1530°C
- M) 71°C I 80°C
- N) 88°C I 90°C

4. kxZjxKiY c×Zi gva⁺tg W⁺Rj BĖb tKvb Zvcgv⁺Îvq bq⁺šZ n⁺q⁺ v⁺K ?

- K) 35°C n⁺Z 45°C Zvcgv⁺Îvq
- L) 70°C n⁺Z 80°C Zvcgv⁺Îvq
- M) 88°C n⁺Z 90°C Zvcgv⁺Îvq
- N) 71°C n⁺Z 80°C Zvcgv⁺Îvq|

5. evqykxZjxKiY c×Z⁺Z Zvc cĭie⁺mZv tKvbUi Dci wbf i K⁺i bv ?

- K) wdb⁺mi mvi⁺dm G⁺iqvi Dci|
- L) BĖb i M⁺Z I V⁺Ův evZv⁺mi cĭig⁺v⁺bi Dci|
- M) BĖb i Rvjvbi cĭig⁺v⁺bi Dci
- N) wdbm I evZv⁺mi Zvcgv⁺Îvi Dci|

$K_{\parallel} I \text{ } c j x D b q b \overline{q}$

6. $\dagger K v b_{\parallel} U \text{ } k x Z j x K i \dagger Y \text{ } _ v \dagger g v \div \text{ } \text{ } v U \text{ } f v j \dagger f i \text{ } K v R \text{ } b q \text{ } ?$

K) $\text{ } \text{ } m \text{ } j \hat{U} v \dagger i i \text{ } Z v c g v \hat{I} v \text{ } \text{ } b \text{ } \text{ } \text{ } \acute{o} \text{ } m x g v \text{ } c h \check{S} \text{ } e R v q \text{ } i v L v \text{ } |$

L) $Z v \dagger c i \text{ } c f v \dagger e \text{ } \dagger P K \text{ } f v j \text{ } f \text{ } L \acute{y} v \text{ } I \text{ } e \ddot{U} \text{ } K i v \text{ } |$

M) $\text{ } \text{ } f v \text{ } e K \text{ } Z v c g v \hat{I} v q \text{ } \dagger P K \text{ } f v j \text{ } f \text{ } L \acute{y} j \text{ } M i g \text{ } c \text{ } \text{ } b \text{ } \dagger i \text{ } \text{ } W \dagger q U \dagger i \text{ } c \dagger e k \text{ } K i v$

N) $\text{ } \text{ } \text{ } \gg \text{ } n I q v \text{ } M \text{ } \text{ } v m \text{ } \text{ } \text{ } b M g b \text{ } K i v \text{ } |$

7. $k x Z j x K i \dagger Y \text{ } \dagger K v b_{\parallel} U \text{ } \dagger i \text{ } \text{ } W \dagger q U \dagger i i \text{ } K v R \text{ } ?$

K) $M i g \text{ } c \text{ } \text{ } \text{ } b \dagger K \text{ } k x Z j \text{ } K i v \text{ } |$

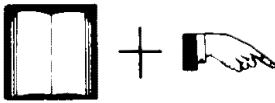
L) $B \text{ } \text{ } \hat{A} \dagger b \text{ } k x Z j \text{ } e v Z v m \text{ } c e v n \text{ } K i v \text{ } |$

M) $B \text{ } \text{ } \hat{A} \dagger b i \text{ } \text{ } \hat{Z} j v \text{ } ^3 Z v \text{ } e v R v q \text{ } i v L v$

N) $B \text{ } \text{ } \hat{A} \dagger b \text{ } R v j \text{ } \text{ } \text{ } b \text{ } m i e i v n \text{ } K i v \text{ } |$

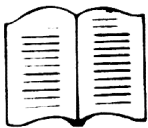
cV 2.2 BÄb ^Zjv³KiY cXIZ

G cV tkzI AvCib —



- BÄb ^Zjv³KiYi msÁv w`tZ cvi#eb|
- BÄb tkb ^Zjv³KiY Kiv nq ejtZ cvi#eb|
- BÄb#bi tkvb tkvb As#k ^Zjv³KiY `iKvi Zv ejtZ I wjL#Z cvi#eb|
- ^Zjv³KiY ôcXIZô eYbv Kitz cvi#eb|
- ^Zjv³KiY e`eüZ ^Zjv³Kvi#Ki (Lubricant oil) bvg ejtZ I wjL#Z cvi#eb|

^Zjv³KiY cXIZ ejtZ Kx ejS?



NybKxj avZe c`v\_ ci`úi i NI#Y qqcwß nq I AwaK Zvcgvîvi mjo K#i| BÄb#bi wefb Ask avZe c`v# %Zwi| mZivs G t#î BÄb#bi Kv#qZv nvm ev `Mubvi Rb# w`tZ cvi#eb| AvCZ `uU#Z BÄb#bi t#î m#jÛvi, jvBbvi I wc÷b, weqv#is, µ`vsK k`vdU BZ`w` Lg gmY g#b n#jI cKZc#q ZZUv gmY bq| G, #jv#K gvB#µv#Kv#ci m#v#h` eiaZ K#i t`L#j t`Lv hvq th, G#i Dc#i fM Amgvb Ges A#bKUv LvB KvUvi gZ| NlbK#j Amgvb Dc#i fM ci`úi ci`úi#K evaw t`q Ges bvbv cKvi Am#eavi mjo K#i| G Ae`v wimbK#i NlbKxj avZe As#ki ga`eZx `v#b ^Zjv³KiY ev wC`QjKviK w#m#e AvW#jv tZ#ji `i (Oil film) e`envi Kiv nq| mZivs G t`#K Avgiv BÄb ^Zjv³KiYi msÁv w`tZ cvi#eb|

BÄb ^Zjv³KiY t BÄb#bi ci`úi ms`ú#k `vKv `jU Pjgvb ev Nlbiz avZe As#ki ga`eZx `v#b AvW#jv tZ#ji `i (Oil film) eRvq ti#L q ev D`P Z#c R#j hvIqv t`#K i qv Kiv#K BÄb ^Zjv³KiY (Lubrication) ejv nq| ^Zjv³KiY th AvW#jv tZj e`envi Kiv nq G#K %Zjv³KviK (Lubricant) e#j|

^Zjv³Kvi#Ki KvR ev ^Zjv³KiYi c#qvRbXqZv

BÄb ^Zjv³KiY GKU A#Ze , i#ZcY c#µqv | h_vh_ ^Zjv³KiYi Afv#e GKU BÄb A#Z Aí mg#q q n#q bó n#q th#Z cvi#eb| Avmb Avgiv BÄb ^Zjv³KiYi c#qvRbXqZv ev ^Zjv³Kvi#Ki KvR, #jv tR#b tbB| G , #jv n#`Q -

- Nlb R#bZ eaw K#q#k k#³i AcPq tiva Kiv|
- PjbKxj Ask, #jvi q#t#iva Kiv| j#e#Kk#bi Afv#e PjbKxj Ask, #jv thgb- m#jÛvi, jvBbvi, w#ób #is, weqv#is, tU#cU, fvjf BZ`w` Ask `Z qqcwß nq|
- BÄb#bi Af`šixY NlbKxj Ask, #jv kxZj ivLv| j#e#Kk#bi Afv#e NlbKxj Ask, #jv R#j th#Z cvi#eb| w#kI K#i w#ób #is m#jÛvi M#q AvU#K th#Z cvi#eb|
- NlbKxj Ask, #jv#Z Nl#bi d#j q# q# avZe KYv tei nq| j#e#K#U G mg` avZe KYv#K a#q ci`Kvi K#i µ`vsK#KB#R w#b#q hvq|
- w#ób #isI m#jÛvi jvBbvi#i ga`eZx wKqv#iY#K Ave# ev m#j (Seal) K#i ivLv| d#j ms#KvPb tPav#i M`vm µ`vsK#KB#R th#Z cvi#eb|
- NybKxj Ask#K ^Zjv³ K#i BÄb#bi kã Kgv#bv|

BÄb#bi w#b#i Ask, #jv#Z ^Zjv³KiY c#qvRb nq -

K₁/I I c jx Dbqb $\bar{q}$

- (K) $\mu^{\text{vs}}Kk^{\text{vd}}U$ I $\mu^{\text{vs}}K k^{\text{vd}}U$ $\dagger gBb$ $\llbracket eq\rrbracket is$
- (L) $Kv\ddagger bK\llbracket Us$ $iW, \llbracket eM$ $G\ddot{U}$ $\llbracket eq\rrbracket is$
- (M) $Kv\ddagger bK\llbracket Us$ $iW, \bar{\imath} j$ $G\ddot{U}$ $\llbracket eq\rrbracket is / \llbracket c\acute{o}b$ $\llbracket cb$ $\llbracket eq\rrbracket is$
- (N) $\llbracket m\rrbracket j\ddot{U}vi$ $jvBbvi$ I $\llbracket c\acute{o}b$ $\llbracket is$
- (O) $UvB\llbracket gs$ $\llbracket Mqv$ i
- (P) $K^{\text{vg}}k^{\text{vd}}U$ I $K^{\text{vg}}k^{\text{vd}}U$ $\llbracket eq\rrbracket is$
- (Q) $f v j f$ $\dagger gK\llbracket bRg$
- (R) $f v j f$ $M\llbracket BW, U^{\text{v}}\ddagger cU$ I $eKvi$ $Av g\mid$

B $\llbracket \ddot{A}b$ $\hat{Z}jv^3KiY$ $c\times\llbracket Zmgn$

$\hat{Z}jv^3KiY$ $c\times\llbracket Z$ $m\llbracket aviYZ$ $c\llbracket B\ddagger cKvi$ $\mid G, \ddagger jv$ $n^{\text{v}}Q$ -

- (K) $\dagger c\ddagger Uvj$ $A\ddagger qj$ $\llbracket m\acute{o}g$ (Petrol oil system)
- (L) $\llbracket QU\ddagger bv$ $c\times\llbracket Z$ (Splash system)
- (M) $\dagger cmvi$ $c\times\llbracket Z$ (Pressure system)
- (N) $\llbracket QU\ddagger bv$ Ges $\dagger cmvi$ $c\times\llbracket Z$ ev $th\acute{s}$ $c\times\llbracket Z$ (Combination of splash and pressure system)
- (O) $W\llbracket B$ $m\llbracket v\acute{u}$ $c\times\llbracket Z$ (Dry sump system)

G $\llbracket U$ $GK\llbracket U$ mnR $c\times\llbracket Z\mid$
 $m\llbracket aviYZ$ $\dagger QvU$ $ai\ddagger bi$ GK
 $\llbracket m\rrbracket j\ddot{U}vi$ $\llbracket e\llbracket k\acute{o}$ $B\llbracket \ddot{A}b$ $e^{\text{v}}envi$
 Kiv $nq\mid$

(1) $\llbracket QU\ddagger bv$ $c\times\llbracket Z$ $t-$ $B\llbracket \ddot{A}b\ddagger bi$ $M\llbracket Zkxj$ $Ask, \ddagger jv\ddagger K$ $\llbracket c\llbracket "Qj$ $Kievi$ $GUvB$ mnR $c\times\llbracket Z\mid$ G
 $c\times\llbracket Z\ddagger Z$ $B\llbracket \ddot{A}b\ddagger bi$ $\llbracket b\ddagger Pi$ $As\ddagger k$ $GK\llbracket U$ $\llbracket Zjvavi$ $(A\ddagger qj$ $c\llbracket v\acute{u})$ $_v\ddagger K,$ $h\llbracket v$ $\llbracket c\llbracket "QjKvix$ $\ddagger Zj$
 $(g\llbracket ej)$ $_v\ddagger K\mid$ $\mu^{\text{vs}}Kk^{\text{vd}}\ddagger Ui$ $c\ddagger Z^{\text{v}}K$ $N\ddagger bKv\ddagger j$ $\mu^{\text{vs}}Kk^{\text{vd}}\ddagger Ui$ $\mu^{\text{vs}}K$ $\llbracket cb$ I $\mu^{\text{vs}}K$ $Av\ddagger gi$
 Ask $\mu^{\text{vs}}K\ddagger K\ddagger Ri$ $\ddagger Z\ddagger j$ $W\ddagger e$ $h\llbracket vq\mid$ $Ic\ddagger i$ $D\llbracket vi$ mgq G $Ask, \ddagger jv$ $B\llbracket \ddot{A}b\ddagger bi$ $\llbracket e\llbracket fb$ $As\ddagger k$ $\dagger thgb-$
 $\llbracket m\rrbracket j\ddot{U}vi$ $Iqvj,$ $\llbracket c\acute{o}b$ $\llbracket is,$ $\dagger gBb$ $\llbracket eq\rrbracket is,$ $\llbracket c\acute{o}b$ $\llbracket cb,$ $\llbracket eM$ $G\ddot{U}$ $\llbracket eq\rrbracket is,$ $f v j f,$ $UvB\llbracket gs$ $\llbracket Mqv$ i
 $BZ^{\text{v}}\llbracket \ddot{A}Z$ $\ddagger Zj$ $\llbracket QU\ddagger bq$ $\ddagger q\mid$ G $\ddagger Zj$ D^3 $Ask, \ddagger j\ddagger K$ $\llbracket c\llbracket "Qj$ ev $\hat{Z}jv^3$ $K\ddagger i$ $Avevi$ $\mu^{\text{vs}}K$
 $\dagger KB\ddagger R$ $\llbracket d\ddagger i$ $Av\ddagger m\mid$ G $c\times\llbracket Z$ $m\llbracket aviYZ$ $\dagger QvU$ $ai\ddagger Yi$ GK $\llbracket m\rrbracket j\ddot{U}vi$ $\llbracket e\llbracket k\acute{o}$ $B\llbracket \ddot{A}b$ $e^{\text{v}}envi$ Kiv
 $nq\mid$ G $c\times\llbracket Z\ddagger Z$ $\hat{Z}jvavi$ i me^{v} $c\llbracket i\llbracket gZ$ $\ddagger Zj$ $_vKv$ $Ac\llbracket invh\mid$

1. $K^{\text{vg}}k^{\text{vd}}U$ $\llbracket eq\rrbracket ism$
2. $Kv\ddagger bK\llbracket Us$ iW $\llbracket eq\rrbracket ism$
3. $\dagger gBb$ $\llbracket eq\rrbracket ism$
4. $\ddagger Zj$ $msMnK$
5. $\llbracket Wcvi$
6. $\llbracket QU\ddagger bv$ $c^{\text{v}}b$
7. $A\ddagger qj$ $c\llbracket v\acute{u}$
8. $A\ddagger qj$ $\ddagger \div Bbvi$

$\llbracket P\hat{I}$ 2.7 $\llbracket QU\ddagger bv$ $c\times\llbracket Z\ddagger Z$ $\hat{Z}jv^3KiY$

G $c\times\llbracket Z\ddagger Z$ $\llbracket eM$ $G\ddot{U}$ $\llbracket eq\rrbracket is,$
 $\dagger gBb$ $\llbracket eq\rrbracket is,$ K^{vg} $k^{\text{vd}}U$
 $\llbracket eq\rrbracket is,$ $\dagger U\ddagger cU,$ $iKvi$ $Av g$ I
 $f v j f\ddagger K$ $\hat{Z}jv^3KiY$ Kiv
 $nq\mid$

(2) $\dagger cmvi$ $c\times\llbracket Z$ $t-$ G $c\times\llbracket Z\ddagger Z$ $GK\llbracket U$ $\llbracket Mqv$ $c\llbracket v\acute{u}$ $\mu^{\text{vs}}K\ddagger KBR$ $n\ddagger Z$ $\ddagger Zj$ MnY $K\ddagger i$ $G\ddagger K$
 $\llbracket KQ\llbracket v$ $D^{\text{v}}P$ $Pv\ddagger c$ Zv $A\ddagger qj$ $M^{\text{v}}jvix\ddagger Z$ $\dagger ciY$ $K\ddagger i$ $\mid$ $\llbracket Mqv$ $c\llbracket v\acute{u}$ $\mu^{\text{vs}}Kk^{\text{vd}}U$ $\llbracket \ddagger q$ $P\llbracket jZ$ $nq\mid$
 $M^{\text{v}}jvix$ $n\ddagger Z$ $Pvch\ddagger y$ $\ddagger Zj$ $\mu^{\text{vs}}Kk^{\text{vd}}\ddagger Ui$ $mi\ddagger$ $\llbracket Q^{\text{v}}$ $c\ddagger _$ $c\llbracket Z\llbracket U$ $\dagger gBb$ $\llbracket eq\rrbracket is$ I $K^{\text{vg}}k^{\text{vd}}U$
 $\llbracket eq\rrbracket is-G$ $h\llbracket vq\mid$ $AZci$ $\hat{Z}jv^3Kvix$ $\ddagger Zj$ $(g\llbracket ej)$ $c\llbracket Z\llbracket U$ $\dagger gBb$ $\llbracket eq\rrbracket is$ $n\ddagger Z$ $ms\ddagger h\llbracket MKvix$ $mi\ddagger$
 $\llbracket Q^{\text{v}}c_$ $\llbracket qv$ $\llbracket bKUZg$ $\mu^{\text{vs}}K\llbracket c\ddagger b$ $\dagger ci\ddagger Q\mid$ G $f v \ddagger e$ $\dagger gBb$ $\llbracket eq\rrbracket is$ I $Kv\ddagger bK\llbracket Us$ iW $\llbracket eq\rrbracket is$ ($\llbracket eM$
 $G\ddot{U}$ $\llbracket eq\rrbracket is)$ $\hat{Z}jv^3$ $nq\mid$ $\dagger Kv b$ $\dagger Kv b$ $B\llbracket \ddot{A}b$ $\llbracket c\acute{o}b$ $\llbracket cb\llbracket U$ $Kv\ddagger bK\llbracket Us$ $i\ddagger Wi$ $gva\ddagger g$ $mi\ddagger$ $\llbracket Q^{\text{v}}c\ddagger _$
 $Pvch\ddagger y$ $\ddagger Zj$ $\ddagger c\ddagger q$ $\hat{Z}jv^3$ $nq\mid$

mvaviYZ weM GŮ weqv̄is, tgBb weqv̄is, K'vg k'vdU weqv̄is, tU#cU, iKvi Avg I fvj f#K
G c×Z†Z ^Zjv³KiY Kiv nq|

1. A†qj †cmvi †MR
2. K'vgk'vdU weqv̄ism
3. A†qj †nWvi
4. tgBb weqv̄ism
5. Kv†bKUs iW weqv̄ism
6. A†qj cṽáú
7. A†qj †÷Bbvi

¶PÎ 2.8 †cmvi c×Z

†m̄jŮvi Iqvj, †cób, †c÷b †cb BZ'v̄ K†bKUs iW I μ'vsKk'vdU n†Z †QU†K hvIqv
†Zj (gvej) ††q †Zjv³ nq|

AvaybK eŮ †m̄jŮvi †ekó
B†Ä†b mvavibZ G `P
c×Zi msigk†Y ^Zjv³KiY
cμqv mṽúB Kiv nq|

(3) †QU†bv Ges †cmvi c×Z ev thš_ c×Z t- AvaybK eŮ †m̄jŮvi †ekó B†Ä†b mvavibZ
G `P c×Zi msigk†Y ^Zjv³KiY cμqv mṽúB Kiv nq| G c×Z†Z B†Ä†bi †KQyM†Zkxj
Ask †QU†bv c×Z†Z Ges evKx M†Zkxj Ask, †jv †cmvi c×Z†Z †Zjv³ nq| G c×Z†Z
†Zj cṽáú†i m̄nv†h" †óBb†i†i gva†g A†qj jvB†b c†ek K†i| A†qj jvBb n†Z †Zj
Kv†bKUs, iW, weqv̄is, μ'vsKk'vdU I K'vg k'vd†Ui †b†P Ae†Z †Zjv††i †v†bš†i†Z nq|
Kv†bKUs iW, weqv̄is K'vc μ'vsKk'vdU c†Z†K AveZ†b †Zjv††i c†ek K†i†Z m̄nv†h"
K†i| Gi Wš Ask †Zjv††i n†Z †Zj †Zj B†Ä†bi I c†i†i hšvsk, †jv†Z mieiv†n K†i| G
†QU†K I W †Zj Ave†i fvjf, †c÷b †cb, †m̄jŮvi Iqvj, †c÷b †is Ges μ'vsK k'vdU
c†i†Z†K ^Zjv³K††Yi gva†g †c†Qj K†i|

AvaybK eŮ †m̄jŮvi †ekó
B†Ä†b G c×Z e'envi Kiv
nq|

G c×Z†Z μ'vsK†KB†R c†qvRb†q †Zj Rgv ivLv nq| μ'vsK†KBR n†Z GKU †óBb†i†i
gva†g †Zj†K †QtK gqjvg† K†i cṽáú†i †bqv nq| mvavibZ μ'vK†KBR ev †óBb†i†i P†K
e'envi Kiv nq| P†K avZe KYv, †jv†K a†i iv†L| cṽáú n†Z †efb A†k †Zj mieiv†ni
c†e G†K †dēv†i†i m̄nv†h" c†im†eY Kiv nq| c†im†eY †Zj†K †efb A†k †cšQv†bvi gva†g
^Zjv³ Kiv nq|

1. A†qj †cmvi †MR
2. K'vgk'vdU weqv̄ism
3. A†qj †nWvi
4. tgBb weqv̄ism
5. Kv†bKUs iW weqv̄ism
6. A†qj cṽáú
7. A†qj †÷Bbvi

¶PÎ 2.9 †QU†bv Ges †cmvi c×Z ev thš_ c×Z

^Zjv³Kvi†Ki (Lubricant) †k†YefvM

†efb a††bi ^Zjv³KviK B†Ä†b I †g†k†b e'envi n†q _v†K| h_v -

K₁/I I c jx Dbqb $\bar{c}$

- 1□ M^vmxq c^v₋t evZvm, $\mathbb{m}j\mathbb{q}g$, b_vB⁺U_v⁺Rb BZ^v₋
- 2□ Zij RvZxq c^v₋t- a_vZe RvZxq †Zj, c_i I kvK m⁺âxi †Zj BZ^v₋ |
- 3□ Avav k³ c^v₋t- MxR, †m_vc BZ^v₋ |
- 4□ k³ c^v₋t- Mvd_vBU |

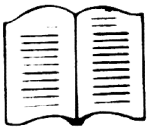
[^]Zj^v ³Kvi⁺Ki agvejx-

- [^]Zj^v ³Kvi⁺Ki Dchy³ m^v₋Z_v (Viscosity) ₋vK⁺e | Zvcg^vîvi c_vieZ⁺b m^v₋Z_vi c_vieZ⁺b n⁺e b_v |
- c³/₄jb †gZ_v †bB |
- $\mathbb{w}eI^v ³Z_v I \mathbb{w}e\hat{u}v iY \mathbb{f}gZ_v †bB |$
- evqy †Zj ev c_vbi m⁺₋ †g⁺k b_v, †db_v %Z_vi K⁺i b_v Ges D₀vqx b⁺n |
- c_vi⁻K_vi K_vi_v †gZ_v i⁺q⁺Q Ges B_vÄ⁺bi hš_vs⁺k_i †K_vb †Z_v K⁺i b_v |

[^]Zj^v ³KviK †Zj AZ^v₋aK c_vZj_v n⁺j G⁺Z c⁺q_vRb Ab_v⁺†Z †Z⁺ji g_vb DbqbK_vi_x Dc_v^vbmgn⁺†gk_v†Z nq | G⁺Z †Z⁺ji , YMZg_vb eR_vq ₋v⁺K |

Dc⁺i_v ³ Av⁺j_vPb_v n⁺Z Av_vi_v [^]Zj^v ³KiY †Z⁺ji cev⁺ni ††î⁺K P_vi_vU cavb $\bar{c}$ i f_vM Ki⁺Z c_vi |

- 1□ $\mathbb{w}c \div b I \mathbb{w}m j\hat{U}v \hat{c} i i \text{ cev} |$
- 2□ $\mu^v sK k^v dU I Kv \hat{b} K \mathbb{U} s iW \mathbb{w}eq \mathbb{w} i s G \text{ cev} |$
- 3□ $\mathbb{w}Mqvi I Ab^v b^v m \mathbb{w}nv h^v K v i x N y q b h s^v s^+ k \hat{c} Z^+ j i \text{ cev} |$
- 4□ iK_vi Avg, f_vj f Ges f_vj f , †j_v†Z †Z⁺ji cev |



migg t m_vav iYZ B_vÄ⁺bi $\mathbb{w}e\mathbb{f}b$ Ask a_vZe c^v₋v⁺ [^]Z_vi | NIYR_vbZ K_vi⁺Y G Ask , †j_v hv⁺₋ D⁺P Z_v⁺c R⁺j b_v hv_q ev †q n⁺q b_v hv_q GRb⁺ B_vÄ⁺b [^]Zj^v ³KiY K_vi_v n⁺q ₋v⁺K | c_v† ai⁺bi [^]Zj^v ³KiY c_v⁺₋Z ₋vK⁺j I Av_v†K B_vÄ⁺b cavbZ $\mathbb{w}QUv \hat{b}v c \times \mathbb{w} Z$, †cm_vi c_v⁺₋Z Ges $\mathbb{w}QUv \hat{b}v I \hat{c} mvi c \times \mathbb{w} Z$ ev th⁺₋ c_v⁺₋Z e⁺envi K_vi_v n⁺q ₋v⁺K |



cvWËi gj`qb 2.2

mVK DË†ii cvk UK PÝ (√) `b|

1. ‡KvbU BÄb ^Zjv³Ki†Yi D†İk" ?

- K) BÄb Pj bvi Rb" c†qvRbxq Rvjvb mieivn Kiv|
- L) BÄ†bi NIYkxj As†ki gaëZx⁻v†b AvW†jv⁻i eRvq †i†L ¶q ev D"P Zv†c R†j hvIqv †_†K i ¶v Kiv|
- M) BÄ†bi Agm,Y ev Amgvb hšvsk†K gm,Y Kiv|
- N) BÄb kvZjxKi†Yi Rb" c†qvRbxq Dcv`vb mieivn Kiv|

2. BÄ†b AvW†jv †Z†ji⁻i eëüZ nq †Kb ?

- K) BÄ†bi Amgvb ev Agm,Y⁻vb fivU ev gm,Y Ki†Z|
- L) BÄb†K PKP†K RoR†o ivL†Z |
- M) BÄ†bi NIYkxj avZe As†ki gaëZx⁻v†bi ¶q I D"P Zvc †iva Ki†Z|
- N) Rvjvbi gqjv-AveRbv c¶i⁻Kvi Ki†Z|

3. eü ¶mijÛvi ¶ekó BÄb ^Zjv³Ki†Y †Kvb c×Z eëüZ nq ?

- K) †c†Uvj A†qj ¶m†÷g
- L) ¶QUv†bv c×Z
- M) †cmvi c×Z
- N) ¶QUv†bv Ges †cmvi c×Z ev thš₋ c×Z

4. †KvbU ^Zjv³Kvi†Ki ag bq ?

- K) Dch9 I Ac¶ieZbxq mv`Zv₋vKv|
- L) cRjb ¶lgZv₋vKv|
- M) ¶el³Zv I ¶e†ùviY ¶lgZv bv₋vKv|
- N) †Zj ev c¶bi mv†_ †g†k bv Ges DØvqx bq|

cV 2.3 B₁Ä**bi** Rvjb mieivn c×₁Z

G cV tkt/I Avcib —



- Aš`vnx B₁Ä**bi** Rvjb mieivn c×₁Z, t jvi bvg ejtZ cvi**teb**|
- tKvb B₁Ä**bi** Kx c×₁ZtZ Rvjb mieivn nq ejtZ cvi**teb**|
- Rvjb mieivn c×₁Z, t jvi eYbv ¹ tZ cvi**teb**|



Avgiv Rvb B₁Äb Rvjb bK `nb Kti k₁³ Drcb Kti| KvKi ⁻q̄Zv tcZ mVK mg**q**
Dch⁹ Rvjbⁱ mieivn ¹ b₁ðZ Kitz nte| maviYZ ⁻q̄yc×₁ZtZ Aš`vnx B₁Ä**bi** Rvjb
mieivn Kiv nq|

- iayRvjb Bb**R**ti i m¹nv**h** D¹P Pvc B₁Ä**bi** cRjb c**K**vô msK**2**Z I D**E**B
evq**y** Dci m⁹ KYv AvKti mieivn Kiv nq| G c×₁Z iay**1** ¹WtRj B₁Ä**bi**
t¹q̄t¹ e⁻envi Kiv n**q** ⁻v**K**|
- evq**y**l Rvjb Kveti Uti ¹gikZ nq Ges h₋vixZ I h₋v mg**q** B₁Ä**bi** cRjb
c**K**vô mieivn Kiv nq| G c×₁Z iay**1** tc**1**Uj B₁Ä**bi** e⁻envi Kiv n**q** ⁻v**K**|

¹WtRj B₁Ä**bi** Rvjb mieivn c×₁Z-

G c×₁ZtZ B₁Äb ¹mijUti i
Af⁻š⁻i D¹P Pvc h⁹ ¹ei×
evZv**mi** Dci ZtZ**wa**K
Pvc ¹WtRj d**z**j t⁻ú Kiv
nq|

G c×₁ZtZ B₁Äb ¹mijUti i Af⁻š⁻i D¹P Pvc h⁹ ¹ei× evZv**mi** Dci ZtZ**wa**K Pvc
¹WtRj d**z**j t⁻ú Kiv nq| d**z**j D³ d**z**j NY K**q**kv¹Qb fvte c**1**ZZ n**q** msK**2**Z evZv**mi**
Zv**c** cRjb NUq| ¹WtRj B₁Ä**bi** Rvjb mieivn c×₁Z maviYZ ¹b**z** e**1**YZ KvR, t jv
m¹úv⁻ b Kti ⁻v**K**|

- M**1**Z I t jv**1**Wi Dci ¹bfi Kti mg⁻ ¹mijUti mVK nv**1** mVK c**1**ig**1**Y Rvjb
mieivn Kiv
- mVK mg**q** Rvjb mieivn Kiv|
- Zij Rvjb t**1**t¹/₂ ¹q̄ž ¹q̄ž KYv Ges ev**1**ú c**1**iYZ Kiv|
- mg⁻ ¹mijUti mgvb fvte Rvjb ¹eZiY Kiv|

¹WtRj B₁Ä**bi** Rvjb mieivn c×₁Z cavbZ ⁻q̄cKvi -

- evq**y**Bb**R**Kkb c×₁Z
- ¹mijW ev tgKvbK⁻vj Bb**R**Kkb c×₁Z|

Av**1**M evq**y**Bb**R**Kkb c×₁ZtZ ¹WtRj B₁Ä**bi** Ges D¹P Pvc evq**y**e⁻envi Kti eo ai**1**bi ⁻i
4-t÷vK B₁Ä**bi** ¹mijUti Rvjb mieivn Kiv n**z**v| ¹Kb eZgv**1** ¹mijW ev tgKvbK⁻vj
Bb**R**Kkb c×₁ZtZ ¹b**z**jLZ ¹ZbU c**1**μqv ¹mijUti Rvjb mieivn Kiv nq|

- 1 ¹maviY t**1**j c**1**μqv
- 2 ¹eZiYKvix c**1**μqv
- 3 ⁻ZŠ c**1**vú c**1**μqv

K) evhyBb†RKkb c×Z

L) mjjW Bb†RKkb c×Z

¶PÎ 2.11

1. mjjÜvi, 2. dZj jvBb, 3. dZj cvaú, 4. Bb†RKkb fvjf, 5. Gqvi jvBb, 6. dZj jvBb, 7. Zb avc eekó Gqvi K†vaúmi, 8. μvsK†Km, 9. GvëmmjjÜvi dZj cvaú, 10. maviY tij, 11. Kg Pichy cvaú I dëvii gva†g dZj UvsK†K dZj

1. maviY tij cμqv

G†¶†Pvc jvNeKvix
fvjf maviY tij Pvc
bbqšY K†i |

G cμqv c†g tciY cvaú mivn†h RjvBb Bb†RKkb cvaú c†ek K†i | c†i D†P Pvc h9 RjvBb cvaú G RjvBb†K 105.41 nB†Z 140.54 †K†R Pvc/eM †m†gt P†c maviY tij tciY K†i Ges G tij 210.82 †K†R/eM †m†gt P†c RjvBb†K c†Z†K†U †Zš Bb†RKU†i †gUvis G†j†g†U gva†g mieivn K†i | Bb†RKU†i RjvBb†K AZš †ZK†i mjjÜvii g†a †Q†U†q †q | G†¶†Pvc jvNeKvix fvjf maviY tij Pvc bbqšY K†i | hLb Gi †fZi Pvc †ek nq ZLb Pvc jvNeKvix fvj†fi evBcvm L†j hvq Ges m†VK Pvc bbqšZ nq | cvaú I Bb†RKU†i A†Z†i³ RjvBb cev† evBcvm ††q RjvBb Uvs†K†ciZ nq |

K. mjjÜvi
L. D†P Pichy RjvBb jvBb
M. RjvBb †diZ jvBb
N. †gUvis G†j†g†U
O. Pvc jvNeKvix fvjf
Q. RjvBb tciY (†ba Pichy) cvaú
R. Q††b†q
S. †Zjvavi
T. D†P Pichy RjvBb cvaú
U. maviY tij
V. K†v†g k†vdU ††q c†iP†jZ †š

¶PÎ 2.12 maviY tij c×Z

2. eZiYKvix c×Z

K₁/I I c j x Dbqb ⁻ž

G c×₁Z mva₁YZ †QvU
†₋†K gvSvix ai†bi B₁Ä†b
e⁻eüZ nq|

G c×₁Z†Z c₁váú n†Z Rvj₁b 2.9 †K₁R/eM †mtigt P₁†c †k₁ QvK₁bi gva⁻†g D⁻P P₁†c
Rvj₁b c₁váú c†ek K†i| G c₁váú 105.45-140.54 †K₁R/eM †mtigt P₁†c Rvj₁b
Wm₁UieDU†i mieivn K†i| AZci Wm₁UieDU†i †Kvb Wm₁jÜv†i Rvj₁b QÜv†Z n†e Zv
baviY K†i| c₁váú I Bb†RKU†i n†Z A₁Z₁i³ Rvj₁b evBcvm W⁻†q Rvj₁bi U⁻vsK †c₁iZ
nq| G c×₁Z mva₁YZ †QvU †₋†K gvSvix ai†bi B₁Ä†b e⁻eüZ nq|

K. Bb†R±i,
L. Wm₁UieDU†i,
M. D⁻P P₁ch⁹ Rvj₁b
c₁váú,
N. UvBigs Mqvi |

W⁻P⁻I 2.13 weZiYKvix c×₁Z

3. ⁻ZŠ c₁váú c×₁Z

D⁻PP₁c we₁kó c₁váú MfYi
WbqŠY i⁻v†Ki ms†M KvR
K†i|

G c×₁Z†Z Rvj₁b D⁻P P₁c we₁kó c₁váú i m₁vnv†h⁻ we₁fb Wm₁jÜv†i f₁vM n†q hvq Ges c†Z⁻K
Wm₁jÜv†i i Rb⁻ GK₁U K†i c₁váú ₋v†K| m₁Zivs c†Z⁻K Wm₁jÜv†i Wfb Wfb Bb†RKU†i i ms†M
GK₁U K†i c₁váú KvR K†i| D⁻PP₁c we₁kó c₁váú MfYi WbqŠY i⁻v†Ki ms†M KvR K†i|
MfY†i W⁻úÜj WjsK Rvj₁b WbqŠY K†i B₁Ä†bi †evSv I M₁Z†eM Kg ev †e₁k K†i Gi mgZv
weavb Kiv hvq|

K. Bb†R±i
L. D⁻P P₁ch⁹ Rvj₁b
c₁váú
M. Rvj₁b †ciY
(Wb₁ P₁ch⁹ c₁ig)
N. K⁻vgk⁻vdU W⁻†q
c₁iP₁jZ

W⁻P⁻I 2.14 ⁻ZŠ c₁váú

W†Rj B₁Ä†b Rvj₁b mieivn c×₁Z mva₁YZ Rvj₁b U⁻vsK, Rvj₁b D†E₁vjbKvix c₁váú,
QvK₁b, D⁻P P₁†ci c₁váú, Rvj₁b mieivnKvix jvBb, A₁Z₁i³ Rvj₁b †diZ jvBb I Bb†R±i
-G hŠ₁vsK, †jv Wb†q M₁VZ|

Rvjwb U`vsK

U`vsK i fZi Rvjwb cevn
wbqšYi Rb` cvÎ ev i`vdj
tCU jvMvBv _vK|

Rvjwb U`vsK dZj Rgv \_vK| dZj U`vsK mvaviYZ tgvUi MvOXi BvÄb i fZi b i`K
_vK| U`vsK i fZi Rvjwb cevn wbqšYi Rb` cvÎ ev i`vdj tCU jvMvBv _vK|
U`vsK i bMgb cZ` Q`hy dëvi \_vK| U`vsK i ga`Z Rvjwb evqyÜji cfvê ivLv
Rb` Gk Q`hy ivLv nq| U`vsK i bPi` K`WBb cvM ms`hWvRZ _vK| Gi bPi` cvš
mvBb dZj jvBb Gi ms`hWv ivLv nq|

Rvjwb cvaú

evg nvZi ØviUB cavb
Rvjwb mieivKix c_ Ges
Wb nvZi ØviU nZjv
új lq|

WvRj BvÄb Rvjwb mieivn cXZ Rvjwb DvEvjBkvix cvaú K`vgi mrvn`h` cwiPvjZ
nq| G cvaú 2 tKvR/eM tmtgt Pvc Rvjwb QvKvbi gva`g D`P Pvc i cvvaú mieivn K i|
G cvaú K`vgi` q cwiPvjZ nq Ges 126-175 tKvR/eM tmtgt Pvc BbRKkb bRj
Rvjwb tciY K i| G cvvaú cavb Ask, t jv nZjv cvÄvi I e`v i j| cvÄv i i tK` eivei
bPi` K` i` N` GKvU Q` \_vK| Gi evB i i Pvi` K i LvB KvUv _vK| G LvZ I
tK` i` Q` Av i GKvU Q` i` mrvn`h` hy \_vK| e`v i j i Mvq l` jv Øvi Av Q| evg nvZi
K i ØviU Wb nvZi ØviU i mvgv` Ic i` vcb Kiv _vK| evg nvZi ØviUB cavb
Rvjwb mieivKix c_ Ges Wb nvZi ØviU nZjv új lq| k`v dUi NvYbi d j Rvjwb
mieivni mgq cvÄviU Dc i i` K DVZ \_vK| e`v i j i fZi cvÄv i i LvZi Ae`vb
vYq K i Kx cWigvY Rvjwb cZa`c (Stroke) mieivn nte|

1. mieivnKvix fvj f
2. mieivnKvix cKvô
3. Rvjwb cKvô
4. wbqšK MZ
5. dW tnv i
6. wbqšK i`vK
7. cvÄvi
8. wbqšK cWbqb
9. wbqšK úf

WÎ 2.15 Rvjwb cvaú I BbR±i Rvjwb mieivn cXZ

GKvU wbqšK iWi mrvn`h`
cvÄv i i bPi` i`vK I
cWbqb Nv i t q Rvjwb
mieivni mgq l cWigvY
vaviY Kiv hvq|

cvÄviU vP t`K Ic i Dvvi c`e c`ek Øvi I evBcvM c_ tLv jv _vK Ges Rvjwb Gi
Dc i i tLv jv RvqMv cY K i| cvÄvi Ic i Dvvi mgq` jv Øvi eÜ nZ _vK Ges
e`v i j i fZi i Pvc evotZ _vK| G Pvc i d j tWv j f vix fvj f Lj hvq Ges Rvjwb
bRj c`ek K i| AZci cvÄvi bPi` K bvgZ _vK Ges Gi LvZ evBcvmi Ges
tK` i` Q` i` mvt` mshy nqv hvq| Rvjwb evBcvM` q` t e i n e v i d j f Z i i P v c K t g
hvq I BvÄb Rvjwb mieivn eÜ nZ hvq| BvÄb Kx cWigvY Rvjwb mieivn nte Dnv vbf i
K i KZ mgq ci cvÄv i i tKvYK LvZ evBcvmi mvt` mshy nq| GKvU wbqšK iWi
mrvn`h` cvÄv i i bPi` i`vK I cWbqb Nv i t q Rvjwb mieivni mgq l cWigvY vaviY Kiv
hvq| wbqšK iWi meP t q evgi Ges meP t q Wvbi Ae`vb cvvaú t`ek Ges Kg Rvjwb
mieivni b` kK|

BbR±i bRj (Injector Nozzle)

WvRj BvÄb msKvPb avci
t k l Gi fZi i evqy Dci
RvjwbK qZ` qZ` KYvq
vbi` cYi Rb` BbR±i i
cvš` k t h hšvsk mshy
_vK, t mUvB BbR±i bRj |

WvRj BvÄb msKvPb avci t k l Gi fZi i evqy Dci RvjwbK qZ` qZ` KYvq
vbi` cYi Rb` BbR±i i cvš` k t h hšvsk mshy _vK, t mUvB BbR±i bRj | Rvjwb

Lvgvi hšcWZ

K₁ I c j x Dbqb ̄z

cv₁úí D^oP P₁ci d₁j bR₁ji K₁R₁ j₁v m₁úb n₁q ̄v₁K | Bb₁R₁±₁ii w₁Wj f₁vj₁fi
 P₁v₁ ̄₁K R₁v₁w₁b ̄₁q c₁Y n₁jB Gi ̄ú₁j₁qi I cv₁Ä₁ii w₁eci₁xZ ̄₁K P₁ci m₁ó n₁q | G
 P₁ci cv₁Ä₁i I w₁Wj f₁vj₁f I c₁i D₁V A₁±m Ges bR₁ji cv₁š₁ ̄₁ki w₁Q` L₁j hv₁q | R₁v₁w₁b

K. ̄cm₁i A₁WR₁ós ̄z
 L. K₁c₁i Iq₁m₁i
 M. ̄ús
 N. ̄úŮ₁j
 O. ̄úŮ₁j av₁K
 P. bR₁j
 Q. w₁Wj f₁vj₁fi A₁mb
 R. w₁Wj f₁vj₁f
 S. R₁v₁w₁b j₁vB₁
 T. K₁vc b₁vU
 U. R₁v₁w₁b †diZ j₁vB₁

̄PĪ 2.16 Bb₁R₁±₁i

cv₁ú L₁v₁ci †kl cv₁š₁ b₁v †c₁š₁Q₁†b₁ ch₁š Giv I c₁ii ̄₁K DV₁Z ̄v₁K | †fZ₁ii P₁c K₁g
 hve₁i m₁†½ m₁†½ w₁Wj f₁vj₁f I cv₁Ä₁i G₁†₁i A₁v₁±MK₁i ̄v₁b w₁d₁i A₁±m Ges R₁j₁w₁b w₁b₁†¶c₁Y
 eŮ₁ n₁q hv₁q | bR₁ji cv₁š₁ ̄₁k GK ev eŮ₁ w₁Q` w<sub>1</sub>ekó n<sub>1</sub>Z cv<sub>1</sub> | eŮ<sub>1</sub>Q` w₁ekó bR₁j ck₁ ̄₁nb
 c₁†K₁v₁ô Ges eŮ₁ ne₁i m₁ve₁b Kg nIqv₁q GK w₁Q` w₁ekó bR₁j A₁†c₁¶vKZ.mi₁ ̄₁nb c₁†K₁v₁ô
 e₁eŮ₁Z n₁q |

Bb₁†RKU₁i bR₁j m₁v₁iYZ ̄j₁cK₁i t

K) w₁c₁Uj bR₁j (Pintle Nozzle)

L) MZhy₁ bR₁j (Hole Nozzle)

w₁c₁Ub bR₁ji cv₁š₁ ̄₁k mi₁ ̄c₁†bi gZ Ges w₁c₁†bi P₁v₁ ̄₁K †Kš₁YK w₁Q`hy₁ | w₁c₁Uj bR₁ji
 w₁Q` A₁†c₁¶vKZ.eo e₁j R₁v₁w₁b w₁b₁†¶c₁†Yi mgq Z₁†b₁g₁†Kf₁v₁te Kg evav cv₁ß n₁q |

MZhy₁ bR₁j ̄j₁ ev Z₁†ZwaK MZ ̄vK₁q Z₁v †₁†K Nb I A₁w₁Qb Ae₁ ̄vq R₁v₁w₁b w₁b₁†¶c₁†Yi
 K₁v₁R n₁q ̄v₁K |

R₁v₁w₁b Q₁†b t G₁U w₁W₁Rj B₁Ä₁†bi GK₁U cav₁b I c₁†qvRb₁xq Ask | Gi m₁nv₁†h₁ w₁W₁Rj
 B₁Ä₁†b w₁Zb av₁c R₁v₁w₁b c₁w₁i@v₁i Kiv n₁q | h₁v -

G₁U w₁W₁Rj B₁Ä₁†bi GK₁U
 cav₁b I c₁†qvRb₁xq Ask |

- U₁vs₁†Ki w₁dëvi ̄xb eo eo gqj₁vi KY₁v ̄†fZ K₁†i |
- cvBg₁vix w₁dëvi †QvU KY₁v ̄†fZ K₁†i (5 gvB₁†µvb gv₁†ci, 1 gvB₁†µw 1/10,000 †mtigt) |
- †m₁†KŮvix w₁dëvi m₁Y KY₁v, w₁j₁†K ̄†fZ K₁†i (2 gvB₁†µvb gv₁†ci)

†Kv₁b †Kv₁b B₁Ä₁†b Ave₁i P₁vš w₁dëvi ̄v₁K | Ave₁i KLbI KLbI w₁dëvi c₁w₁bi KY₁v, w₁j₁†K
 Avj₁v₁ v Ki₁†Z cv₁†i |

m₁v₁iYZ w₁Zb c₁x₁†Z†Z R₁v₁w₁b c₁w₁i@v₁i Kiv hv₁q | h₁v -

1. †kvaY (Straining)

GUv GK cKvi hvšK c×Z|Gi mnvth" A#c¶KZ.epĒi KYv,†jv†K ¶bibi gva"†g AvUKv†bv hvq| G ¶b Avevi Zv†ii Rvj A_ev KvMR I Kv†oi n†Z cv†i|

2. tkv/b (Absorption)

GB c×Z†Z k³ KYv,†j Ges Rj KYv,†jv†K ¶dēvi gva"†gi mv†_ AvUKv†bvi e"ē_v _v†K| Bnv†Z mvaviYZ Z†v, tmj†jvR I `vbv RvZxq c`v_ e"envi Kiv nq|

3. g"vM†bUK c„KvKiY

GB c×Z†Z KvMR I Ab"b" ivmvqibK c`v_ e"envi K†i Rvjvib n†Z Rjxq KYv c„K Kiv hvq|

¶W†Rj B¶Ā†bi MfYs c×Z (Governing System of Diesel Engine)

Uv±i I ¶ewfb cKvi ¶W†Rj B¶Āb Pm†jZ Mvox†Z MfYi e"ēüZ nq| H mg⁻ B¶Ā†bi M†Z†e†Mi mgZweavb KivB nj MfY†ii KvR| tevSvB B¶Ā†bi N†b M†Zi hv†Z †Kvb c¶ieZb bv nq, †mRb" MfYi e"ēüZ nq| B¶Ā†bi Dci tevSv evo†j nVr Gi N†b M†Z K†g th†Z cv†i Ges tevSv miv†j N†b M†Z te†o th†Z cv†i| tmB mg†qi Rb" ē`ÿZK †Rbv†iUi†K Ges N†b M†Z†Z ††L Drcv"Z †fv†ĒR ¶VK ivLv I MfYs c×Zi KvR| B¶Āb KvR Kievi mgq MfYi†K Pm†jZ K†i Avcbv Avcvb tevSv Ab†vq Kg ev teik Rvjvib ¶m†jŮ†i mieivn K†i| Kg RvjvibZ Kg N†b; teik Rvjvib†Z teik N†b M†Z eRvq iv†L| Avevi M†Z†eM teik n†Z _K†j Kg c¶igvY Rvjvib†K Av† Av† Dnvi Øvi evio†q mgZweavb Kiv nq| MfYi mvaviYZ ¶Zb cKvi -

Uv±i I ¶ewfb cKvi ¶W†Rj B¶Āb Pm†jZ Mvox†Z MfYi e"ēüZ nq| H mg⁻ B¶Ā†bi M†Z†e†Mi mgZweavb KivB nj MfY†ii KvR| tevSvB B¶Ā†bi N†b M†Zi hv†Z †Kvb c¶ieZb bv nq, †mRb" MfYi e"ēüZ nq| B¶Ā†bi Dci tevSv evo†j nVr Gi N†b M†Z K†g th†Z cv†i Ges tevSv miv†j N†b M†Z te†o th†Z cv†i| tmB mg†qi Rb" ē`ÿZK †Rbv†iUi†K Ges N†b M†Z†Z ††L Drcv"Z †fv†ĒR ¶VK ivLv I MfYs c×Zi KvR| B¶Āb KvR Kievi mgq MfYi†K Pm†jZ K†i Avcbv Avcvb tevSv Ab†vq Kg ev teik Rvjvib ¶m†jŮ†i mieivn K†i| Kg RvjvibZ Kg N†b; teik Rvjvib†Z teik N†b M†Z eRvq iv†L| Avevi M†Z†eM teik n†Z _K†j Kg c¶igvY Rvjvib†K Av† Av† Dnvi Øvi evio†q mgZweavb Kiv nq| MfYi mvaviYZ ¶Zb cKvi -

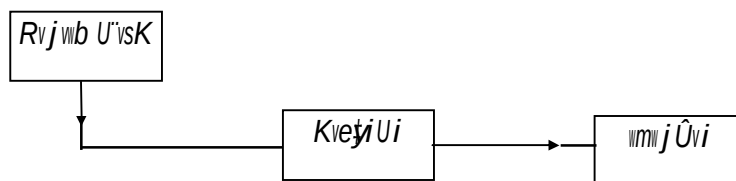
- 1□ †m†Uv†dDM"vj ev hvšK MfYi
- 2□ nvBW†jK MfYi
- 3□ evqkb" MfYi



Ab†jbx t ¶W†Rj I †c†Uvj B¶Ā†b Rvjvib mieivn c×Zi g†a" Kx ai†bi cv_K" i†q†Q?

†c†Uvj B¶Ā†b Rvjvib mieivn c×Z

¶b†a eK ¶P††i mnvth" †c†Uvj B¶Ā†b Rvjvib mieivn c×Z †`Lv†bv nj -



†c†Uvj B¶Ā†b Rvjvib mieivn c×Zi cavb hšvsk nj Kve†iUi| GvU GKvU Rvjvib c¶igvK I ¶gkY hš| Kve†iUi ¶b¶j¶LZ KvR,†jv m†v"b K†i _v†K|

- Zij Rvjvib ¶ž ¶ž KYvq i†cvšiz Kiv|
- Rvjvibi Ab†K ev†@ú c¶iYZ Kiv|
- ev@úvq Rjvib†K m†VK Ab†v†Z evq† mv†_ ¶g†kZ Kiv|
- B¶Ā†bi tevSv I M†Z Ab†v†i Rvjvibi ¶gkY cRjb c†Kv†ô h_vixiz I m†VK c¶igv†Y mieivn Kiv|

KvejiUi KvhcxZ

c₋tg d_zj U^{vs}K t₋K Rvjwb jvB^{bi} gva^{tg} t_d-vU t_{Pav}i c_{tek} K_ii | d_zj U^{vs}K t₋K Rvjwb t_dU t_{Pav}i c_{tek} Kivi mv₋ mv₋ t_dU_U Ic_i DV_Z ₋v_K | d_zj Ic_i ⁻i GK_U _Ub_U ^ó mxgvq t_cS_Qt_j t_dU_i mv₋ mshy⁹ _UbWj fvj f _U⁻q d_zj jvBb eÜ n_q hvq |

ZLb Avi t_dU t_{Pav}i Rvjwb c_{tek} Ki_Z cv_i b_v | t_dU t_{Pav}i d_zj B_UÄb KZK.e^eüZ nevi mv₋ mv₋ d_zj c_{igv}Y Kg_Z ₋v_K Ges d_zj Kgv_i mv₋ mv₋ t_dU _Ub_P t_bg Av_m | d_zj _UbWj fvj f L_j hvq Ges t_{Pav}i d_zj Av_mZ ₋v_K | Ab^U⁻q K Gqv_i t_fU t_dU t_{Pav}i mgZ_Z Pvc eRvq ivL_Z mvn_h K_ii |

t_kv_b av_ci mgq _Um_UjÜv_i Av_skk i_b⁻Zv_i m_U^ó nq | G i_b⁻Zv c_y⁻Yi Rb⁻ Gqv_i _UKb_vi n_Z c_Ui_U evq_UKvejiUi c_{tek} K_ii | evq_UfbP_Zi t_fZi _U⁻q cev_UnZ nevi mgq ₋t_U Gi t_em t_eo hvq | KviY GKB c_{igv}Y evq_UfbP_Zi _UžZg c⁻t⁻Q⁻t⁻i t_fZi _U⁻q hvevi mgq Gi M_UZk³ ep_Ulg c⁻t⁻Q⁻t⁻i Z_Zb_vq e_o hvq | c_Uš_i Gi Pvc K_g hvq | Avevi t_dU t_{Pav}i XvKb_v t_c-t_U GK_U _UQ⁻ ₋v_K hv_i gva^{tg} Gi t_fZ_i Rvjwb_i Dci evB_ii evZ_Um Pvc c_qvM K_ii | G Kvi_Y t_dU t_{Pav}i Ae⁻Z Rvjwb_i Dci Pvc I t_fbP_Zi_Z (bR_tj) Ae⁻Z Rvjwb_i Dci P_vc_i c_v₋K⁻ c_Ui_j_U _UZ nq | P_vc_i G c_v₋K⁻K Bb_tUK _UW_tckb e_tj | Gi d_zj Rvjwb ₋t_U Ae⁻Z bRj _U⁻q t_fbP_Zi_Z c_{tek} K_ii | t_fbP_Zi A_Ät_j evq_Ucev_Uni _Ub_PPvc I D⁻P M_UZi c_fv_te d_zj KY_v _tjv ev_Uq_U AvK_vi av_iY K_ii Ges evq_U mv₋ _Ug_UkZ nq | Z_vici G evq_U d_zj _Ug_UY Bb_tjU t_gb_td_vi c_{tek} K_ii Ges G c_{tek} ₋Uj fvj f _U⁻q _Ubq_UšZ nq | Bb_tjU t_gb_td_vi n_Z _Ug_UY _Um_UjÜv_i c_{tek} K_ii | GB Rvjwb B_UÄ_tbi cR_jb c_tK_vô ⁻UvK c_v_tMi mvn_U⁻h⁻ cR_UjZ I ⁻» nq GK_Um_UjÜv_i mvn_U⁻h⁻ ₋U fvj f N_U⁻q c_{tek} _UX_Dt_ei c⁻t⁻Q⁻ Kgv_tb_v I evov_tb_v hvq | hv_Uvi d_zj B_UÄ_tbi M_UZ I Rvjwb mie_U⁻ni c_{igv}Y _Ubq_UšZ nq |

_UPÎ 2.17 GK_U mvaviY KvejiUi

1. evq_Uc_Ui_UviK hš n_Z c_Ui_Uvi evZ_Um, 2. c_Ui_Uvi evZ_Um, 3. t_PivK, 4. t_fbP_Zi, 5. t_RU, 6. t_dU, 7. _UbWj fvj f, 8. Rvjwb c_{tek} c₋, 9. t_dU _Uj fv_i, 10. t_dU t_{Pav}i, 11. evq_U Rvjwb_i _Ug_UY, 12. ₋Uj, 13. evq_U Rvjwb_i _Ug_UY (K_Ukb t_{Pav}i)

mvaviYZ 1 f_vM t_ct_Ut_ji m_t½ 13.15 f_vM evq_U(13t1 ev 15t1) _Ug_UkZ n_q t_h _Ug_UY _UZ_Ui K_ii G_tK h₋₋ _Ug_UY (Proper Mixture) e_tj | _UKb t_h _Ug_Uk_UY evq_U c_{igv}Y Kg ₋v_K A₋_Ur evq_U t_ct_Ut_ji Ab_Uv_Z 8t1 ₋v_K G_tK M_Up _Ug_UY (Rich Mixture) e_tj | Avevi t_h _Ug_Uk_UY evq_U c_{igv}Y t_eik ₋v_K A₋_Ur evq_U I t_ct_Ut_ji Ab_Uv_Z 20t1 ₋v_K G_tK c_vZ_jv _Ug_UY (Lean Mixture) e_tj | B_UÄ_tbi M_UZ Ges _Ulg_Uv evq_U Rvjwb _Ug_Uk_UYi Ab_Uv_Z, _Ug_UkZ

mvaviYZ 1 f_vM t_ct_Ut_ji m_t½ 13.15 f_vM evq_U(13t1 ev 15t1) _Ug_UkZ n_q t_h _Ug_UY _UZ_Ui K_ii G_tK h₋₋ _Ug_UY e_tj |

Rvjvbi cevn, NbZ I Gi e'enviK , Yvejxi Dci wbf i Kti| evqyl Rvjvbi wgy wewfb
 AbvZ %Zwi Kivi Rb" mvaviY KvejiUi (Simple Carburetor) KgcbtmUs tRU UvBc
 KvejiUi (Companseting Jet Type Carburetor) Ges tcBb wUDE Gqvi wew UvBc
 KvejiUi (Plain Tube Air Bleed Type Carburetor) e'eüZ nq|

tcUvj BvÄb Rvjvbi mieivn c×wZtZ KvejiUi QvovI tZjvavi, Qvwb, tKvb tKvb tTt
 Rvjvbi cvaú Ges evqycwi@viK _vK|

evqycwi@viK hš (Air Cleaner)

ayvevj I Abvb" wZKviK
 e hvZ evqy mv_ BvÄb
 ctek KiZ bv cvti tmRb"
 evqycwi@viK hš e'envi Kiv
 nq|

BvÄb mšvIRbK I `xN tggv`x KvRi Rb" cwi@vi evqy cqvRb| ayvevj I Abvb"
 wZKviK e hvZ evqy mv_ BvÄb ctek KiZ bv cvti tmRb" evqycwi@viK hš e'envi
 Kiv nq| GwU Acwi@vi _vKtj Kg cigvY evqyBvÄb ctek Kti| dtj BvÄb Kvh `wZv
 Ktg hvq| ctek fvjf I wcb wistqi wqmiab, bvbv cKvi Kvjv favq I gqv Rvjvbi
 Amou`nb BZw`i Rb" Acwi@vi evqyl Rvjvbi mou`fvte `vqx| evqycwi@vi Kievi Rb"
 mvaviYZ tZjm³ I iQ Qvwb ev evqycwi@viK hš e'eüZ nq| G, tju cvq 95% gqv
 cwi@vi KiZ cvti|

thnZtZji cvt ayv-evj
 I gqv RgtZ _vK, ZvB
 Bnvi wfZiKvi tZj cZ 10
 NvUv KvRi ci cieZb Kiv
 cqvRb|

tZjm³ QvwbZ evqyc_tg wc-wbvti ctek Kti| GLv evhy Nybi dtj A+c wvKZ.eo
 eo KYv, wj gqv wBMgb c_ `tg ewnti Pti hvq| wZxq avc evqyGKU bj I cvti wfZi
 wci"QjKviK tZji ga" `tg hvevi mgq ayv-evj I gqv `tZj AvUKv cto| G fvte
 cwi@vi evqyievi wUDtei gva'tg ctek tgvbtdv Ges BvÄb ctek Kti| thnZtZji
 cvt ayv-evj I gqv RgtZ _vK, ZvB Bnvi wfZiKvi tZj cZ 10 NvUv KvRi ci
 cieZb Kiv cqvRb| hv evqyZ ayv-evj cwigvY Kg _vK Zte tZji cvt 3-6 wgt wgt
 gqv Rgtj tZj cieZb Kiv DvPr| AšZttc w cZ GK ermi ci ci mg QvwbU
 cwi@vi Kti cqv cvtU tZj vuv cKiv cqvRb| `p ivLZ nte thb cvt me mgq
 cwigvY gZ tZj _vK|

iQ evqycwi@viK hš cvt ti tZti wci"QjKviK tZj `tg w³ Zvii Rvj _vK| evBii
 Acwi@vi evqyGi tZti `tg hvIqv mgq ayv-evj I gqv `tZj AvUKv hvq| G cKvi
 Qvwb mvaviYZt vqx fvte wcz tQU BvÄb e'eüZ nq| Gi hšvsk, tju evqycv Ges
 tKtiwmb `tg cwi@vi Kiv cqvRb|



mvigg t BvÄbK mvvKfvte Kg wlv ivLZ cwi@vi Rvjvbi mieivn Kiv cqvRb| wvRj I
 tcUvj `wvB Aševnx BvÄb ntj I Gt`i Rvjvbi mieivn c×wZ mout Avjv`v|
 wvRj BvÄb iayRvjvbi BvRtiii mnvth" c34jb cKvô mieivn Kiv nq| Avi
 tcUvj BvÄb Rvjvbi I evqy wgy ^Zwi Kti c34jb cKvô mieivn Kiv nq|



K₁/I I c j x Dbqb $\bar{q}$

cv#VwEi gj'vqb 2.3

mVK DĖ*i i* cv#k UK Pý (√) $\bar{b}$

1. W#Rj BĖ#b Rvjv**biei**n c×Z ca**bZ** KZ cK*i* ?

K) $\bar{c}$ K*i*

L) Z**b** cK*i*

M) P*i* cK*i*

N) cv**D**cK*i*

2. †KvbU W#Rj BĖ#b Rvjv**biei**n Ask bq ?

K) Bb#R±*i*

L) Kve*y*U*i*

M) Rvjv**c**vú

N) A#Z*i*³ Rvjv**†di**Z jvBb

3. †KvbU W#Rj BĖ#b*i* Mf**bs** c×Z*i* K*v*R ?

K) BĖ#b*i* $\bar{K}$ $\bar{b}$ # $\bar{k}$ b c`vb K*v*

L) BĖ#b*i* μ U $\bar{b}$ # $\bar{k}$ b K*v*

M) BĖ#b*i* M#Z#eM mgZv **veav** K*v*

N) BĖ#b*i* A#qj c×Z#Z Pvn`v **ba**v*i*Y K*v*|

4. †KvbU c#Uvj BĖ#b h_v_ **gkY** ?

K) GK fVM †c#Uvj*i* mv#_ 13-15 fVM evq**y** **gkY**|

L) GK fVM †c#Uvj*i* mv#_ 8 fVM evq**y** **gkY**|

M) GK fVM †c#Uvj*i* mv#_ 20 fVM evq**y** **gkY**|

N) GK fVM †c#Uvj*i* mv#_ 105.41 fVM evq**y** **gkY**|

5. Ac*i* K*i* evq**y** Rvjv**BĖ#b**i † $\bar{q}$ # $\hat{I}$ †Kvb K*v*RU K#i b*v* ?

K) Kvh ` $\bar{q}$ Zv K#g#q †`q|

L) c#ek fvj f I $\bar{c}$ ÷b $\bar{is}$ Gi $\bar{q}$ e#× K#i |

M) Kvjv **ag** Mgb K#i |

N) BĖ#b*i* KvhKvj*i* $\bar{vq}$ Z e#× I Rvjv**LiP** Kgvq|

cV 2.4 B₁Ä₂bi m₁v₁iY i q̇v₁te q̇Y, Î₁Umgn- I Z₁vi c₁ZK₁vi

G cV t₁k₁ I Avc₁ —



- B₁Ä₂bi m₁v₁iY i q̇v₁te q̇Y K₁ ej₁Z cv₁teb|
- B₁Ä₂bi m₁v₁iY i q̇v₁te q̇Y i c⁻q̇c₁ j₁vi b₁vg j₁L₁Z cv₁teb|
- B₁Ä₂bi i q̇v₁te q̇Y i w₁fb c⁻q̇c₁ j₁vi eY₁vi K₁iZ cv₁teb|
- B₁Ä₂bi m₁v₁iY Î₁U, Z₁vi K₁viY I c₁ZK₁vi m₁q̇Ü ej₁Z cv₁teb|



Av₁g₁iv R₁v₁b, B₁Ä₂bi w₁fb c₁K₁vi h₁š₁sk I c₁x₁Z₁i mg₁š₁q M₁v₁Z| Z₁v₁B Gi Kg₁q₁g₁Z₁v A₁q̇₁š₁ i₁v₁L₁vi R₁b⁻ B₁Ä₂bi H mg⁻ h₁š₁sk I c₁x₁Z₁i i q̇v₁te q̇Y c₁q̇v₁R₁b| B₁Ä₂bi h₁v₁š₁K k₁³ i Drm n⁺q⁺ R₁v₁j₁w₁b| t₁f₁R₁v₁ L₁v⁻ I c₁w₁b t₁h₁gb g₁v₁š₁ i k₁i₁ I t₁c₁U L₁v₁iv₁c K₁iZ cv₁i| t₁Zg₁w₁b t₁f₁R₁v₁ R₁v₁j₁w₁b| B₁Ä₂bi mg₁ñ q̇v₁Z K₁iZ cv₁i| t₁f₁R₁v₁ R₁v₁j₁w₁b w₁W₁R₁j B₁Ä₂bi t₁q̇₁š₁ d₁z₁q₁ c₁v₁ó I B₁b₁t₁R₁±i Ges t₁c₁U₁v₁ B₁Ä₂bi t₁q̇₁š₁ K₁ve₁š₁U₁±i i t₁R₁U₁ j₁vi₁K b₁ó K₁i t₁q̇₁| Ave₁vi B₁Ä₂bi h₁v₁ m₁v₁K R₁v₁j₁w₁b e⁻env₁i K₁iv b₁v n₁q A₁v₁r h₁v⁻ w₁W₁t₁R₁±i t₁q̇₁š₁ t₁K₁i₁w₁mb ev t₁c₁U₁v₁ e⁻env₁i K₁iv n₁q Z₁te B₁Ä₂bi Dc₁i₁v³ Ask₁ j₁vi q̇v₁ZM⁻ n₁te| ^Z₁j₁v³ K₁iY I k₁x₁Z₁j₁K₁iY h₁v⁻ m₁v₁K ,Y m₁óub ^Z₁j₁v³ K₁viK (Libricant) I c₁w₁b BZ⁻ e⁻env₁i K₁iv b₁v n₁q, Z₁te B₁Ä₂bi P₁j₁g₁v Ask₁ j₁vi q̇v₁Zmn eo ai₁bi ^M₁ubv NU₁Z cv₁i| ai₁bi eÜzevÜemn M₁v₁ox w₁b₁q₁ Avc₁b₁iv⁻ t₁ci₁j₁vi á₁g₁Y tei n₁q₁Q₁b| w₁K₁b g₁v₁S c₁±_ w₁M₁q₁ n₁V₁r c₁io₁xi ÷v₁U eÜ n₁q₁ t₁M₁j ev ÷v₁U w₁b⁺q⁺ b₁v| A₁v₁ ev c₁iZ⁻ t₁bi t₁P₁q M₁v₁oxU A₁v₁R w₁fb A₁v₁f₁w₁eK k₁ã ev A₁v₁P₁iY K₁iQ₁| P₁v₁j₁K₁i D₁iP₁Z Gi K₁viY L₁j₁R tei K₁iv Ges t₁K₁v₁b b₁vU w₁X₁j₁ ev A₁v₁j₁M₁ A₁v₁Q₁ K₁v₁b Z₁v t₁L₁v|

t₁f₁R₁v₁ L₁v⁻ I c₁w₁b t₁h₁gb g₁v₁š₁ i k₁i₁ I t₁c₁U L₁v₁iv₁c K₁iZ cv₁i| t₁Zg₁w₁b t₁f₁R₁v₁ R₁v₁j₁w₁b| B₁Ä₂bi mg₁ñ q̇v₁Z K₁iZ cv₁i|

B₁Ä₂bi g₁š⁻ev₁ h₁š₁sk₁K q̇v₁ I ^M₁ubv t₁±K i q̇v₁ K₁iv Ges c₁iZ₁bq₁Z t₁g₁iv₁Z LiP Kg₁v₁b₁vi R₁b⁻ B₁Ä₂bi P₁v₁j₁b₁q, R₁v₁j₁w₁b I ^Z₁j₁v³ K₁viK e⁻env₁i B₁Ä₂bi c₁iZ h₁Zk₁x₁j n₁Z n₁te|

Dc₁i₁v³ A₁v₁t₁j₁v₁P₁b₁ t₁±K Av₁g₁iv ej₁Z c₁w₁i, B₁Ä₂bi K₁ ^x₁N₁b Kg₁q₁g K₁i i₁v₁L₁vi, B₁Ä₂bi g₁š⁻ev₁ h₁š₁sk₁K q̇v₁ I ^M₁ubv t₁±K i q̇v₁ K₁iv Ges c₁iZ₁bq₁Z t₁g₁iv₁Z LiP Kg₁v₁b₁vi R₁b⁻ B₁Ä₂bi P₁v₁j₁b₁q, R₁v₁j₁w₁b I ^Z₁j₁v³ K₁viK e⁻env₁i B₁Ä₂bi c₁iZ h₁Zk₁x₁j n₁Z n₁te| Gi₁c m₁ZK _v₁K₁ Ges B₁Ä₂bi c₁iZ h₁Zev₁ n₁lq₁v₁K Av₁g₁iv i q̇v₁te q̇Y ej₁Z c₁w₁i| Gme t₁Q₁v₁U L₁v₁U i q̇v₁te q̇Y B₁Ä₂bi K₁eo ^M₁ubv I h₁v₁b g₁v₁t₁j₁ q̇v₁Z t₁±K i q̇v₁ K₁i₁te| B₁Ä₂bi Î₁U w₁bim₁b w₁b₁q̇j₁L₁Z b₁x₁Z₁ j₁vi Ab₁y₁iY K₁iZ n₁te -

- B₁Ä₂bi t₁K₁v₁b Ask₁ K₁v₁R b₁v K₁i₁t₁j m₁iv₁m₁i Z₁v b₁v L₁j₁ Î₁Ui K₁viY Ab₁y₁Üv₁b K₁iZ n₁te
- mn₁R t₁±K R₁iU₁j Ac₁v₁i₁k₁t₁b t₁h₁Z n₁te
- Kg mg₁t₁q m₁óub K₁iv h₁v₁q G ai₁bi t₁PK t₁±K t₁e₁k mg₁q ^i₁K₁vi n₁q Ggb t₁P₁K₁i w₁^K₁ Av₁M₁t₁Z n₁te
- c₁_g₁Z B₁Ä₂bi ev₁t₁i t₁±K t₁f₁Z₁±i w₁^K₁ Î₁Ui K₁viY Ab₁y₁Üv₁b K₁iv
- Î₁Ui K₁viY Ab₁y₁Üv₁b w₁b₁t₁Ri Ges B₁Ä₂bi w₁biv₁c₁Ev₁ c₁iZ A₁w₁aK ,i₁z₁ w₁^Z n₁te|

Av₁m₁b₁ Ge₁vi B₁Ä₂bi i q̇v₁te q̇Y c⁻q̇c₁ j₁vi t₁R₁b t₁bB|

B₁Ä₂bi i q̇v₁te q̇Y c⁻q̇c₁ j₁viK m₁v₁iYZ ^w₁bK, w₁bqgZ₁w₁šK I FZ₁š₁ G P₁viU f₁v₁t₁M f₁v₁M K₁iv t₁h₁Z cv₁i|

- 1□ mvaviY iYvteY (General maintenance)
- 2□ `bK iYvteY (Daily maintenance)
- 3□ wbggZwŠK iYvteY (Periodical maintenance)
- 4□ FZzf` iYvteY (Seasonal maintenance)

mvaviY iYvteY

mvaviY iYvteYi wbi`ó
tKvb wbgg tbb| mvaviY
cZivagjK e`vKB
Kwimix iYvteYi wfE
wnmte MnY Kiv DvPZ|

mvaviY iYvteYi Rb` wekI tKvb Kwimix Ávb ev`qZvi cqvRb tbb| gwjK ev
PvjKi mnòymPZbZv Ges mvaviY ÁvbB Zvi Rb` h`ó| D`vniY`ic ejv thZ cvti
thLv tmlvb Mox cws bv Kiv Ges wivc` RvMq ivLv| Avei AbifÁ tjk KZK.ev
eÜy c` BÄb Pvjvb bv Kiv ev BÄbi tKvb Ask hLb-ZLb bv tLjv| mvaviY
iYvteYi wbi`ó tKvb wbgg tbb| mvaviY cZivagjK e`vKB Kwimix iYvteYi
wfE wnmte MnY Kiv DvPZ|BÄb GKU gj`evb m`ú| mZivs GUi cZ hZkxj nZ nte|
G gbvfveB mvaviY iYvteYi gj`eteP` elq nIqv DvPZ|

`bK iYvteY

G aibci`kb I iYvteY PvjK wbr KiZ cvtib| `bK iYvteYi Dci
BÄbi KvhqZv I`qZv wbf Ki| `bK iYvteYi KiYxq KvR, tjjv wbi|c-

1| BÄb ÷vU t`qvi cte KiYxq

K) ajvej ci@vi Kiv t BÄbi ajvej ci`Kvi KiZ nte| Ab`vq Zv dzqj m÷÷g
weN m`ó KiZ cvti|

L) Rvjwb U`stK Rvjwbi cigvY I, Yv, Y cixqv Kiv t Rvjwb U`stK Rvjwbi cigvY
cixqv KiZ nte Ges cqvRb Rvjwbi cigvY ex KiZ nte| U`stK Kg Rvjwb vKtj
wbPi ZjvbxZ cto vKv gqjv Rvjwb cv`ú, BbR±i, KvejiUi Xk G, tjjvi qZmn
A+K+Rv Ki t`Z cvti| th tKvb mgq BÄb eÜ nte thZ cvti| mVK, Yv, Y mgx mVK
Rvjwb e`envi KiZ nte| RvjwbZ thb ajvej, gqjv, cwb ev tRvj bv vK tmm`K
bRi w`Z nte|

M) ^Zjv³KviK tZji (Lubricant) cigvY I, Yv, Y cixqv Kiv t Wc÷÷Ki mrvth`
m`stK+K+m BÄb tZj ev gteji cigvY t`LZ nte| Wc÷÷K`xv gvlv wb`kK`vM
AvQ| wbPi`vMu wbxZg gvlv Ges lciii`vMu D`PZg gvlv wb`k Ki| BÄb ÷vU
t`qvi mgq tZji gvlv G`yvtMi gvSvgs Ae`v`b vKtZ nte| tZji cigvY Kg ev
teik DfqB qZKviK| tZji gvlv ev cigvY cixqv Kivi mgq`xv elqi cZ wekI
`ó ivLZ nte|

c_gZ BÄbU thb mgZj Ae`v`b vK|

wZxqZ t Wc÷÷K+K c`vNyitq tZti Xkvbv hvte bv| tmvRvmyR Wc÷÷K+K m`stK+K+m
tXvKvZ nte| BÄb tZji gvlv ev cigvY gvcvi mgq BÄb tZji AvWtjv ev wci`QjZv
AvQ| wKbv cixqv KiZ nte|

N) kZjKviK cwb cigvY cixqv Kiv t cwb U`stK cwb cigvY Kg vKtj thvM
KiZ nte| BÄbi kZjKiY cxiZi Rb`v`ycwb e`envi KiZ nte| GtZ thb fmgvb
gqjv AveRbv bv vK tmm`K bRi ivLZ nte|

K₁ I c j x Dbqb ⁻q

bgvYKvi x c₁Zôv³bi b⁺kvb₁q₁ (Instruction) μ⁻vsK⁺K⁺m tZj, d₁qj U⁻vs⁺K b₁o⁻
d₁qj, P₁U Ab₁q₁ M₁R I [^]Zjv³ Kiv Ges c₁iP₁v₁b₁ c₁μ₁q₁ i ⁻ZKv₁j I Ab⁻v⁻b⁻ K₁R₁ t₁jvi
jM-eB (Log-book) %Z₁i Ki⁺Z n₁e|

O) eÜbh₁y I teëh₁y tRv₁o, j (Joint) cix₁q₁ Kiv t Bi⁺Ä⁺bi e₁fb b₁U-eë⁺z msh₁y³ Ges
d⁻v⁻b te⁺ë⁺i tUbkb cix₁q₁ K⁺i c⁺q₁Rb Ab₁y₁t₁i G₁t₁U ev Xj₁v K⁺i ⁻z n₁e|

P) ⁻úvK c₁vM ev Bb⁺t₁R⁺±i Ges Q₁vK₁ib c₁i₁o₁vi Ki⁺Z n₁e|

Q) μ₁q₁vi c₁ieZK j fvi b₁D₁U₁vj Ae⁻v₁t₁b i₁vL⁺z n₁e|

2| Bi⁺Ä⁺b Pj₁vK₁t₁j KiY₁q

K) μ₁g₁U₁i cix₁q₁ Kiv t W⁻vm tev₁W μ₁g₁U₁i, t₁jv P₁vjyAv₁t₁Q K₁b₁v, e₁t₁k₁I K⁺i g₁e₁j μ₁g₁U₁i VK
Av₁t₁Q K₁b₁v cix₁q₁ K⁺i t⁻L⁺z n₁e|

L) Bi⁺Ä⁺b Pj₁yK₁ivi ci Kgc₁t₁q 5 μ₁g₁U₁U tev₁S₁v₁x₁b Ae⁻v₁q Pj₁v₁t₁b₁t Bi⁺Ä⁺b Pj₁y₁ ci ciB tev₁S₁v
t⁻q₁ D₁iPZ bq| Bi⁺Ä⁺bi Ac₁v₁t₁i₁U₁s Z₁vcg₁v₁î₁v jvf Ges e₁fb As₁t₁k %Z₁jv³K₁viK VK gZ
t₁c₁S₁Q₁t₁Z Bi⁺Ä⁺bK Kgc₁t₁q 5 μ₁g₁U₁U tev₁S₁v₁x₁b Ae⁻v₁q Pj₁t₁Z ⁻z n₁e|

M) bZ₁z ev t₁g₁iv₁gZ t₁k₁t₁I Bi⁺Ä⁺b P₁t₁j₁v₁ t bZ₁z ev t₁g₁iv₁gZ t₁k₁t₁I Bi⁺Ä⁺bK c₁_g 50 NÈ₁v c₁Y
tev₁S₁v ⁻z₁q Pj₁v₁t₁b₁ D₁iPZ bq| bZ₁z ev t₁g₁iv₁gZ t₁k₁t₁I Bi⁺Ä⁺b Pj₁v₁t₁b₁vi d₁t₁j Bi⁺Ä⁺bi N₁l₁b₁k₁x₁j
Ask q₁ c₁v₁ß n₁t₁q ⁻U₁b₁v NU₁t₁Z c₁v₁t₁i| Z₁vB c₁_g 50 N₁U₁v Bi⁺Ä⁺bK A₁í tev₁S₁v ⁻z₁q Pj₁v₁t₁Z
n₁e| Bi⁺Ä⁺bK ⁻x₁N₁ ⁻b Kg₁q₁g i₁vL⁺z h₁s₁vs₁t₁ki M₁iZ I tev₁S₁v ax₁t₁i ax₁t₁i evoi₁t₁b₁ D₁iPZ|

N) Bi⁺Ä⁺b t₁Z₁t₁j₁i ce₁vn ch₁te₁q₁Y Kiv t Bi⁺Ä⁺b Pj₁vK₁t₁j Bi⁺Ä⁺b t₁Z₁t₁j₁i ce₁vn ev Pj₁vPj t₁K₁v₁b
K₁vi₁Y eÜ n₁t₁j A₁í mg₁t₁qi g₁t₁a⁻B Bi⁺Ä⁺bi mg₁t₁q₁ ⁻q₁Z n₁t₁Z c₁v₁t₁i| Z₁vB, Bi⁺Ä⁺b t₁Z₁t₁j₁i ce₁vn
n₁t₁q₁ K₁b₁v Z₁v ch₁te₁q₁Y Ki⁺Z n₁e|

O) tZj I R₁vj₁U₁bi AcPq n₁t₁q₁ K₁b₁v ch₁te₁q₁Y Kiv t M⁻vm₁t₁KU, e₁eq₁v₁is, ev μ⁻vsK t₁K₁t₁mi
g₁v₁î₁v₁Z₁i³ tZj Ab⁻ t₁K₁v₁b f₁v₁te AcPq n₁t₁q₁ K₁b₁v cix₁q₁ Ki⁺Z n₁e| R₁vj₁U₁bi mie₁iv₁n j₁vB₁t₁b
î₁U₁, ev Ab⁻ K₁vi₁Y R₁vj₁U₁bi AcPq n₁t₁q₁ K₁b₁v t⁻L⁺z n₁e|

P) bMg₁b ag₁ ch₁te₁q₁Y Kiv t Bi⁺Ä⁺bi b₁MZ ag₁vi iO t⁻L î₁U₁i K₁viY Ab₁y₁Ü₁v₁t₁bi tPó₁v
Ki⁺Z n₁e| t₁e₁k c₁ig₁v₁t₁Y m₁v⁻ M⁻vm ⁻c⁻÷⁻b ⁻is q₁n₁t₁q h₁v₁I₁q₁v Ges K₁v₁t₁jv M⁻vm R₁vj₁U₁bi m₁o₁ú₁Y₁
b₁v R₁j₁vi P₁Y₁ enb K⁺i|

Q) Bi⁺Ä⁺bi A⁻v₁f₁weK k₁ã ev K₁o₁úb ch₁te₁q₁Y Kiv t Bi⁺Ä⁺b A⁻v₁f₁weK k₁ã ev K₁o₁úb n₁t₁j
m₁v₁t₁ m₁v₁t₁ Bi⁺Ä⁺b eÜ K⁺i K₁viY Ab₁y₁Ü₁v₁b Ki⁺Z n₁e| n₁V₁r Bi⁺Ä⁺b eÜ n₁I₁q₁v ev A₁ib₁q₁igZ
K₁ih₁μ₁g c⁻k₁t₁bi K₁viY Ab₁y₁Ü₁v₁b Ki⁺Z n₁e|

3| Bi⁺Ä⁺b eÜ Kiv Ges eÜ Kivi ci KiY₁q

K) Bi⁺Ä⁺b eÜ Kivi c₁te tev₁S₁v₁x₁b Ae⁻v₁q 5 μ₁g₁U₁U Pj₁v₁t₁b₁ D₁iPZ|

L) WK#úkb j fvi tU#b BÄb eÜ bv Kiv t- BÄb#K ti ,tjU#ii mvrn#h" eÜ Ki#Z n#e|
Zvic#e tevSv bmg#q tdj#Z n#e| WK#úkb j fvi tU#b BÄb eÜ Kiv D#PZ bq|

M) GMR÷ I Bb#UK fvj f#K eÜ ivLvt BÄb e#Üi ci GMR÷ I Bb#UK fvj f eÜ ivL#Z
n#e| bZ#v tLv#v Ae⁻vq WKQy`#bi g#a" B fvj f I jvBb#i g#iPv ai#Z cv#i|

WbqgZ#ŠK iYv#eY

G iYv#eY#Yi Ašf,³ eü msL"K c#Z#ivag#K e"e⁻v i#q#Q | G iYv#eY#Yi D#iK"
n#Q- AbjgW"Z KvhKv#j i g#a" ⁻vfweK Kwimix Ae⁻v#K Wb#Z Kiv|

BÄb#bi WbqgZ#ŠK iYv#eY

K) c#Z Wkd#Ui ci KiYxq t W`#bi t#k#l ev`#Wv Wkd#Ui ga"eZx mg#q (Wei#Z Kv#j) m#úb
Ki#Z nq|

L) L# ajveWj Ae⁻vq KvR Ki#j t ajveWj c#i⁻Kvi, evqyc#i@Kvi#Ki ^Zj e`jv#bv ev
Gqvi Gj#g>U (Air element) c#i⁻Kvi Ki#Z n#e|

M) bZ# BÄb n#j c_g 2/3 evi c#Z WkdU Aši Aši BÄb A#qj c#ieZb Ki#Z n#e|

G iYv#eY#Yi W⁻ZKvj 50 Wg#b#Ui t#k n#lqv D#PZ bq|

Wb# WbqgZ#ŠK iYv#eY#Yi KiYxq KvR ,tjv Av#jvPbv Kiv n#jv -

BÄb c#Z 50 N>Uv e"env#ii ci KiYxq

c#Z 50 N>Uv Pjv ev 450 WjUvi RvjWb e"env#ii ci -

- RvjWb U"vsK c#i⁻Kvi d#Bb d#qj Wd#vi I tKvm d#qj Wd#vi n#Z ZjWb
Acmv#Y Kiv| c#qvR#b RvjWb mieivn Ki#Z n#e|
- tiW#qU#i c#i⁻Kvi cWb W`#Z n#e ev e`jv#Z n#e|
- ^Zjv³KviK (g#ej) c#ieZb Ki#Z n#e|
- Gqvi Wkbvi I Wm>Uv dDMvj I#qj Wd#vi c#i⁻Kvi Ki#Z n#e|
- d"vb e"v#ëi Uvb cix#v Ki#Z n#e|

BÄb c#Z 100 N>Uv e"env#ii ci KiYxq

- c#Z 15 KvH>Uv Pjv ev 1600 WjUvi RvjWbi e"env#ii ci t g#jvi (Mufler)
n#Z RgvKZ.Kieb Acmv#Y Ki#Z n#e|
- BÄb μ"vsK#Km, d#qj cv#ú n#DR MfY#ii g#ej c#ieZb Ki#Z n#e| i#Uv
gWdK W#fb hšvs#k tZj gWjk Ki#Z n#e|
- d"vb e"v#ëi Uvb cix#v Ki#Z n#e| fvj f I fvj f ,tjvi Avmb, iKvi Avg I Pvc
Kgv#bv hšvs#ki g#a" #q WbqšY I tgi#gZ Ki#Z n#e|
- Gqi Wkbvi m#gc (Sump) Wd#vis B#j#g>U (Sump) ,tjv c#i⁻Kvi Ki#Z n#e|
mvr#úUv c#i⁻Kvi g#ej Øviv c# Ges Wkbv#ii tRiov Bb#UK jvB#bi evqytivaxZv
cix#v Ki#Z n#e|

K_hl I c jx Dbqb $\bar{q}$

B_hÄb c_hZ 300 N_hUv e^{en}i i ci KiYxq

c_hZ 300 K_hN_hUv ev 2000 $\mathbb{J}$ Uvi R_vj_vmb e^{en}i i ci -

- $\mathbb{W}e\ddot{K}l\ cix\mathbb{V} \div \bar{v}\hat{U}\ d\dot{z}j\ c\mathbb{V}\acute{u}\ K\ cix\mathbb{V}$ Ges c_hq_vR_hb e^j v_hZ n_he|
- $f\dot{v}j\dot{f}\ \mathbb{M}q\dot{v}i$ Ges K_g†c_hmb $\mathbb{W}i\mathbb{J}R\ t\dot{g}K\mathbb{V}bR\dot{g}i\ \mathbb{W}Kq\dot{v}i\acute{Y}\ cix\mathbb{V}$ K_hi G_WR_v÷ K_hi_hZ n_he|
- $d'\dot{v}b\ t\dot{e}\ddot{e}\dot{i}\ U\dot{v}b$ Ges $\mathbb{J}i\mathbb{Z}c\dot{Y}\ b\dot{v}U\ I\ e\ddot{e}\mathbb{Z}\mathbb{J}j\dot{v}\ cix\mathbb{V}$ K_hi c_hq_vR_hb G_hU $\mathbb{W}^{\dot{h}}\mathbb{Z}$ n_he|
- $\dagger c\ddot{U}v\dot{j}\ B\mathbb{W}\ddot{A}\dot{b}i\ \dagger\mathbb{V}\hat{I}\ K\dot{v}e\mathbb{Y}U\dot{i}\ c\mathbb{W}i\textcircled{v}i\ \mathbb{W}\dot{W}\dot{R}j\ B\mathbb{W}\ddot{A}\dot{b}i\ B\dot{b}\dot{R}\dot{\pm}i\ R\dot{g}iK\mathbb{Z}.K\dot{v}eb\ c\mathbb{W}i\text{K}vi\ K\dot{h}\mathbb{Z}\ n\dot{h}e|$
- $B\mathbb{W}\ddot{A}\dot{b}i\ \mathbb{W}e\dot{f}b\ Ask\ \hat{Z}j\dot{v}^3\ K\dot{h}\mathbb{Z}\ n\dot{h}e|$

e_vr_miK KiYxq

- $\dagger i\mathbb{W}\dot{q}U\dot{i}\ c\mathbb{W}i\text{K}vi\ K\dot{h}\mathbb{Z}\ n\dot{h}e|$
- $c\ddot{h}q\dot{v}R\dot{h}b\ B\mathbb{W}\ddot{A}\dot{b}\dot{K}\ I\ f\dot{v}i\ n\mathbb{W}js\ K\dot{h}\mathbb{Z}\ n\dot{h}e|$

$\bar{x}N\dot{t}gq\dot{v}\ \bar{x}\ ms\dot{i}\mathbb{V}\dot{Y}\ KiYxq$

- $R\dot{v}j\mathbb{V}b\ U'\dot{v}sK\ n\dot{h}\mathbb{Z}\ m\acute{u}\mathbb{Y}\ R\dot{v}j\mathbb{V}b\ t\dot{e}i\ K\dot{h}i\ \mathbb{W}^{\dot{h}}\mathbb{Z}\ n\dot{h}e|$
- $\hat{Z}j\dot{v}^3K\dot{v}iK\ c\mathbb{V}b\ t\dot{e}i\ K\dot{h}i\ \mathbb{W}^{\dot{h}}\mathbb{Z}\ n\dot{h}e|$
- $B\dot{b}\dot{h}UK\ I\ GMR\div\ f\dot{v}j\dot{f}\ e\ddot{U}\ Ae\text{v}q\ i\dot{v}L\dot{h}\mathbb{Z}\ n\dot{h}e|$
- $\bar{x}N\ t\dot{g}q\dot{v}\ \bar{x}\ ms\dot{i}\mathbb{V}\dot{Y}\ \mu\text{v}SK\dot{h}K\dot{h}mi\ \dagger Zj\ c\mathbb{W}ieZ\dot{b}\ Ges\ \mathbb{W}e\dot{f}b\ cK\dot{v}i\ msh\dot{y}^{\dot{b}}\ I\ h\dot{s}\dot{v}sk\ \dagger Zj\dot{g}q\ K\dot{v}i\ ev\ L\dot{y}j\ \text{Z}\dot{S}\dot{f}\dot{v}\dot{h}e\ i\dot{v}L\dot{v}i\ e\dot{v}e\text{v}\ K\dot{v}i\ t\dot{h}\dot{h}\mathbb{Z}\ c\dot{v}\dot{h}i\ |$
- $\dot{I}K\dot{b}\dot{v}\ I\ c\mathbb{W}i\text{K}vi\ R\dot{v}qM\dot{h}\dot{h}\mathbb{Z}\ Z\dot{v}e\dot{y}ev\ t\dot{g}vU\dot{v}\ c\text{v}\ \mathbb{W}^{\dot{h}}\mathbb{Z}\ \dagger X\dot{h}K\ i\dot{v}L\dot{h}\mathbb{Z}\ n\dot{h}e|$

FZzf_hÄK i_hY_hte_hY

A_ven_vI_qv_i c_hieZ_hbi m_v†_ m_gÄm^h †i_hL FZzf_hÄK i_hY_hte_hY_h†K $\mathbb{Y}\dot{f}\dot{v}\dot{h}M\ f\dot{v}M\ K\dot{v}i\ h\dot{v}q|$

K) t_hngš - k_hZK_h†j i_hY_hte_hY_h†Y KiYxq -

- $_v\dot{t}g\dot{v}\div\bar{v}\hat{U}i\ K\dot{v}h\ cix\mathbb{V}\ K\dot{v}i|$
- $e\text{v}U\dot{v}i\dot{x}\ B\dot{h}jK\dot{h}U\dot{v}j\dot{v}B\dot{h}U\dot{i}\ N\dot{b}Z\ e\mathbb{J}\times\ K\dot{v}i|$
- $B\mathbb{W}\ddot{A}\dot{b}i\ \mu\text{v}SK\dot{h}Km,\ d\dot{z}j\ c\mathbb{V}\acute{u},\ \mathbb{W}Mq\dot{v}i\ e\text{v}\ BZ\text{v}\mathbb{W}^{\dot{h}}\mathbb{Z}\ k\dot{x}ZK\dot{v}j\dot{x}b\ \dagger M\dot{h}Wi\ \dagger Zj\ e\text{en}vi\ K\dot{v}i|$

L) emš - M_x†K_h†j i_hY_hte_hY_h†Y KiYxq -

- $B\mathbb{W}\ddot{A}\dot{b}i\ \mu\text{v}SK\dot{h}Km,\ d\dot{z}j\ c\mathbb{V}\acute{u},\ \mathbb{W}Mq\dot{v}i\ e\text{v}\ BZ\text{v}\mathbb{W}^{\dot{h}}\mathbb{Z}\ M\dot{x}\textcircled{S}K\dot{v}j\dot{x}b\ \dagger M\dot{h}Wi\ \dagger Zj\ e\text{en}vi\ K\dot{v}i|$
- $e\text{v}U\dot{v}i\dot{x}\ B\dot{h}jK\dot{h}U\dot{v}j\dot{v}B\dot{h}U\dot{i}\ N\dot{b}Z\dot{h}K\ n\dot{v}m\ K\dot{v}i|$

- Kzjs m#÷g n#Z RgvKZ.Kvib AcmviY Kiv|

Avq#`i t`#k mvaviYZ kvZ - Mx8 Pig fvevcb bq e#j G i¶Yvte¶Y tZgb ,i#Z c#bq|
Z#e e/vKv#j BÄb#K e#ó ev`j t\_#K i¶vi e`v Ki#Z n#e| Ab`vq BÄb#i hšisk g#iPv
a#i `vqvZ K#g hv#e|

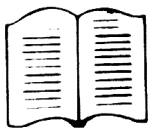
BÄb#i ¶KQymvaviY ÎU I Zvi c#ZKvi ¶b# Av#jvPbv Kiv n#jv-

ÎU	KviY	c#ZKvi
BÄb ÷vU nq bv	1 tmjd óUvi Nji bv K) e`vUvix P/R Kg L) e`vUvixi Uv#gby ¶Xjv ev ¶q n#q tM#Q 2 U`vs#K Rvjv¶b tbB	K) e`vUvix tPK Ki#Z n#e L) Uv#gby c#i@vi Ges m#hvM UvBU Ki#Z n#e 2  U`vs#K Rvjv¶b fi#Z n#e
	tc#Uvj BÄb#i t¶#Î 1 BM¶bkb m#P eÜ 2 ÎUc#ev gqjvhy `úvK c#M I Kb#Wbmvi 3 BM¶bkb UvBigs m#VK bq 4 Kb#Wbmvi ÎUc# 5 Rvjv¶b mieivn eÜ	1 m#P PvjyKi#Z n#e 2 c#i@vi Ki#Z n#e ev c#ieZb Ki#Z n#e 3 UvBigs ¶VK Ki#Z n#e 4 c#ieZb Ki#Z n#e 5 Rvjv¶b mieivn ¶b#Z Ki#Z n#e
	¶W#Rj BÄb#i t¶#Î 1 Rvjv¶b mieivn jvB#b evZvm X#K#Q 2 Rvjv¶b ¶dëvi eÜ 3 Rvjv¶b c#ó AvU#K hv#Q K) c#Ävi AvU#K hv#Q L) ¶ús fv#v M) Ask ,#jv ¶qcvß 4 Bb#RKUi ÎUc# K) ¶ús P/c Kg ev ¶ek L) bRj ¶Q` eÜ	1 n`U c#Bgi Pvjbv K#i evZvm#K UvYdvi c#ó, Rvjv¶b ¶dëvi Ges Bb#RKkb c#óú c#ek c_ t_#K tei K#i ¶#Z n#e 2  c#qvRbgZ c#i@vi ev c#ieZb Ki#Z n#e 3  Ab#g#`Z ¶Wjv#ii Kv#Q tgivg#Zi Rb` c#v#Z n#e
	-----	-----
	BÄb#i AibqgZ Kv#µg Ges c# `¶Zv	1 c#i@vi Ki#Z n#e/evq#ei Ki#Z n#e 2 bRj c#ieZb Ki#Z n#e 3 d#j c#ó GWRv÷ Ki#Z n#e 4 Bb#RKkvb tcmvi GWRv÷ Ki#Z

ARb bv Kiv	4 Bb†R±i Kg ev ǂeǂk Rvjǂb †ˉú Kiv ev eÜ ˉvK†j 5 ˉí ms†KvPb K) KveǂiU†ii †PvK I ˉU fvj f ǂUjv nIqv L) fj fvj f ev fj ˉvcb M) ǂmǂjŮvi †n†Wi Mˉvm†KU ǂUjv N) fj ǂc ÷ b ev ǂis I jvBbvi O) gqjvhyǂ evqycǂi@viK	nǂe K) cǂi@vi Ges UvBU Kiv L) †U†cU ǂKqvi GWRv ÷ Kiv M) ǂmǂjŮvi †nW ˉp Kiv Ges c†qvR†b Mˉvm†KU cǂieZb N) cǂi@vi Ki†Z nǂe I mǂVK ˉvcb Ki†Z nǂe O) cǂi@vi Ki†Z nǂe
ǂǂU	KviY	cǂZKi
BǂĀb AǂZǂi ³ Mig n†"Q	1 kǂZj xKvi†Ki Afve 2 dˉvb ǂeë ǂXjv 3 ˉvǂgǂóˉvU fvj f A†K†Rv ˉvK†j 4 Nbǂqǂb hšvsk ˉǂjv ǂeǂk hvg ev ǂXjv n†j 5 IqvUvi cǂvú KvR Ki†Q bv 6 ˆZjv ³ KvIK †Zj cǂZjv n†j Ges μˉvsK†KB†R †Zj ǂeǂk n†j 7 IqvUvi Rˉv†KU gqjv ev Pǂbi AveiY co†j 8 BMǂbkb UvBǂgs mǂVK bq 9 AǂZǂi ³ ǂevSv n†j -----	1 †iǂW†qU†i cǂb mieivn Ki†Z nǂe 2 dˉvb ǂeë c†qvRbgZ Gǂu (Tight) ǂˆ†Z nǂe 3 Lvivc fvj f cǂieZb Ki†Z nǂe 4 cǂiˉKvi ev Gǂu ǂˆ†Z nǂe 5 †givgZ ev eˉ jv†Z nǂe 6 mǂVK ˆZjv ³ KiY Ki†Z nǂe 7 cǂiˉKvi Ki†Z nǂe 8 BMǂbkb UvBǂgs ǂVK Ki†Z nǂe 9 ǂevSv Kgǂ†Z nǂe -----
BǂĀ†b ǂeǂk Rvjǂb LiP n†"Q	1 Rvjǂb mieivn jvB†b ǂQˉ ˉvK†j 2 KveǂiUi ǂVK gZ ǂUDǂbs Kiv nqǂb 3 Bb†R±i ǂǂUcY 4 BǂĀ†bi hǂšK Aeˉv Lvivc 5 evqǂvǂb gqjv hyǂ ˉvK†j 6 BǂĀb AǂZǂi ³ Mig n†j -----	1 †givgZ Ki†Z nǂe 2 KveǂiUi mǂVK fvǂe ǂUDǂbs Ki†Z nǂe 3 Bb†R±i †givgZ ev cǂieZb Ki†Z nǂe 4 †givgZ Ki†Z nǂe 5 cǂiˉKvi Ki†Z nǂe 6 BǂĀb kǂZj Ki†Z nǂe -----
BǂĀb †ˉǂK AˉvfvǂeK ǂavqǂ ǂei nIqv 	Kv†jv ǂavqǂ ǂei n†j 1 dǂqj Bb†R±i ǂUi cǂvú ǂǂUcY 2 bRj gqjvhyǂ 3 AǂZǂi ³ ǂevSv n†j 4 †fRvj Rvjǂb eˉenvi Ki†j	1 cǂvú †givgZ Ki†Z nǂe 2 cǂiˉKvi Ki†Z nǂe 3 ǂevSv Kgǂ†Z nǂe ev Kg MǂZ†Z Pǂjv†Z nǂe 4 Rvjǂb cǂieZb Ki†Z nǂe

	5 Achvß evqynieivn 6 Rvjvmb mieivn AvtM ev cti nti (AvtM nti Kvti Avt cti nti mv`v taqv)</p> <p><b>mv`v taqv tei nti - 1 BvAb AvZi³ kvZj nti 2 msKvPb Pvc Achvß nti 3 Rvjvmbi mvt_ cvb vgti bxj av tei nti - 1 μ`vsK kvdtU AvZi<sup>3</sup> tZj </p> <p>2  tZj cvZjv </p> <p>3  vc÷b ev vc÷b vis ev jvBvti i`vbPzZ ----- 1 Rvjvmb tkl nti hvIqv 2 Rvjvmb cvBc eÜ 3 Rvjvmb vmt÷tg evqyctek KtiQ 4 Rvjvmb QvKbx eÜ 5 vWtRj U`vtKi tfe tnvj eÜ</p> <p>6  RvjvmbZ cvb itgiQ </p> <p>7  vcób vmtj Ůvti AvUk hvIqv </p> <p>8  KvbtKUs iW vevqvis ev tgbB vevqvis AvUk hvIqv </p> <p>9  Kv`vž kvdU AvUk hvIqv	5 evqyci`Kvi cvi`vi KiZ nte 6 GWRvó KiZ nte 1 Mig KiZ nte 2 K) fvj f cii`Kvi I MbŮ KiZ nte </p> <p>L) tUtcU vKvtiY GWRvó KiZ nte </p> <p>M) vmtj Ůvti tnW MvmtKU e`jvtZ nte N) vIq nti hvIqv vcób vis e`jvtZ nte </p> <p>3  Rvjvmb cieZb KiZ nte </p> <p>1) AvZi<sup>3</sup> tZj AcmtiY KiZ nte </p> <p>2  tZj cvieZb KiZ nte </p> <p>3  GWRvó KiZ nte </p> <p>-----</p> <p>1  U`vtK Rvjvmb mieivn KiZ nte 2 cii`Kvi KiZ nte </p> <p>3  evqytei KiZ nte </p> <p>4  cii`Kvi ev cieZb KiZ nte 5 cii`Kvi KiZ nte </p> <p>6  tPK Ges cieZb KiZ nte </p> <p>7  tPK I cieZb KiZ nte </p> <p>8  tPK I cieZb KiZ nte </p> <p>9  tPK I cieZb KiZ nte </p> <p>1  mVK fvt`nvcb I bvU GtU`tiZ nte 2 tPK, ctqrbt taš ev cieZb KiZ nte 3 fvj f vKvtiY GWRvó KiZ nte 4 GWRvó KiZ nte
----- BvAb nvvr eÜ nti hvIqv 		
BvAb KvúZ nIqv	1 vfvEi Dci BvAb vVKgZ vvcZ bv nti ev bvU tevë vXjv vKti 2 GK ev GKvAK dazj BbtRti AKvhtKi nti 3 fvj f vKvtiY vVK bv vKti 4 vmtj Ůvti vcóbt gi ta`teik	

	duK _vK†j 5 cavb Ges ıem GŪ ıeqvıis ıXjv 6 ıcób, ıcó ıcb I ıis Gi cvk†`k †ek ıq cvß n†j 7 μ˘ısk k˘ıdu I Kv†bKıUs iW GjvBb†g†U f† n†j 8 BıÄb AıZıi ³ Mig n†j	5 GWRıó Ki†Z n†e 6 ıqcvß Ask cıieZb Ki†Z n†e 7 GWRıó Ki†Z n†e 8 BıÄb kxZjxKib Ki†Z n†e
----- AıZıi ³ †Z†ji AcPq	1 cvZjv ev Lvıvc iK†gi †Zj 2 BıÄb AıZıi ³ Mig nıqv 3 M˘ıvm†KU, ıeqvıis I Ab˘ıvb˘ c†_ †Z†ji AcPq 4 μ˘ısk†K†m gvııZıi ³ †Zj _vK†j	1 cıieZb Ki†Z n†e 2 BıÄb kxZj Ki†Z n†e 3 AcPq eÜ Ki†Z n†e 4 cııgvb gZ †Zj ivL†Z n†e
----- †Z†ji Kg PıC	1 †Z†ji cııgvY Kg 2 cvZjv †Zj e˘envı 3 I†qj cvıú gqjvhy˘ ev eÜ _vKv 4 †Zj Pv†ci ıııjd fvj ÎııUhy˘ _vK†j 5 I†qj cvıú †ek ıKqv†ıY _vK†j 6 †gBb ev Kv†bKıUs iW ıeqvıis G †ek ıKqv†ıY _vKv 7 †cmvı †MR cvB†c ÎııU ev ıQ˘ _vKv	1 c†Y Kiv 2 †Zj cıieZb Ki†Z n†e 3 cıııKvi Ki†Z n†e 4 ıb†`kvbııqıx ıvcb Kiv 5 cıieZb Ki†Z n†e 6 †gıvgZ Ki†Z n†e 7 †PK Ki†Z n†e
----- †Z†ji D˘P PıC	1 Nb †M†Wi †Zj e˘envı 2 †cmvı ıııjR fvj f R˘ıvg 3 †Z†ji M˘ıvjvıx gqjvhy˘ 4 I†qj †cmvı †MR mıVK bv	1 cıieZb Ki†Z n†e 2 ıb†`kvbııqıx GWRv÷ Kiv 3 cıııKvi Kiv 4 †gıvgZ ev cıieZb Ki†Z n†e



mıigg t GKıU BıÄ†bi ıefb hšvsk mıVKfv†e ıbı`ó mg†q iıYv†eıY Ki†Z nq | GQıov I BıÄ†b †Kıv mgm˘v †`Lv ı`†j Dchy˘ KviY LıR †ei K†i Zvi mıVK cııZKvi Kiv DııPZ |



cv†VıEı gf˘ıqb 2.4

mıVK DĖ†ıi cv†k ıUK ıPıY (√) ı`b |

1. BiÄþbi maviY µU bimþb þKvbU AbjriYxq bq ?

- K) BiÄþbi þKvb Ask KvR bv Kiþj mivm i Zv bv Lþj µUi KvY AbjÜvþb evni þ_K þfZþii `þK AMmi nIqv|
- L) Kg mgþq mþúb Kiv hvq Ggb þPK þ_K þek mgq `iKvi Ggb þPKi `þK AvMþbv|
- M) µUi KvY AbjÜvþb þþRi I BiÄþbi þbivcËvi cZ AaK , iZ þ`qv|
- N) BiÄþbi cZU hþsk Lþj cþiþvi Kþi µU bimþb Kiv|

2. U`vsþK Kg Rvjvbi ZjvbxþZ þKvbU ¶ZM® nþe ?

- K) þgBb eqwis `þj eqwis|
- L) `cþb, `cþb is I `cþb cb|
- M) Rvjvþb cþú, BþRþi I KþþiUi|
- N) KvþbKUs iW, K`vg k`vdU I µ`vsK k`vdU|

3. BiÄb þZj ev gþþj i gþv gvcvi mgq Wc`þKþK µ`vsK Kfvþe XþþþZ nþe ?

- K) GK cþP NþþZ
- L) me , þjv cþP Nþþq|
- M) AþaK cþP Nþþq|
- N) mþvþR cþP bv Nþþq

4. bZb BiÄþbi þ¶þ c_g 2/3 evi e`envi Kivi mgq KLb Aþqj cþieZb KiþZ nþe ?

- K) 5 `gþbU Aþi|
- L) 10 NþUv Aþi|
- M) 50 NþUv Aþi|
- N) 50 `gþbU Aþi|

5. þKvb mgq Rvjvþb U`vsK cþiþvi ev þiWþqUþi cþb mþþvRb ev e`jþþZ nþe ?

- K) cþZ 50 NþUv Aþi|
- L) cþZ 100 NþUv Aþi|
- M) cþZ 300 NþUv Aþi|
- N) cþZ 1000 NþUv Aþi|

6. þKvb mgq BiÄb µ`vsK þKm dþqj cþú nþDR MfYþii gþej cþieZb KiþZ nþe ?

- K) cþZ 50 NþUv Aþi|
- L) cþZ 100 NþUv Aþi|

$K_{\parallel} I \text{ c j x Dbqb } \overline{q}$

M) $c_{\parallel} Z 300 N_{\times} U_{\vee} A \check{s} i |$

N) $c_{\parallel} Z 1000 N_{\times} U_{\vee} A \check{s} i |$

7. $B_{\parallel} \check{A} b \text{ , } \text{'v} \ddot{g} m s i \text{ ¶ } \ddot{Y} i m g q D_{\parallel} P Z b q -$

K) $R_{\vee} j_{\vee \parallel} b U^{\vee} s K n \ddot{z} m \acute{u} \Upsilon R_{\vee} j_{\vee \parallel} b \text{ ¶ } e i K \ddot{z} i \text{ ¶ } \text{'q}_{\vee} |$

L) $k_{\vee} Z j K_{\vee} i K c_{\vee \parallel} b \text{ ¶ } e i K \ddot{z} i \text{ ¶ } \text{'q}_{\vee} |$

M) $B b \ddot{z} U K \text{ ¶ } I G m R_{\vee} \div f_{\vee} j f e \ddot{U} A e^{\vee} q i_{\vee} L_{\vee} |$

N) $B_{\parallel} \check{A} b m P j \text{ ¶ } I M i g i_{\vee} L_{\vee} i R b^{\vee} \div \vee U \text{ ¶ } \text{'q } i_{\vee} L_{\vee} |$

8. $\text{¶ } K f_{\vee} \text{ ¶ } e B_{\parallel} \check{A} b e \ddot{U} K i_{\vee} D_{\parallel} P Z ?$

K) $\text{ ¶ } i \text{ , } \text{ ¶ } j U \text{ ¶ } i i m \vee n \text{ ¶ } h^{\vee}$

L) $\text{ ¶ } W m \text{ ¶ } \acute{u} k b \text{ ¶ } j f_{\vee} i \text{ ¶ } U \text{ ¶ } b$

M) $G M R_{\vee} \div \text{ ¶ } B b \ddot{z} U K f_{\vee} j f e \ddot{U} K \ddot{z} i$

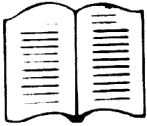
N) $d^{\vee} \vee b \text{ ¶ } e \ddot{e} \text{ ¶ } U \text{ ¶ } b$

cV 2.5 `e`ÿZK tgvUšii cKvišf` I e`envi

G cV tKšI Avcib —



- weifb cKvi `e`ÿZK tgvUšii bvg ejšZ cvišeb|
- tKvb cKvi we`ÿZ tKvb tgvUi Pšj jLšZ cvišeb|
- tKvb Kvr Kx aišbi `e`ÿZK tgvUi e`envi nq eYbv KišZ cvišeb|



`e`ÿZK tgvUi w`šq Avgiv weifb cKvi Kvh mšv`b KšI _wK| GKB tgvUi w`šq Avevi me Kvh mšv`b Kiv hvq bv| me tgvUi Avevi GKB aišbi we`ÿZ Pšj bv| Avmš, Avgiv AvšjvPbvi gva`tg `e`ÿZK tgvUšii cKvišf` I e`envi ,šjv tRšb tbB|

we`ÿZi aišbi Dci wšI KšI tgvUšK c\_gZ `šfvšM fVM Kiv hvq -

- (K) WwBšš KvršU (w.w.m.) tgvUi |
- (L) GšvišbšUs KvršU (G. w.m.) tgvUi |

K) WwBšš KvršU (w.w.m.) - tgvUšK wšfvšM fVM Kiv hvq| Gš`i e`envi mn tkšYefVM t`qv nšjv t

• kšU tgvUi (Shunt)

e`envi

- 1□ tšj` (Lathe) e`eüZ nq|
- 2□ tmšUšdšDMvj (Centrifugal) cvšš e`envi Kiv hvq|
- 3□ tgvkb Ušm (Machines tools) G e`eüZ nq|
- 4□ tevqvi I cVLv (Blowers and fans) cšPvjbvš Rb` e`eüZ nq|
- 5□ tšmšcvšKšUs (Receprocating) cvšš wšmš e`envi Kiv hvq|
- 6□ aš MšZ (Constant speed) mšvb PvjK wšmš e`envi Kiv hvq|

• wšiR tgvUi (Series motor)

e`envi

- 1□ `e`ÿZK BZ`Z mšvix (Electric Locamotives) Ujx MvOX BZ`w` Kvrš e`eüZ nq|
- 2□ tKvb fviš e` Dššvjšbi Kvrš e`eüZ nq (Cranes and hoists)|
- 3□ enbKviš (Conveyors) wšmš e`eüZ nq|

• KšDšjšUšf KšššDš (Cumulative Compound)

e`envi

- 1□ DššvjK (Elevators) wšmš e`eüZ nq|
- 2□ enbKviš (Conveyors) wšmš e`eüZ nq|
- 3□ tnfx tcbvi (Heavy planers) wšmš e`envi Kiv hvq|
- 4□ tšwšjs šgšj (Rolling mills) G e`eüZ nq|

L) Aëvi#bUs Kv#i>U (G.m.) tgvUi#K #b#fv#M fVM Kiv hvq

1| tgvU#i i gjb#Zi Dci #fi#E K#i

• #mb#μvbm (Synchronous) tgvUi

#mb#μvbm tgvUi maviYZ
tgvUi tRb#iUi, #d#Kv#q#Y
tP#vi, ^e`ÿZK cvLv,
K#úmv, cvú cf#Z.
c#iP#j#b#i t#i#i e`eüZ nq|

**e`envi** - #mb#μvbm tgvUi maviYZ tgvUi tRb#iUi, #d#Kv#q#Y tP#vi, ^e`ÿZK cvLv, K#úmv, cvú cf#Z. c#iP#j#b#i t#i#i e`eüZ nq| #mb#μvbm tgvU#i i GK#U cavb e`envi nj hLb tKvb ^e`ÿZK jvB#bi cvIqvi d`vKU#i i Aeb#Z N#U, ZLb tmLv#b A#aK D#E#RZ (Overenicated) #mb#μvbm tgvUi e`envi K#i cvIqvi d`vKU#i i Db#Z mvab Kiv hvq|

• Gmb#μvbm (Asynchronous) tgvUi G#K c#i#q `ÿfv#M fVM Kiv hvq -

1| BÜvKkb (Induction) tgvUi

**e`envi** - ^e`ÿZK cvLv, tm#U#dDM#j d#Ri K#úki, tevqvi enbKvix evb #Kb#i (Barn clear) #Wc-#UDe I#qj BZ`w` Kv#R BÜvKkb tgvUi e`eüZ n#q _#K|

BÜvKkb tgvUi#K c#i#q `ÿfv#M fVM Kiv hvq -

K) $\overline{\text{q}}$ i`vj tKR (Squirrel cage)

L) #ú#is (Slip ring) ev IÜ #ivUi (Wound rotor)

2| K#gD#UUi tgvUi (Commutator motors)

G#K c#i#q #b#fv#M fVM Kiv hvq -

K) #m#iR ev BD#b#fv#mj (Series or Universal)

L) K#úb#m#UW (Compensated)

M) m#U (Shunt)

N) #ic#jkb (Repulsion)

O) #ic#jkb ÷vU BÜvKkb (Repulsion start induction)

P) #ic#jkb BÜvKkb (Repulsion enduction)

**e`envi** - K#gD#UUi tgvUi maviYZ tcv#Uej U#m (Protable tools) #K#Pb GcvqY (Kitchen appliance) #n#m#e e`eüZ nq|

t#Ri (Phase) Dci #fi#E K#i -

• #ms#Mj t#R (Single-phase) tgvUi

**e`envi** - ^e`ÿZK cvLv, tm#U#dDM#j cvú, K#úmi, enbKvix tevqvi km` i#K Kivi Rb` tmP cvú, evb #Kb#i #Wc-#UDe I#qj BZ`w` Kv#R #ms#Mj t#R tgvUi e`eüZ nq|

• #_ t#R (Three-phase) tgvUi

**e`envi** - eo eo KvLv#q km` i#K Kivi cvLv, tmP cvú D#I#jK enbKvix BZ`w` Kv#R #_ t#R tgvUi e`eüZ n#q _#K|

tgvU#i i M#Zi Dci #fi#E K#i -

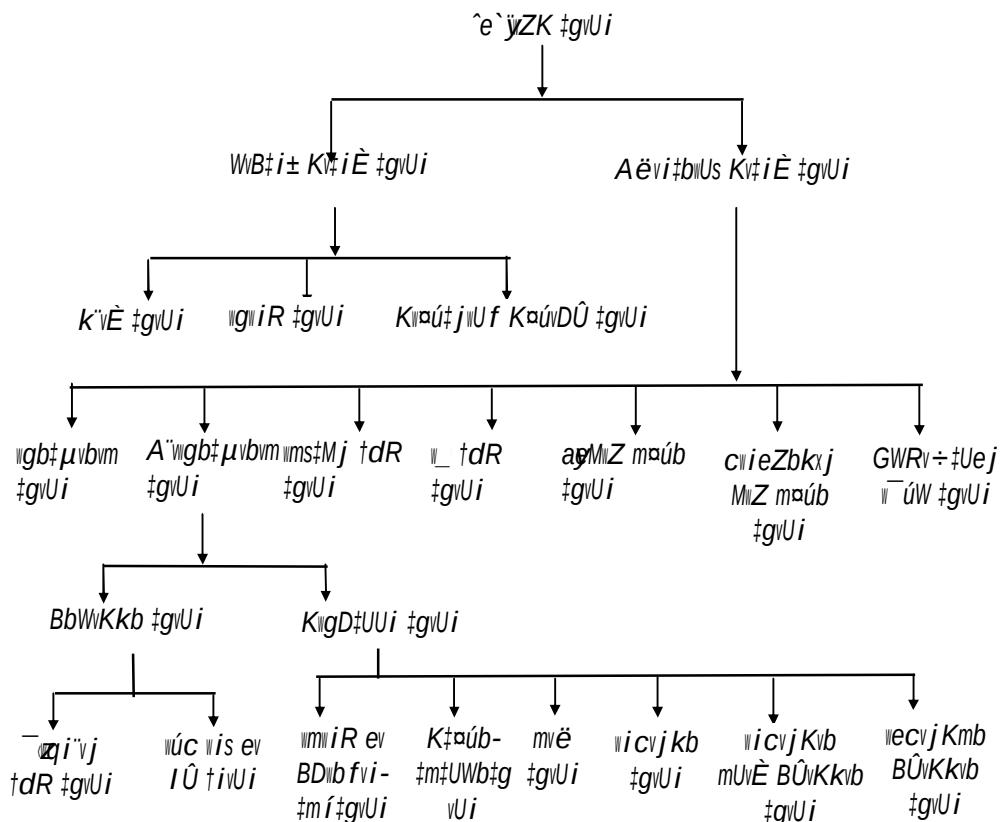
1# a# M#Z (Constant speed) m#úb tgvUi

2# c#ieZbk#j M#Z (Variable speed) m#úb tgvUi

3 GWRvóUej WúW (Adjustable) tgvUi

e`eniv - vjdU μvb BZ` KvR e`eüZ nq|

vbt QKti mvinth` e`yZK tgvUi i cKvif` t`Lvbn n+jv -



mvigg t e`yZi ai#bi Dci vfvÈ K+i, tgvUi i gjbWZi Dci vfvÈ K+i, tD+Ri Dci vfvÈ K+i, tgvUi i Mz i Dci vfvÈ K+i tgvUi K vefbfvte fM Kiv hvq|
 vefb ai#bi tgvUi vefb KvR e`eüZ nq|



K₁/I c j_x Dbqb $\bar{q}$

c_v#V₁Ëi g_f˘qb 2.5

m₁VK DË₁i i c_v#k UK (√) P_y ˘b|

1| ˘e`ÿZi ai#bi Dci ˘f₁Ë K₁i †g_vUi#K Kqf_v#M f_vM Kiv n₁q₁Q?

K) ˘g f_v#M

L) ˘Zb f_v#M

M) P_vi f_v#M

N) c_vË f_v#M

2| †d₁Ri Dci ˘f₁Ë K₁i †g_vUi#K KZ f_v#M f_vM Kiv n₁q₁Q ?

K) ˘g f_v#M

L) ˘Zb f_v#M

M) P_vi f_v#M

N) c_vË f_v#M

3| †j₁˘ #K_vb †g_vUi e˘eüZ nq ?

K) k_vU †g_vUi (˘W.˘m.)

L) ˘m₁iR †g_vUi

M) ˘mb₁μ_vb_vm

N) BÛ_vKkb †g_vUi

4| ˘Wc ˘UDe I₁q₁j ˘b₁Pi †K_vb †g_vUi˘U e˘eüZ nq ?

K) k_vU †g_vUi (˘W.˘m.)

L) K₁ú_vDÛ †g_vUi (˘m.˘m.)

M) ˘mb₁μ_vb_vm †g_vUi

N) BÛ_vKkb †g_vUi

5| ˘q₁i˘˘j †KR K_x ai#bi †g_vUi ?

K) ˘W.˘m. m_vU †g_vUi

L) ˘_ †dR †g_vUi

M) BÛ_vKkb †g_vUi

N) ˘mb₁μ_vb_vm †g_vUi

e'enmIK

cV 2.6 W†Rj BÄ†bi cavb Askmgñ-mbv³KiY I ch†e¶Y

G cV tktI Avcib —



- W†Rj BÄ†bi cavb Ask,†jvi bvg ej†Z cvi†eb|
- W†Rj BÄ†bi cavb Ask,†jv mbv³ Ki†Z cvi†eb|
- W†Rj BÄ†bi Mb Rvb†Z cvi†eb|



W†Rj BÄb eifb hšvsk b†q MvZ| GKU W†Rj BÄb†K ch†e¶Y Ki†j Avgiv b†q³ Ask,†jv t`L†Z cve| Avm† Avgiv GKU W†Rj BÄ†bi cavb Ask,†jv ch†e¶Y I mbv³KiY Ki|

W†Rj BÄ†bi Askmgñ

W†i Askmgñ-t

W†i Ask,†jv e†ki K†i m†jŮvi eK, m†jŮvi tnW I μvsK tKm mgš†q BÄ†bi KvW†gv %Z†i nq| Ask,†jv Abvb Pjbxj KvKix Ask,†jv aviY K†i Ges mg P†c I av°v enb K†i|

Avm†,Gevi GKU W†Rj BÄ†bi Kv†Q hvB GesGi eifb Ask ch†e¶Y Ki| b†q c`E Q†eI mbv³KiY P†y†g†j†q hšvsk,†jv P†y†Z Ki|

W†Rj BÄ†bi Pjg†b Ask mgñ

hšvsk†ki bvg	Q†e/ch†e¶Y	mbv³KiY P†y
m†jŮvi eK		Gi GKL†Ů XvjvB K†i %Z†i BÄ†bi g† KvW†gv gmY Mv†hy† tMvjvKvi m†jŮvi hv† fZi c÷b DV†-bvgv K†i, Gi P†i††K kvZj c†b PjvP†ji iv† I fvj f i†q†Q

<i>hšis:ki bvg</i>	<i>Qie/chteY</i>	<i>mbv³KiY Pý</i>
<i>¶c ÷ b</i>		<i>avZe c`v<sub>+</sub>i %Zi</i> <i>GK<sub>U</sub> †MvjvKvi`Ů,</i> <i>hvi Dc†ii As†k</i> <i>c¶iwa eivei LvRKvUv</i> <i>_v†K ¶c ÷ †bi ¶b†Pi</i> <i>As†k e`vm eivei ¶Q`</i> <i>_v†K G ¶Q` c<sub>+</sub></i> <i>¶c ÷ b ¶cb`viv</i> <i>Kv†bK¶Us i†oi mv₊</i> <i>Bnv hy₊ _v†K </i>
<i>¶c ÷ b ¶is</i>		<i>¶c ÷ †bi Dc†ii As†k</i> <i>c¶iwa eivei LvB KvUv</i> <i>`v†Mi g†a` †MvjvKvi</i> <i>XvjvB †jvrv I B`úvZ</i> <i>Gj†qi %Zi ¶is</i> <i>_v†K Dc†ii mst†KvPb</i> <i>¶is Ges ¶b†P A†qj</i> <i>¶is _v†K </i>
<i>¶c ÷ b ¶cb</i>		<i>¶c ÷ b ¶cb ¶c ÷ b†K</i> <i>Kv†bK¶Us i†oi ¶ž</i> <i>cvš ev †j G†Ůi</i> <i>mv₊ hy₊ i₊L </i>
<i>Kv†bK- ¶Us iW</i>		<i>Kv†bK¶Us iW ¶c ÷ b I</i> <i>μ`vsK k`vd†Ui</i> <i>ms†hvRK`Ů  †j</i> <i>GŮ cvš ¶c ÷ b ¶c†bi</i> <i>gva`†g ¶c ÷ †bi mv₊</i> <i>hy₊ Ges ¶eM GŮ G</i> <i>cvš mivm<i>i</i> μvsK</i> <i>k`vd†Ui mv<sub>+</sub> mshy<sub>+</sub> </i> <i>`jcv†š<i>i</i> ga`eZ_x</i> <i>Ask†K iW e†j </i>

<i>dvB ûBj</i> <i>K`vg k`vdu</i> <i>mmjûvi tnW</i>		<i>dvB-ûBj nj XvjvB †jvnvi %Zi fviX Piv we†k G†K μ`vsK k`vd†Ui GK cv†š mshy Kiv nq (dvB ûB†j LvB KvUv Mqvi _vK†Z cv†i) dvB ûB†j mshy cyi gva`†g BvĀ†bi hvšK kĒĒK AbĒĒ vbiš K†i  </i></p> <p><i>K`vg k`vdu XvjvB B`uvZ ev †jvnvi %Zi</i> <i>`û ek†I  GUv μ`vsK k`vd†Ui mv_ UvBigs Mqv†i i mrv†h` mgvšivj fv†e hy _v†K K`vg k`vd†Ui WavKvZ Ask†K K`vgi e†j  K`vtgi DPAsk†K †Uv (Toe) Ges we`Z. bPz Ask†K nj (Heel) e†j  K`vg I c† i†oi mrv†h` K`vg k`vdu Kavkb †Pav†i i fvj f chvqμ†g †Lvjv I eÜ Kivi cμqv†K bqšY K†i  G k`vd†U K`vg QvWvI GK ev GKvaK Mqvi hy _vK†Z cv†i </i> <i>mmjûvi tnW XvjvB K†i GK L†û %Zi</i>
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$\text{mmj}\hat{U}i$ $\dagger nW$ $M^{\text{vm}}\dagger KU$	$Kiv\ nq G\dagger K\ b^vU\ I$ $\dagger ev\ \overline{\text{q}}\ \text{mmj}\hat{U}i$ $e-\dagger Ki\ Dci\ AvUKv\dagger bv$ $_v\dagger K G\dagger Z\ Bb\dagger R\pm i$ $AvUKv\dagger bv\ i\ \overline{\text{Q}}^{\text{'}}\text{'},\ evZvm$ $c\dagger ek\ I\ \dagger cvov\ M^{\text{vm}}$ $\text{bm}g\dagger bi\ \overline{\text{Q}}^{\text{'}}\ Ges$ $A\dagger bK\ \dagger \hat{\text{q}}\dagger \hat{I}\ f_vj\ f$ $PjvP\dagger j\ i\ \overline{\text{Q}}^{\text{'}}\ _v\dagger K$ $Zvgv\ ev\ GR\dagger e\div v\dagger i\ i$ $\%Zv\ i\ M^{\text{vm}}\dagger KU\ \text{mmj}\hat{U}i$ $eK\ I$
$\text{mmj}\hat{U}i$ $\dagger nW$ $Kfvi$	$\text{mmj}\hat{U}i\ \dagger n\dagger Wi\ gv\dagger S$ $_vcb\ Kiv\ nq GUv$ $\hat{\text{q}}\text{qc}v\beta\ n\dagger j$ $\text{mmj}\hat{U}i\dagger i\ \dagger fZi$ $K\dagger \text{oumb}\ Pvc\ K\dagger g$ $Bv\ \ddot{A}\dagger bi\ Kvh\ \hat{\text{q}}\text{g}Zv\ nvm$ cvq
$\mu^{\text{vs}}K$ $\dagger Km$	$GUv\ \text{mmj}\hat{U}i\ \dagger n\dagger Wi$ $Dc\dagger ii\ Ask,\ \dagger jv\ iKvi$ $Avg,\ f_vj\ f\ BZ^{\text{v}}\ \overline{\text{v}}^{\text{'}}$ $Pjgvb\ Ask\ mg\ n\dagger K$ $\dagger X\dagger K\ ivLv\ i\ Rb^{\text{'}}$ $\dagger jvnvi\ \%Zvi\ XvKvb$ $\text{we}\dagger kl$ $Bnvi\ Dc\dagger ii\ AskvU$ $\text{mmj}\hat{U}i\ e\dagger Ki\ m\text{nn}Z$ $GKmv\dagger_XvjvB\ K\dagger i$ $\%Zvi \ \text{vb}\dagger Pi\ As\dagger k$ $I\dagger qj\ M^{\text{vm}}\ ev$ $\hat{Z}jvav\dagger i\ \hat{Z}jv^3$ $KviK\ \dagger Zj\ _v\dagger K$
$\text{weq}v\text{is}$ $mg\text{r}$	$\text{weq}v\text{is}\ big\ avZ\hat{z}$

Bb±R±i		%Zwi Aa tMvjK hš we±kl hv BÄ±bi Pjbkxj Ask, ±jv±K h_v v±b a±i iv±L Ges chÿ Pvc I av°v enb K±i weqwis Gi †fZ±ii Aa tMvjvKvi Ask±K K"vc e±j K"vsK k"vd±Ui μ"vsK Rvbv±j †gBb weqwis, Kv±bKUs i±oi epr cv±š weM GÛ weqwis I ¶žcv±š a±j GÛ weqwis Ges K"vg k"vdu±K wmwjÛvi e±Ki gta" K"vg k"vdu weqwis Gi gva"†g vcb Kiv nq Gi Dc±ii cv±š †cmvi GWRv ÷s iz _v±K ewWi GKcv±k D"PPi±c Rvjv±b c±ek Kivi c_ I Ab" cv±k AwZwi ³ Rvjv±b tei nlqvi c_v±K wb±Pi cv±š bRj _v±K bR±ji wba cv±š GKU ¶žKwZi wQ`_v±K   wQ` c±_ G wQ` c±_ Rvjv±b D"P Pv±c Kgvkb †Pav±i t"ú Kiv nq
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K₁/I I c jx Dbqb $\bar{c}$

cV 2.7 $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger bi$ cavb Askmg $\bar{n}$ mbv³ KiY I ch $\ddagger e$ Y

G cV $\dagger k\ddagger I$ Av $\bar{c}$ ib —



- $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger bi$ cavb Ask $_{\ddagger jvi}$ b $\bar{v}g$ ej $\ddagger Z$ cv $\ddagger eb$ |
- $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger bi$ cavb Ask $_{\ddagger jv}$ mbv³ Ki $\ddagger Z$ cv $\ddagger eb$ |
- $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger bi$ MVb eYbv Ki $\ddagger Z$ cv $\ddagger eb$ |



$\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger b$ $\bar{w}efb$ avZe hšvsk $\bar{w}b\ddagger q$ M $\bar{v}Z$ | GK $\bar{U}$ $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger b$ ch $\ddagger e$ Y Ki $\ddagger j$ Av $\bar{g}iv$
 $\bar{w}b\ddagger v^3$ hšvsk $\dagger L\ddagger Z$ cve| Gevi Av $\bar{m}b$, GK $\bar{U}$ $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger bi$ Kv $\ddagger Q$ hvB Ges Gi $\bar{w}efb$
hšvsk $_{\ddagger jv}$ ch $\ddagger e$ Y Ki $\bar{i}$ | c` $\bar{E}$ Q $\bar{w}e$ I mbv³ KiY $\bar{w}P\ddagger y\bar{i}$ mv $\ddagger$ $\bar{w}g\bar{v}j\ddagger q$ hšvsk $_{\ddagger jv}$ mbv³
Ki $\bar{i}$ | $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger bi$ cavb Ask $_{\ddagger jv}$ n $\ddagger$ Q t

K) $\bar{w}i$ Askmg $\bar{n}$

- $\bar{w}m\bar{v}j\bar{U}vi$ eK
- $\bar{w}m\bar{v}j\bar{U}vi$ tnW
- $\bar{w}m\bar{v}j\bar{U}vi$ tnW M $\bar{v}m\ddagger KU$
- $\bar{w}m\bar{v}j\bar{U}vi$ tnW Kfv $\bar{i}$
- $\mu\bar{v}sk$ $\dagger Km$

L) $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger bi$ Pjg $\bar{v}b$ Askmg $\bar{n}$

- $\bar{w}c\div b$
- $\bar{w}c\div b$ $\bar{w}is$
- $\bar{w}c\div b$ $\bar{w}cb$
- Kv $\ddagger b$ Ki $\bar{U}s$ iW
- $\mu\bar{v}sk$ k $\bar{v}dU$
- d $\bar{v}B$ $\bar{u}Bj$
- K $\bar{v}g$ k $\bar{v}dU$
- $\bar{w}eq\bar{w}is$

$\dagger c\ddagger Uvj$ I $\bar{w}W\ddagger Rj$ B $\ddot{A}\ddagger bi$ $\dagger \bar{w}\ddagger \hat{I}$ Ic $\ddagger i$ D $\bar{v}j$ $\bar{w}LZ$ hšvsk $\bar{i}$ MVb I cK $\bar{U}Z$. GKB| m $\bar{v}Z$ vs $\dagger c\ddagger Uvj$
B $\ddot{A}\ddagger bi$ Dc $\ddagger iv^3$ hš $\bar{I}vsk_{\ddagger jvi}$ ch $\ddagger e$ Y I mbv³ KiY Av $\bar{g}iv$ cV 2.6 $\bar{w}W\ddagger Rj$ B $\ddot{A}\ddagger bi$ cavb
Ask $_{\ddagger jvi}$ mbv³ KiY I ch $\ddagger e$ Y $\ddagger K$ $\dagger R\ddagger b$ $\bar{w}b\ddagger Z$ c $\bar{w}i$ |

G $_{\ddagger jv}$ Qvov I $\dagger c\ddagger Uvj$ B $\ddot{A}\ddagger b$ i $\ddagger q\ddagger Q$ K $\bar{v}e\ddagger y\bar{U}i$ I $\bar{w}u\bar{v}K$ c $\bar{v}M$ |

<i>hš[†]ki b[†]g</i>	<i>Q[†]e/ch[†]e[†]Y</i>	<i>mbv³KiY</i>
<i>Kve[†]jiUi</i>		<i>GK[†]U m[†]av[†]iY</i> <i>Kve[†]jiU[†]i [†]b[†]Wj</i> <i>f[†]vj f, [†]d[†]W, [†]P[†]K,</i> <i>[†]f[†]b[†]P[†]z, [†]tRU, _U</i> <i>BZ[†] [†]v[†]K </i>
<i>[†]ú[†]K c[†]M</i>		<i>GK[†]U [†]ú[†]K c[†]v[†]M</i> <i>[†]kj, M[†]D[†]Ů</i> <i>B[†]jK[†]UW, [†]m[†]U[†]vi</i> <i>B[†]jK[†]UW,</i> <i>[†]c[†]vi[†]m[†]j[†]b</i> <i>Bbm[†]jiUi I Z[†]gv[†]i</i> <i>M[†]vm[†]KU _[†]v[†]K </i> <i>GU[†] cR[†]j[†]b c[†]K[†]v[†]ó</i> <i>ms[†]K[†]v[†]PZ I DĚB</i> <i>evq[†]R[†]v[†]j[†]vb m[†]ó</i> <i>K[†]i k[†] ³ Drcb</i> <i>K[†]i </i> <i>GK[†]U Kve[†]jiUi I</i> <i>[†]ú[†]K c[†]M [†] [†]L</i> <i>GK[†]U [†]c[†]U[†]j B[†]Äb</i> <i>mbv³ Ki[†] h[†]iq</i>

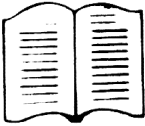
K₁/I I c jx Dbqb ⁻č

cW 2.8 GK tDR I Zb tDR e`yZK tgvUi chteY



G cW tktI Avcb —

- GK tDR I Zb tDR e`yZK tgvUi mbv³ KiZ cvi**eb** |
- tgvUi Pvjbvⁱ c**te** KiYxq ejZ cvi**eb** |
- tgvUi PjvKvj mZKZv g**JK** e⁻v, ⁺jv eYbv KiZ cvi**eb** |



e`yZK tgvUi n<sup>+</sup>Q Ggb GKU tgv**kb** hv <sup>+</sup>e`yZ k³ K h⁺ŠK k³ Z i|cvš*i* K**i** | GLv**b**
Avgiv GK tDR I Zb tDR e`yZK tgvUi chteY Kie |

GK tDR e`yZK tgvU**i** mvcB tDR-G GKUv tDR Ges GKUv ⁺bdUvj Zvi ⁻vK | tDRi
Zv**i** tU÷vi (Tester) ai**j** Rj**te** | K**b** ⁺bdUvj Zv**i** tU÷vi ai**j** Rj**te** bv | Aci c**te** |
⁺Zb tDR e`yZK tgvU**i** ⁺ZbU tDRi Zvi ⁻vK**te** Ges cU**Z**U tDR tU÷vi ai**j** Rj**te** |
Gfv**te** Avgiv GK tDR I Zb tDR e`yZK tgvUi mbv³ KiZ c**vi** |

GK tDR I Zb tDR e`yZK tgvUi chteY YKvj ⁺ba**j** LZ ⁺elq, ⁺jvi cU**Z** bRi ivL**Z**
n**te** |

- 1□ tgvU**i** ai**j** e**vi** c**vi** Kiv |
- 2□ c**vb** ev ⁻Zj RvZxq c⁻v ⁺tgvU**i** IqvBŮs (Winding) -Gi m⁻s ⁻ú**te** hv**Z** bv
Av**tm** Zvi e⁻v Kiv |
- 3□ Gqvi M⁻vc (Air gap) ⁺VK ⁺Kbv cix**te** Kiv |
- 4□ Pvj**jae**⁻vq tgvU**i** e**vi** DĖvc ⁻vfv**ie**K Av**Q** ⁺Kbv cix**te** Kiv |
- 5□ ⁺eq**vis** Gi tZj ev MxR ⁺VK Av**Q** ⁺Kbv cix**te** Kiv |
- 6□ t÷U**i** I tivUi IqvBŮs Gi Bbm**j**kb ti**R** ÷⁻vY Ing ⁺gU**i** (Ohm meter)
mvr**th** gvcv |
- 7□ tgvU**i** Av**i**vcZ tfv**te**R Ges cev**n**Z Kv**i** ⁻vfv**ie**K Av**Q** ⁺Kbv Zv h⁻v**μ**g
t**fv** ⁺gU**i** I A⁻vgU**i** ⁻q cix**te** Kiv |
- 8□ tgvU**i** Uv**ig**bvj Kv**tb**Kkb, ⁺jv ⁺VK Av**Q** ⁺Kbv t⁻Lv |
- 9□ tgvU**i** ÷vU**i** (Starter) K**U**vj ⁺Mqvi cix**te** Kiv |
- 10□ ⁻ú**te** Qvov tgvUi ⁻Q⁻ M**Z**Z Pj**Q** ⁺Kbv chteY Kiv |
- 11□ tgvU**i** Ak k³ (H.P.) thgb- 1 Ak k³, 10 Ak k³ BZ⁻v⁻; Av**i**.c.Gg.
(R.P.M.= Revulation per minute) thgb- R.P.M. 1500, 3500 ; mvcB
t**fv** ⁻teR ⁺d**te**Kv**q**Y BZ⁻v⁻ cix**te** K**i** t⁻Lv |



Ppš gj`qb - BD`bU 2

iPbgjK ck

- 1| kxZjxKiYi c†qvRbxqZv ‖K ?†dvmW mvK†jkb cv‖b kxZjxKiY c×‖Z eYbv Kib|
- 2| BÄb ^jv³KiYi c†qvRbxqZv ‖K ?†cmvi c×‖Zi ^Zjv³KiY eYbv Kib|
- 3| ‖W†Rj BÄ†bi Rvj‖b mieivn c×‖Z ‖K ‖K ?¯Zš cvú c×‖Zi eYbv ‖`b|
- 4| BÄ†bi maviY i ¶Yv†e ¶Y ej†Z ‖K ejSb ? ‖bqgZ‖šK i ¶Yv†e ¶Yi eYbv ‖`b|
- 5| Wb†i± Kv†i>U (‖W.‖m.) †gvU†ii †kY‖efvM,†jv ‖jLb| ‖m†½j †dR I _ †dR †gvUi ‖K ‖K Kv†R e`envi Kiv nq|



DĚigvjv - BD`bU 2

cv†WĚi gj`qb 2.1

1| L 2| M 3| K 4| M 5| M 6| N 7| K

cv†WĚi gj`qb 2.2

1| L 2| L 3| N 4| L 5| M 6| N 7| K

cv†WĚi gj`qb 2.3

1| K 2| L 3| M 4| K 5| N

cv†WĚi gj`qb 2.4

1| N 2| M 3| N 4| L

cv†WĚi gj`qb 2.5

1| 2| 3| 4| 5|

BDu** 3**
crlqvi wUjvi l Uv±i

BDwbU 3 cvIqv i wJvi I Uv±i

G BDıb#U KıL.KvR eûj e'eüZ k³i Drm cvIqvi UJvi I Uv±i maú#K Av#jvPbv Kiv n#q#Q| G BDıb#U †gvU 7ıU cvV i#q#Q| Gi g#a` t*k#li`y*bv cvV e'enviK maúıKZ| c_g cv#V i#q#Q cvIqvi UJv#ii wfb A#ki weeiY I KvhcYwjj | `Zxq cv#V Av#jvPbv Kiv n#q#Q cvIqvi UJv#ii cvIqvi UvYıgkb c×ıZ, Gi cııPvjbv I i¶Yv#e¶Y maúıK| ZZxq cvıUı Uv±ıii tkıYıefvM I e'envi maúıKZ| PZz cv#V i#q#Q Uv±ıii gy Ask, #jvi weeiY I KvhcYwjj| cÂg cv#V Uv±ıii cvIqvi UvYıgkb c×ıZ, Gi cııPvjbv I i¶Yv#e¶Y maúıK Av#jvPbv Kiv n#q#Q|

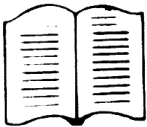
lô cvV cvlqvi wUjv±ii wfb As±ki cwiPz l cvlqvi wUjvi PvjkiY welqK| U±±ii
caib Ask, ±jv mbv³ KiY el±q Av±jvKcvZ Kiv n±q±Q mBg cv±V|

cvV 3.1 cvIqvi wUjv‡ii weifb As‡ki weeiY I KvhcYvwj

$G \subset V \nmid k \nmid A \subset b$ —



- $c \vee l q i \vee U j \vee i i \vee n n K \vee e f b A s \dagger k i \vee b g e j \dagger Z c \vee i \dagger e b |$
- $c \vee l q i \vee U j \vee i i \vee n n K \vee e f b A s \dagger k i \vee e e i Y I K \vee h c Y \vee j \vee j L \dagger Z c \vee i \dagger e b |$



cvlqvi wUjvi n#Q GKwU hviŠK kwi³i Drm hvi mvt_ mshy_ v#K GKwU wUjjs BDwBU (Klb hš)| GwU maviYZ fyg Kl#bi Kv#RB #wk e'eüZ nq| GQvovI GwU#K #mP cvaü Pvjv#bv, KvUbvKK wQUv#bv, dmj gvovB, avb fv#zvi Kj Pvjv#bv, c#ienb BZ'w` Kv#R e'envi Kiv hvq|

ʱesk kZãxi c_g ʱ`ʰK hLb BDʰivc, AvʰgwiKvq Lvqvi hwiʰSKxKiY ʰiiz nq ZLb Awʰzbi,
 ʰQvU ʰQvU kvK meʱRi eʱwvb BZʱw ʰPvʰli Rbʱ ʰʱZvKwzi MwʰWb Uvʰzʰii cPjb nq| G,ʰjv
 ʱUjvi wntmʰe ciwʱPZ ʱQj| ʱeʰki ʰkʰK Rvcvb G,ʰjv Avgʱvbx Kʰi Ges cieZʰz G,ʰjvi
 hʰ_ó Dbqb mvab Kʰi, hv AvR cvlqvi ʱUjvi bʰg ciwʱPZ| Awgʱʰi ʰʰk lʰʰUi ʰkʰKi
 c_g ʱ`ʰK GwʱUi ciwʱPq NʰU AZʰš mʱwʱgZ AvKvʰi| Zʰe Awʱki ʰkʰKi ʰkʰli ʱ`ʰK ci
 kʱ³i ʱeKí wntmʰe cvlqvi ʱUjvi Avgʱʰi ʰʰk Lvqvi chrʰq fʱg Klb l KʱlRvZ cYʰ
 ciwʰz eʰeüz nʰZ ʰiiz Kʰi| Pʱlveʰʰ eʰenviʰhʱMʰ Mewʱcʰii msLʱv ʱeʱfb KvʰY µʰg
 Kʰg hvʱlqvq eZgʱvb Gʰʰk ʱeKí hwiʰSK kʱ³ wntmʰe cvlqvi ʱUjvi RbʱwqZv cvʰʰQ|

mvaⁱYZ 7-12 Akk³
m^ub W[†]Rj B[†]Äb e^{en}vi
Ki^v nq| w^gb c^vlqvi
U^jvⁱi t[†]†[†] 3-5 Akk³
t^cU^j B[†]Äb e^eüz n[†]q
v[†]K|

GKwU BwÄb cvIqvi wUjvfi ¶gZvi Drm| cvIqvi wUjvfi i mvgþb bvU I tevë w`tq tdþgi
mvt_ BwÄbU AvUKvþbv_vþK| mva viYZ 7-12 Akk^{w3} múb wWþRj BwÄb e`en vi Kiv nq|
wgwb cvIqvi wUjvfi i t¶fî 3-5 Akk^{w3} i tcvUvj BwÄb e`eÜZ nþq_vþK|

Gevi Avmb GKU cvlqvi Ujviii evnK wefb Aski mv_ cwiPZ nB| PÎ bs 3.1 (K)
I 3.1(L) -G GKU cvlqvi Ujviii wefb Ask t'Lvby nqgQ|

¶PÎ 3.1 (K) GKU c v I q v i ¶U j v ¶i i ¶e ¶f b Ask

1. P_vK_vi k[˘]v dU (Wheel shaft) 2. c_vk †cU (Side plate) 3. K_v˘ v c_vZ_†i v aK X_vK b_v
(Mud- proof cover) 4. ¶i R_vi $\overline{\dot{q}}$ Screw for ridger) 5. †cQ_†b i P_vK_v A_vU K_v†b v i
n_vZ j- (Rear wheel tightening handle) 6. ¶óq ¶i s K_vP ¶j f v i (Steering clutch
lever-right) 7. c_vb n_vZ j (Main handle) 8. G_¶ · j v ¶i ¶U s ¶j f v i (Accelerating
lever) 9. m_vn_vh[˘] K_vi x n_vZ j (Auxiliary handle) 10. d j †K i M_¶Z c ¶i e ZK ¶j f v i
(Blade speed change lever) 11. †g B b K_vP ¶j f v i (Main clutch lever) 12. M_¶Z
c ¶i e ZK ¶j f v i (Speed change lever) 13. ÷[˘] v Ũ ¶j f v i (Stand lever) 14. †i v U v i x
n[˘] v s ¶M s ¶d K P v i (Totary hanging fixture) 15. m_ve-†P B b †K m (Sub-chain case) 16.

¶PÎ 3.1 (L) GKU c v l q v i ¶U j v # i i ¶e ¶ f b A s k

17. †U b k b c y j (Tension pulley) 18. ÷`v Û (Stand) 19. m v g # b i K v W # g v (Front farne) 20. c † U K U i (Protector) 21. B ¶ Ä b c y j (Engine pulley) 22. V- t e Æ (V- belt) 23. † g B b c y j (Main pulley) 24. t e Æ K f v i (Belt Cover) 25. U ‡ e · ( Tool Box) 26. U ‡ e # · i X v K ¶ b (Tool Box cover) 27. j `v ¶ ú † P Ä I f v i m ¶ P (Lamp change over switch) 28. ¶ ÷ q ¶ i s K v P ¶ j f v i (e v g) (Steering clutch lever) 29. † c Q # b i P v K v i n v Z j (Rear wheel handle) 30. K v `v c ¶ Z # i v a K (Mud-proof) 31. † c Q # b i P v K v (Rear wheel) 32.

c v l q v i ¶U j v # i i c a v b c a v b A s k , † j v i K v h c Y ¶ j

¶PÎ 3.1 (K) I (L) † Z c `k Z µ ¶ g K b ¶ i A b ¶ q x ¶ b # ¶ c v l q v i ¶U j v # i i e ¶ n `K ¶ e ¶ f b A s # k i K v h e j x e Y b v K i v n # j v -

- 1| **P v K v i k ' v d U --** m v g # b i P v K v - G i m v # _ b v U - † e v Æ ¶ ` † q j v M v # b v _ v # K |
- 2| **c v k † c U --** c v # k i K v `v c ¶ Z # i v a K X v K b v G † Z A v U K v # b v n q |
- 3| **K v `v c ¶ Z # i v a K X v K b v ---** P v # I i m g q g ¶ U e v K v `v N Y v q g v b † i v U v i x n # Z ` † i ¶ b ¶ ¶ β n l q v c ¶ Z # i v a K # i ( 3 I 30 b s ¶ ` † q ¶ P # Î ¶ b # `k Z) |
- 4| **¶ i R v i ¶ ---** G ¶ y m v n v # h " c † q v R b n # j ¶ i R v i (D P ¶ e W c ¶ Z K v i x) - † K A v U K v # b v h v q |
- 5| **† c Q # b i P v K v A v U K v # b v i n v Z j -** G n v Z # j i m v n v # h " † c Q # b i P v K v i ` Û # K c v l q v i ¶U j v # i i m v # \_ ` p f v # e A v U K v # b v n q |

- 6| **𐌴𐌹𐌸𐌴𐌹𐌸 Kvp 𐌴j fvi--** 𐌸c𐌴𐌹𐌸 ki nVZþj (Wb I evg) 𐌸jUv 𐌴𐌹𐌸𐌴𐌹𐌸 Kvp 𐌴j fvi _vþK (6 I 28 bs)|
cVlqvi 𐌴UjviþK tNviþbvi mgq Gþjv e"envi Kiv nq| th 𐌴þK cVlqvi 𐌴UjviþK tNviþbvi nþe
tm 𐌴þKi Kvp 𐌴j fviU tþc aiþZ nþe|
- 7| **cavb nVZj--** cVlqvi 𐌴Ujvi Pvjbvi mgq PvjK 𐌸c𐌴𐌹𐌸 ki nVZj aþi cVlqvi 𐌴UjviþK 𐌴bqšb Kþi|
- 8| **Gþ · jvþiU 𐌴j fvi--** GþU Wb nVZþji I cþii 𐌴þK emþbv tQvU GKU 𐌴j fvi | cVlqvi 𐌴Ujvþii MþZ
I tevSv Abþq GþK Gþ · jvþiU Kivi Rb" e"eüZ nq| cVlqvi 𐌴Ujvi ÷vU þbqvi mgq GB 𐌴j fviþK
Nþþq mþev" P Ae"vþb Ges eÜ Kivi mgq meþb Ae"vþb iVlv nq|
- 9| **mVnþh"Kvix nVZj--** cVlqvi 𐌴Ujvi Pvjbvi mgq PvjK cavb nVZþji c𐌴ieþZ KLþbv KLþbv G nVZj
e"envi Kþi|
- 10| **djþKi MþZ c𐌴ieZK 𐌴j fvi--** GþU 𐌴þq cVlqvi 𐌴Ujvþii tCQþb jvMþbv tivUvixi MþZ c𐌴ieZb Kiv
nq| High I Low-- 𐌸jUv MþZþZ tivUvixþK þNviþbv hvq|
- 11| **tgBb Kvp 𐌴j fvi--** G 𐌴j fviþK ÔAbô ÔAdô I ÔteKô-- GB 𐌴ZbU Ae"vþb 𐌴vcb Kiv hvq| GþU (11
bs) GbþMR (Ab) ev 𐌴WRGbþMR (Ad) Kþi BþÄb tþK UvYigkbþK (𐌴Mqvi e ·) h_vþg hþ ev
𐌴ehþ Kiv hvq| cVlqvi 𐌴UjviþK ÷vU tþqvi cþe 𐌴Ksev MþZ c𐌴ieZþbi cþe GþUþK 𐌴WRGbþMR
c𐌴Rkþb iVlvþZ nq| cVlqvi 𐌴UjviþK _vgvþZ nþj GþUþK teK c𐌴Rkþb 𐌴bþZ nq| GþUþK GbþMR
c𐌴Rkþb 𐌴bþj cVlqvi 𐌴Ujvi PjþZ iþi Kite h 𐌴 MþZ c𐌴ieZK 𐌴j fvi tKvb 𐌴Mqviþii mþ_ GbþMR
Kiv _vþK|
- 12| **MþZ c𐌴ieZK 𐌴j fvi--** cVlqvi 𐌴Ujvþi mVaviYZ 6þU mþj MþZ Ges 2þU tCQþbi MþZ _vþK| G
𐌴j fviþii Ae"vþb c𐌴ieZb Kþi cVlqvi 𐌴UjviþK Dcþiv³ MþZ mgþni th tKvbiUþZ Pvjbv Kiv mþe|
BþÄb ôvU tþqvi cþe Ges cVlqvi 𐌴UjviþK _vgvþbvi mgq GB 𐌴j fviþK 𐌴bDUvj c𐌴Rkþb iVlv nq|
- 13| **÷"Ü 𐌴j fvi--** mvgþbi ÷"ÜþK Gi mVnþh" I Vvþbv ev bvgvþbv nq|
- 14| **tivUvix n"vsþMs 𐌴dKþi--** Gi mþ_ tPbb ev ûK jvMþq tivUvixþK I cþi DVþbv hvq| tivUvix tLvþv ev
jvMþbvi mgq GþU e"eüZ nq|
- 15| **mveþPbb tKm--** G tKþmi þfZþi tPbb I tþvþKU _vþK| G tPbb-þþvþKU 𐌴þq UvYigkb nþZ
tivUvixþZ Kþ³ 𐌴bvšivZ nq|
- 16| **g"𐌴RK evi --** G evþii mVnþh" cVlqvi 𐌴Ujvþii GK c𐌴𐌹𐌸 ki PþKvþK I cþi Dþvþq iVlv hvq| PþKv e`j
Kivi mgq GþU e"eüZ nq|
- 17| **tUbkb cyj--** BþÄb cyj I tgBb cyjþK mþþvMKvix V-AvKþZi teëþK Uvb Uvb Ae"vq iVlvþZ mVnþh"
Kþi|
- 18| **÷"Ü--** cVlqvi 𐌴Ujvþii mvgþb 𐌴bþPi 𐌴þK fvR Kþi iVlv nq| Gi Dci fi Kþi BþÄbþK AbyigK
Ae"vq tþL 𐌴 Kivþbv nq|
- 19| **mvgþbi KvVþgv--** G KvVþgvi Dci BþÄb 𐌴vcb Kþi bvU-þevþëi mVnþh" AvUKvþbv nq|
- 20| **cþUKUi--** mvgþb Pjvi mgq BþÄbþK mivmþi AvNþZ cVlqv tþK i 𐌴v Kþi|
- 21| **BþÄb cyj--** GþUþK μ"vsK k"vdu cyj I ejv nq| GþU dvBBþji mþ_ mshþ³ ÔPvjKô cyj| G cyj
tþK BþÄþbi Kþ³ V- teþëi gva"tg tgBb cyjþZ 𐌴bvšivZ Kiv nq| tgBb cyj nþ"Q ÔPvjZô
cyj| tgBb cyj tþK tgBb Kþþi gva"tg Kþ³ 𐌴Mqvi eþ · hvq|
- 22| **V- teë --** G teþëi mVnþh" BþÄb cyj nþZ Kþ³þK tgBb cyjþZ 𐌴bvšiv Kiv nq|

- 23| **tgBb cyj--** tgBb cyj i mv#_ msh³ k`vd#Ui gva`tg B#Ä#bi k³ UY#gk#b ev #Mqvi e#· tci#Q|
tgBb cyj i e`vm B#Äb cyj i e`vm A#c¶v#e#k|
- 24| **teë Kfvi--** #bivcEvi Rb` teë#K tX#K iv#L|
- 25| **Už e·--** GLv#b c#qvRbxq Užm ivLv nq|
- 26| **Už e#· i XvK#b-** Už e· #K tX#K iv#L|
- 27| **j`v#ú tPÄ I fvi m#P--** cvlqvi #Ujv#i i tnW jvBU#K #bqšY K#i|
- 28| **#÷q#is KvP #j fvi (evg) --** #gK bs 6 G e#YZ|
- 29| **tcQ#bi P#Kv i n#Zj--** G n#Zj#K N#i#q tcQ#bi P#Kv#K Ic#i I V#b# ev #b#P b#gv#b# hvq|
- 30| **Kv`v c#Z#ivaK--** P#i i mgq t#ivUvix n#Z #b#¶ß Kv`v ev g#U#K c#Z#iva K#i|
- 31| **tcQ#bi P#Kv--** G#U GK#U tQvU P#Kv hv Kl#bi MfxiZv #bqšY K#i| G P#Kv#K #b#Pi #`#K b#gv#j
Kl#bi MfxiZv Kg#e Ges P#Kv#K Ic#i I V#j Kl#bi MfxiZv eio#e| G Qvov I GB P#Kv cvlqvi
#Ujv#i i tcQ#bi IRb enb K#i Ges fvimvg` i ¶v K#i|
- 32| **c#k KvV#gv--** G KvV#gvi m#v#h` t#ivUvix#K `pfv#e AvUKv#b# nq|
- 33| **Uqv i -** cvlqvi #Ujv#i i IRb enb K#i Ges G#K Pj#Z m#v#h` K#i| g#U#Z `pfv#e Pjvi Rb`
Uqv#i i Dc#i fv#M DP#DP#Ask _v#K|
- 34| **t#ivUvix #Ujvi--** G#U cvlqvi #Ujv#i i tcQ#b msh³ Kl#b hš| GK#U j#v `#Û A#bK, #jv ev#v djk
emv#b# _v#K| G#U N#i#bi gva`tg Kl#b Kv# m#ú#b K#i|

K₁L. I c jx Dbqb $\overline{\text{q}}$



cvWĖi gj'vqb 3.1

mVK DĖi i cvk UK(√) Pý `b|

1. óqvi KvP j fvi Kb e"eüZ nq ?

- K. cvIqvi UjviK _vgv#bvi Rb"
- L. cvIqvi UjviK †Nvi#bvi Rb"
- M. BĖb#K eÜ Kivi Rb"
- N. cvIqvi Ujv#i i MZ evov#bvi Rb"

2. tgBb KvP j fv#i i †¶#Ė b#Pi †KvbU mVK bq ?

- K. GB j fviK ÒAdĖĖ cRk#b ivL#j BĖb †_#K UvYgkb ehŷ nq
- L. GB j fviK ÒAbĖĖ cRk#b ivL#j BĖb#i mv_ UvYgkb hŷ nq
- M. GUK WRGb#MR ev ÒAdĖĖ cRk#b b#j cvIqvi Ujvi Pj#Z i i# Ki#e
- N. cvIqvi UjviK _vgv#Z n#j GUK ÒteKĖĖ cRk#b b#Z nq

3. b#Pi †KvbUi mrv#h" BĖb cyj n#Z k³#K tgBb cyj#Z $\overline{\text{v}}$ bš i Kiv nq ?

- K. †Ubkb cyj
- L. †ivUviX
- M. †PBb
- N. V- teĖ

4. cvIqvi Ujv#i i †cQ#b hŷ Nŷqgvb Klb hš †KvbU ?

- K. tgvì tevW cvD
- L. †ivUviX Ujvi
- M. W $\overline{\text{c}}$ cvD
- N. W $\overline{\text{c}}$ n'v#iv

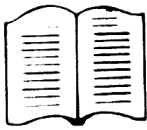
cV 3.2 cVlqvi Ujv#ii cVlqvi UvYgkb cXZ, cVlPjv I iYvteY

G cV tk#I Avcb —



- cVlqvi Ujv#ii cVlqvi UvYgkb cXZi eK PÎ I iYvteY PÎ Avcb
- cVlqvi UvYgkb cXZi efb Ask, KVR eYbv KiZ cvi#eb|
- cVlqvi Ujvi cVlPjv efb avc, t#v eYbv KiZ cvi#eb|
- cVlqvi Ujvi iYvteY efb c`c, t#v eYbv KiZ cvi#eb|

cVlqvi Ujv#ii cVlqvi UvYgkb cXZ

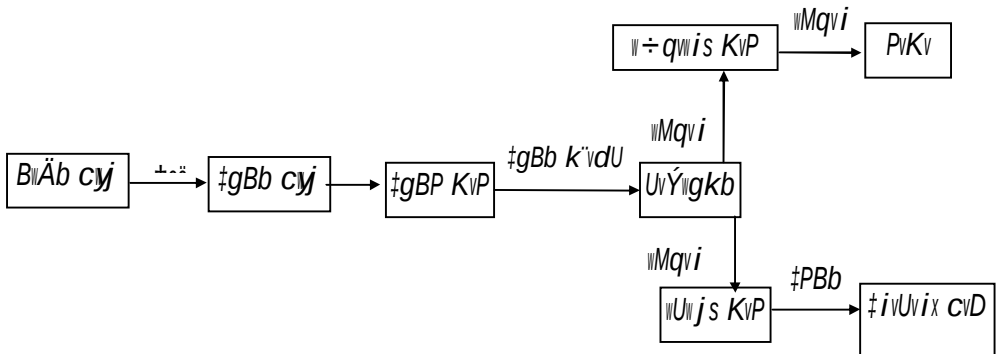


th hviŠK tKŠk#j BiÄ#b Drcb k³ cVlqvi Ujv#ii Pvk I Nvqgub Klh#Š mybqšZfve tčQvb nq Zv#K UvYgkb cXZ e#j| UvYgkb A#bK, t#v Mqv#ii mgvó| GKU t#vni tKB#Ri (case) t#Zi efb e`v#mi Mqv e#kl tKŠk#j k`vd#Ui Dci emv#b _v#K| efb Mqv I k`vd#Ui gva`tgB UvYgkb Zvi Kvh m#v`b K#i| GQov I Av#iv KQyKvR K#i GB UvYgkb| BiÄb dvB ūB#ji D`P Nv#b MvZ#Z UvYgk#bi gva`tg c#qvRb Abv#i Kvg#q Pvkq tčQvb nq| ŪZxqZ Pvj#Ki B`Qv ev Kv#Ri c#qvRb Abv#q cVlqvi Ujvi ev Uv#ii MvZi `K cieZb A`vr mvg#b ev tčQ#bi `K Pjv#Z cvi|

th hviŠK tKŠk#j BiÄ#b
Drcb k³ cVlqvi Ujv#ii
Pvk I Nvqgub Klh#Š
mybqšZfve tčQvb nq
Zv#K UvYgkb cXZ e#j|

k³ v#v#š#ii Rb` Mqv, te#-cy I tPBb-#v#KU e`eüZ nq| KvQvKw `yUv k`vd#Ui gta` k<sup>3</sup> v#v#š#i Kivi Rb` Mqv e`eüZ nq| Mqv, t#v tRovq tRovq e`eüZ nq Ges GKU i`vZi mv#\_ AciUi `vZ gk#Z cvi| efb ai#bi Mqv G UvYgk#b e`eüZ nq| thgb: v#v# Mqv, te#fj Mqv, t#v jK`vj Mqv I lqg Mqv|

Gevi Avmb, eK P#Îi gva`tg cVlqvi UvYgkb cXZ Ges Gi efb Ask, t#vi cvi`úvK eYbv t`qv hvK|



PÎ 3.2 cVlqvi Ujv#ii cVlqvi UvYgkb cXZi eK PÎ

Dc#i evYZ eK PÎU#K iYvteY PÎi gva`tg PÎ bs 3.3 G t`Lv#b n#j| G#Z cVlqvi Ujv#ii cVlqvi UvYgkb cXZi hšvsk, t#vi cvi`úvK Ae`vb I k³ mAv#bi MvZc_ Av#iv m#vó n#e|

K₁L.1 c j_x Dbqb $\overline{q}$

$\mathbb{P}\hat{I}$ 3.3 c_vlqvi $\mathbb{U}jv\ddagger ii$ Uv $\dot{Y}$ gkb c $\times$ $\mathbb{Z}i$ $\sim i$ $\mathbb{L}K$ $\mathbb{P}\hat{I}$

Uv $\dot{Y}$ gkb c $\times$ $\mathbb{Z}i$ $\mathbb{W}e$ fb Ask₃ $\ddagger jv$ m α ú $\ddagger K$ Av $\ddagger iv$ c $\mathbb{I}$ $\overline{v}i$ avib_v c_vlqvi Rb $\overline{v}$ $\mathbb{W}b\ddagger\alpha$ Av $\ddagger jv$ Pbv
Kiv n $\ddagger jv$ |

B $\mathbb{A}$ b cyj -- G $\mathbb{U}$ B $\mathbb{A}$ bi d_vB $\hat{u}B\ddagger ji$ m $\ddagger$ $\overline{v}$ msh $\overline{y}$ | G cyj $\ddagger$ $\overline{v}$ K B $\mathbb{A}$ bi k $\mathbb{U}$ ³ $\ddagger e\ddagger \ddot{e} i$
gva $\overline{v}$ $\ddagger g$ $\ddagger gBb$ cyj $\ddagger Z$ $\overline{v}b\ddagger \mathbb{S}iZ$ nq|

V - $\ddagger e\ddot{e}$ -- B $\mathbb{A}$ b cyj I $\ddagger gBb$ cyj $\ddagger K$ msh $\overline{y}$ K $\ddagger i$ GB $\ddagger e\ddot{e}$ | Gi gva $\overline{v}$ $\ddagger g$ B $\mathbb{A}$ bi k $\mathbb{U}$ ³ B $\mathbb{A}$ b
cyj n $\ddagger Z$ $\ddagger gBb$ cyj $\ddagger Z$ $\overline{v}b\ddagger \mathbb{S}iZ$ nq| c_vlqvi $\mathbb{U}jv\ddagger i$ m $\ddagger$ aviYZ GKm $\ddagger$ $\overline{v}$ 2-3 $\mathbb{U}$
 $\ddagger e\ddot{e}$ e $\overline{v}$ $\ddot{u}Z$ nq|

$\ddagger gBb$ cyj -G $\mathbb{U}$ $\ddagger gBb$ Kv $\ddagger Pi$ m $\ddagger$ $\overline{v}$ msh $\overline{y}$ | GL $\ddagger b$ $\ddagger c\dot{S}Q\ddagger b$ k $\mathbb{U}$ ³ $\ddagger gBb$ Kv $\ddagger Pi$ gva $\overline{v}$ $\ddagger g$ Uv $\dot{Y}$ gk $\ddagger b$
hvq| GB cyj i Av $\ddagger Kvi$ B $\mathbb{A}$ b cyj A $\ddagger c$ $\mathbb{U}$ eo Ges N $\ddagger bM\mathbb{Z}I$ A $\ddagger c$ $\mathbb{U}$ KZ.Kg|

$\ddagger gBb$ KvP- $\ddagger gBb$ Kv $\ddagger Pi$ gva $\overline{v}$ $\ddagger g$ k $\mathbb{U}$ ³ $\ddagger gBb$ cyj $\ddagger$ $\overline{v}$ K Uv $\dot{Y}$ gk $\ddagger b$ $\ddagger c\dot{S}Q\ddagger$ | G $\mathbb{U}$ $\ddagger K$ Gb $\ddagger MR$
 $\mathbb{W}Ksev$ $\mathbb{W}mGb\ddagger MR$ K $\ddagger i$ B $\mathbb{A}$ bi k $\mathbb{U}$ ³ $\ddagger K$ Uv $\dot{Y}$ gk $\ddagger b$ c_v $\mathbb{W}\ddagger b$ $\mathbb{W}Ksev$ e $\ddot{U}$ Kiv hvq|

G Uv $\dot{Y}$ gk $\ddagger bi$ m $\ddagger$ $\overline{v}$ $\ddagger h$
c_vlqvi $\mathbb{U}jv\ddagger K$ 6 $\mathbb{U}$ m α $\overline{y}$
M $\mathbb{Z}$ Ges 2 $\mathbb{U}$ c $\ddot{a}vr$ M $\mathbb{Z}\ddagger Z$
P $\ddagger jbv$ Kiv hvq|

Uv $\dot{Y}$ gkb- KZK₃ $\ddagger jv$ $\mathbb{W}Mqv\ddagger ii$ mg $\dot{S}\ddagger q$ M $\mathbb{V}Z$ | $\ddagger gBb$ KvP $\ddagger$ $\overline{v}$ K k $\mathbb{U}$ ³ $\ddagger gBb$ k $\overline{v}$ $\ddagger d\ddagger Ui$ gva $\overline{v}$ $\ddagger g$
Uv $\dot{Y}$ gk $\ddagger b$ $\ddagger c\dot{S}Q\ddagger$ | G Uv $\dot{Y}$ gk $\ddagger bi$ m $\ddagger$ $\overline{v}$ $\ddagger h$ c_vlqvi $\mathbb{U}jv\ddagger K$ 6 $\mathbb{U}$ m α $\overline{y}$ M $\mathbb{Z}$ Ges 2 $\mathbb{U}$
c $\ddot{a}vr$ M $\mathbb{Z}\ddagger Z$ P $\ddagger jbv$ Kiv hvq| $\mathbb{W}jfv\ddagger ii$ m $\ddagger$ $\overline{v}$ $\ddagger h$ $\mathbb{W}Mqv\ddagger jv\ddagger K$ k $\overline{v}$ $\ddagger d\ddagger Ui$ Dci $\acute{u}vBW$
(Slide) K $\mathbb{I}$ $\ddagger q$ GK $\mathbb{U}$ $\mathbb{W}Mqv\ddagger ii$ m $\ddagger$ $\overline{v}$ Ac $\mathbb{I}$ $\mathbb{U}$ h $\overline{y}$ Kiv nq|

$\mathbb{W}jcv\ddagger ki$ P $\ddagger Kvq$ $\mathbb{W}U$ $\mathbb{W}\ddagger q\mathbb{W}is$
KvP $\overline{v}\ddagger K$ |

$\mathbb{W}\ddagger q\mathbb{W}is$ KvP-- G Kv $\ddagger Pi$ m $\ddagger$ $\overline{v}$ $\ddagger h$ Uv $\dot{Y}$ gkb $\ddagger$ $\overline{v}$ K P $\ddagger Kvq$ k $\mathbb{U}$ ³ $\overline{v}b\ddagger \mathbb{S}i$ Kiv nq| $\mathbb{W}jcv\ddagger ki$ P $\ddagger Kvq$

U ÷ qwis KvP _vK| G KvP e`envi K+i cvlqvi UjviK Nvivbv nq|
 tKvb GK cvtki ÷ qwis KvP K WRGbMR Ki+j H cvtki Pvkq k³
 tcsQZ cvti bv| d+j cvlqvi UjviU H `KB tgvb tbq|

Ujs KvP-- UvYgkb t_K G KvPi gva`tg k³ tivUvix cvD-G vbšiz nq| G U+K
 GbMR ev WR GbMR K+i tivUvix cvDq k³ vbši Ae`vnZ A_ev eÜ Kiv
 hvq|

cvlqvi Ujvi ciiPjvb

cvlqvi UjviK mōzve KvR jvMvbi Rb" Gi ciiPjvb c×Z mōúK c_tg RvbZ nte|
 cvlqvi Ujviii h_vh_ ciiPjvb Gi KvKv+ji tgqv` eioq t`q| GQvov Gi d+j Afxó
 KvR fv+jvve mōúb nq Ges PvjK I tgkbi bivcĖv bōZ nq|

meavi Rb" cvlqvi Ujviii ciiPjvb c×Z K bñjLZ KtqKU avtc fvM K+i tbB|

K) ce-c⁻Z (Pre-preparation)

L) ÷vU t`qv (Starting)

M) Pjvb (Operation)

N) eÜ Kiv (Stopping)

O) Pjvbi mgq mKZv (Precoution during operation)

cvlqvi UjviK myi I mōzve ciiPjvb I KvR jvMvbi Rb" Dc+iv³ ciZU avtc K
 K e`v ev mKZv vbZ nte Zv fv+jvve Rvb\_vKv` iKvi| Avmly Zvnt+j Dc+iv³ ciZU
 avtc KiYxq elq we`wiz Av+jvPbv Kii|

K) ce-c⁻ZKvj KiYq t cvlqvi UjviK ÷vU t`qvi cte BÄb I Ab`vb" As+k KQy
 bqggdK cix¶v (Check up) KiZ nte|

tZ+jj gvi G `jUv`vMi
 gvSvgs_vKv fvj| Kg ev
 tek Dfq cigvb tZjB
 BÄbi Rb" ¶ZKviK|

1| Wc ÷K (Dip-stick)
 mwnvth" BÄbi μvsK+m
 jjeKUs tZ+jj cigvb cix¶v
 KiZ nte| G ÷K D"P I bā
 gviv vb`kK `jUv`vM_vK
 (PĖ....)| tZ+jj gvi G `jUv`vMi
 gvSvgs_vKv fvj| Kg
 ev tek Dfq cigvb tZjB
 BÄbi Rb" ¶ZKviK| tZ+jj
 gviv cix¶v Kivi mgq cvlqvi
 UjviK mgZj RvqMvq
 AbvgK ivLZ nte|

PI 3.4 GKU WcOK

- 1| M₁Z c₁ieZK wj fvi#K c₁qvRb₁q M₁Z w₁b₁`kK Ae₁⁻v₁b₁ v₁cb Kiv|
[D₁jL₁ GB wj fviwU₁K mvg₁bi w₁`#K M₁Z c₁ieZ₁bi Rb₁ 1 t₁#K 6 Ges
t₁cQ₁bi w₁`#K M₁Z c₁ieZ₁bi Rb₁ 1 l 2 Ae₁⁻v₁b₁ v₁cb Kiv hvq| R₁wg
Pv₁j₁li mgq cv₁lqvi wUjvi#K mvaviYZ 1 t₁#K 3 bs M₁Z₁Z mvg₁bi w₁`#K
Pv₁j₁b₁ Kiv D₁lPZ₁ i₁v₁q Pj₁vi mgq ev U₁jhy₁ Ae₁⁻v₁q c₁wien₁bi Kv₁R 4-6
bs mvg₁bi M₁Z₁Z (D₁P M₁Z) Ges 1 l 2 t₁cQ₁bi M₁Z₁Z cv₁lqvi wUjvi#K
Pv₁j₁b₁ Kiv hvq| Pv₁j₁li mgq cv₁lqvi wUjvi#K t₁cQ₁bi (Reverse) M₁Z₁Z
v₁cb Kiv m₁u₁Ab₁Y₁Z₁]
- 2| tgBb KvP wj fviwU ax₁i ax₁i ôôAbôô Ae₁⁻v₁b₁ G₁b₁ cv₁lqvi wUjvi Pj₁Z
Avi₁ Kiv|
- 3| gw₁Ui Ae₁⁻v₁ t₁f₁` dj₁#Ki M₁Z c₁ieZK wj fviwU ôôbDUvjôô t₁#K ôôD₁Pôô ev
ôôb₁ôô Ae₁⁻v₁b₁ v₁cb Ki₁Z n₁e| G₁Z₁ t₁ivUvix₁ cv₁D₁U Ny₁Z₁ i₁i₁ Ki₁e|
[D₁jL₁ th, i₁ô₁ l k₁³ gw₁U₁Z Ges cv₁vgK Pv₁l mvaviYZ cv₁lqvi wUjv₁i₁
1g l 2q mvg₁bi M₁Z Ges t₁ivUvix₁ ôôb₁ôô M₁Z e₁eüZ nq| Avevi w₁ØZ₁xq
chv₁qi Pv₁l big gw₁U₁Z ev av₁bi R₁wg Pv₁l Ki₁Z cv₁lqvi wUjv₁i₁ 2q ev
3q mvg₁bi M₁Z Ges t₁ivUvix₁ ôôD₁Pôô M₁Z e₁eüZ nq|]
- 4| G₁· jv₁i₁U₁S wj fvi#K N₁oi K₁U₁i w₁`#K Ny₁iq B₁Ä₁bi M₁Z evov₁b₁v|
- 5| KlbiZ Ae₁⁻v₁q cv₁lqvi wUjv₁i₁ tgvo #Nvivi mgq c₁tg G₁· jv₁i₁U₁S
wj fviwU N₁oi K₁U₁i weci₁X₁ w₁`#K Ny₁iq B₁Ä₁bi M₁Z Kg₁v₁b₁v|
c₁i th w₁`#K #NviviZ nte t<sub>1</sub>m<sub>1</sub> w<sub>1</sub>`#Ki w₁÷q₁w₁is KvP wj fvi t₁P₁c a₁i Ges GKB
mgq w₁óq₁w₁is n₁v₁U₁j₁U GKUzl c₁i Z₁zj a₁i tgvo #NviviZ nte|

N) eÜ Kiv Kv#j KiYxq t KvR t₁k₁l wKsev Kv₁Ri mgq t₁Kv₁ mgm₁v₁ t₁`Lv w<sub>1</sub>`#j cv₁lqvi
wUjv₁i₁ B₁Ä₁b l t₁ivUvix eÜ Kiv c₁qvRb₁ w₁b₁av₁³ c₁x₁Z₁Z avive₁w₁nKf₁ve m₁u₁b Kiv hvq|

- 1| tgBb KvP wj fviwU ôôAbôô Ae₁⁻v₁b₁ t₁#K ôôAdôô Ae₁⁻v₁b₁ Avb₁v|
- 2| M₁Z c₁ieZK wj fvi l Klb dj₁#Ki M₁Z c₁ieZK wj fvi#K ôôbDUvjôô
Ae₁⁻v₁b₁ Avb₁v|
- 3| G₁· jv₁i₁U₁S wj fviwU ôô÷côô Ae₁⁻v₁b₁ G₁b₁ B₁Ä₁b eÜ Kiv|
- 4| Rvjv₁b c₁ eÜ Kiv|

0) Pj₁bvi mgq mZKZ₁ t cv₁lqvi wUjv₁i₁ w₁bivc₁ c₁wiPv₁j₁b₁ w₁b₁ôZ Ki₁Z Ges t₁Kv₁ cKvi
w₁U₁b₁ Gov₁Z Pj₁bvi mgq KiYxq mZKZ₁ gj₁K e₁e₁⁻v₁ n₁#Q-

- 1| B₁Ä₁b ÷vU t₁`qvi mgq tgBb KvP wj fvi#K ôôteKôô Ae₁⁻v₁b₁ Ges M₁Z
c₁ieZK wj fvi#K ôôbDUvjôô Ae₁⁻v₁b₁ ivLv|
- 2| R₁wg₁Z Pv₁l Kivi mgq t₁Kv₁ Ae₁⁻v₁ZB t₁cQ₁bi 2 bs w₁Mqvi e₁en₁vi Kiv D₁lPZ
bq| t₁ivUvix w₁`#q R<sub>1</sub>wg Pv<sub>1</sub>l Kivi mgq t<sub>1</sub>Kv<sub>1</sub> Kv<sub>1</sub>i<sub>1</sub>Y<sub>1</sub> wUjvi#K t<sub>1</sub>cQ<sub>1</sub>bi w<sub>1</sub>`#K
Pv₁j₁Z n₁j c₁tg tgBb KvP wj fvi#K ôôAdôô Ges dj₁#Ki M₁Z c₁ieZK
wj fvi#K ôôbDUvjôô Ae₁⁻v₁b₁ Avb₁Z nte| Zvici M₁Z c₁ieZK wj fvi₁i₁
m₁vnv₁h₁ t₁cQ₁bi 1 bs w₁Mqvi e₁en₁vi K₁i wUjv₁i₁ n₁Z₁j₁i m₁vnv₁h₁ wUjvi#K
w₁b₁Pi w₁`#K t₁P₁c ivL₁Z nte Ges tgBb KvP wj fvi#K ax₁i ax₁i ôôAbôô
Ae₁⁻v₁b₁ Avb₁Z nte| Kv₁iY t₁cQ₁b Pj₁vi mgq wUjv₁i₁ t₁cQ₁bi Ask l₁c₁i
D₁V t₁h₁Z Pv₁q|

- 3| BÄbþK 𐌲bawiz NYþbi I cþi Pvjbv Kiv DmPZ bq|
- 4| XvjyAe⁻vþb þUBjvi ev Ujmn 𐌲UjviþK 𐌹𐌸 Kivþbvi mgq teK e⁻envi Kiv|
- 5| þUBjvimn Pjgvb Ae⁻vq KLþbv 𐌲Ujvþii teK e⁻envi bv Kþi þUBjvþii cþqi teK e⁻envi Kiv|
KviY G Ae⁻vq 𐌲Ujvþii teK e⁻envi Kþi 𐌲UjviþK 𐌲vgvþZ þMþj þUBjvimn Dþë thþZ cþi|
- 6| þUBjvimn Pjgvb Ae⁻vq þgvo þNvivi mgq 𐌲þqwis KvP e⁻envi bv Kþi þay 𐌲þqwis nvZþji mrvþh⁻ þNviviþbv|
KviY 𐌲óqwis KvP e⁻envi Kþj 𐌲UjviU KvZ nþq Dþë thþZ cþi|
- 7| Pjgvb Ae⁻vq A⁻ev Pvjbv ciCiB KLþbv ÔþiWþqUi K⁻vcÔ þLvþj DmPZ bq|
h⁻ 𐌲Lvþvi cþqvRb nq Zþe c þg BÄb eÜ Kþi GUþK Kgcþ 10 𐌲gþbU WÜv nþZ 𐌹þZ nþe| Zvici þiWþqUi K⁻vþci þevZigþU Pvc 𐌹þq evþúþi Pvc Kþgþq 𐌲bivcþ⁻ K⁻vcU LþþZ nþe|

cvlqvi 𐌲Ujvi i 𐌲Yvþe 𐌲Y

GKuU tgkþbþK Gi KvþKvþji (Economic Life) gþa⁻ jvfRbKfvþe Pvlv⁻ I Ab⁻vb⁻ KuLKvþR e⁻envi KiþZ nþj 𐌲bqþgZ i 𐌲Yvþe 𐌲Yi , iþZ Acimþg| Dchy i 𐌲Yvþe 𐌲Yi dþj tgkþbU 𐌹N⁻b Kvþ 𐌲g 𐌲vþK Ges Gi þgvgZ LiP Kþg hvq| KvþR 𐌲bþqþRZ GKU cvlqvi 𐌲Ujvþii Pjgvb Ask, þjv NIþb 𐌲q nq Ges tgkþbi cþiPvjbv, SuKþb, NIbRþbZ 𐌲q I KvþRi cþiþeþki KvþþY 𐌲wfb Ask 𐌲Xjv nþq hvq| hvi dþj G Ask, þjv (Parts) Îþcþ Ae⁻vþb þ⁻þK tgkþbi mþVK KwiMix Ae⁻vþK e⁻nZ Kþi| cvlqvi 𐌲Ujvi hLb A⁻vfweK Kg 𐌹þZvq PwþjZ nq, AþZwi³ Rvjwþb MnY Kþi Ges Nb Nb AKZKvþ (Failure) nq ZLb GuU 𐌲wgþq cþZKvi KiþZ nþe| bZþv GþZ cvlqvi 𐌲Ujvi 𐌲wZM⁻ nþe| G mg⁻ - mgm⁻v Gwþq cvlqvi 𐌲UjviþK DEg Ae⁻vq KvþKix iþLvi Rb⁻ 𐌲bqþgZ chþe 𐌲Y I i 𐌲Yvþe 𐌲Y AZ⁻veK⁻K|

GKuU cvlqvi 𐌲Ujvþii h⁻vh⁻ i 𐌲Yvþe 𐌲Yi c⁻þ 𐌲c, þjvþK 𐌲bþjwþLZ 𐌲Zb cKvþi þkþYex Kiv hvq| G, þjv nþ⁻Q -

- K) 𐌹þ⁻b⁻þ i 𐌲Yvþe 𐌲Y (Daily Maintenance)
- L) mþgþqK i 𐌲Yvþe 𐌲Y (Periodic Maintenance) I
- M) evrmþiK i 𐌲Yvþe 𐌲Y (Annual Maintenance)

Aþmþy Gevi Avgiv cvlqvi 𐌲Ujvþii i 𐌲Yvþe 𐌲Y mþúþK 𐌲e⁻wiZ þRþb þbB|

K) 𐌹þ⁻b⁻þ i 𐌲Yvþe 𐌲Y

G i 𐌲Yvþe 𐌲Y 𐌹þbK KvR Kivi cþe I cþi mþúþ KiþZ nq| KvþR hvþlqvi cþe KiYxq--

- 1 𐌲Äþbi dþDþÜkb, PþKvi nve I I UþBb þnv⁻þþii bþU-þev⁻, þjv cix 𐌲v Kiv| cþqvRþb Gþw 𐌹þZ nþe|
- 2 þgBb KvP I 𐌲þqwis KvP 𐌲VKgZ KvR Kþi 𐌲Kbv cix 𐌲v KiþZ nþe|
- 3 MþZ cþieZK 𐌲j fvi, djþKi MþZ cþieZK 𐌲j fvi, þjv⁻þvþšwiZ Kiv hvq 𐌲Kbv þ⁻LþZ nþe|
- 4 PþKvi evqþy Pvc cix 𐌲v Kiv|

- 5□ jje#KUs †Zj Ges kxZjxKviK cwi@vi gvlv cix¶v Kiv|
- 6□ BÄb ÷vU †`qvi ci I†qj BÜ#KUi †`L†Z nte Ges BÄ#bi †Kvb As#k A⁻vfwieK kã n†”Q †Kbv cix¶v Kiv| hml †Kvb A⁻vfwieKZv †`Lv †`q Z†e BÄb eÜ K†i Zv †PK Ki†Z nte|

KvR †k†I KiYxq --

- 1□ mg⁻ ewin”K Ask, †jv†K fv†jvfv†e cwi@vi Kiv| ewfb As#k †j†M _vKv a†jvev†j ev Kv`vgvU fv†jvfv†e a†q g†Q †`†Z nte|
- 2□ †Kvb Ask †`†q †Zj ev cwi@b P†q co†Q †Kbv cix¶v Kiv|
- 3□ Klb djK, †jv cix¶v Kiv Ges †f†½ †M†j e`jv†bv|
- 4□ M⁻v†i†R ivLvi ci tgBb KvP †j fvi†K ÔÖAdÖÖ Ae⁻v†b Ges MvZ cwieZK †j fvi I Klb dj†Ki MvZ cwieZK †j fvi†K ÔÖbDUvjÖÖ Ae⁻v†b ivLv|

L) mgvqK i ¶Yv†e ¶Y

†bv`ó KvN>Uv ci ci cvlqvi †Ujvi †h i ¶Yv†e ¶Y Kiv nq Zv mgvqK i ¶Yv†e ¶Y|

c†Z 10 KvN>Uv AŠi KiYxq --

- 1□ bZb cvlqvi †Ujvi e`env†ii †¶†Î c_g 2/3 evi c†Z 10 N>Uv AŠi BÄb †Zj cwieZb Kiv|

c†Z 25 KvN>Uv AŠi KiYxq -

- 1□ bZb cvlqvi †Ujvi e`env†ii †¶†Î c_g 2/3 evi c†Z 25 N>Uv AŠi UvY†gkb I †ivUvix †K†mi †Zj cwieZb Kiv|
- 2□ †÷q†is Kv†Pi K`ve†ji ^`N” cix¶v Kiv Ges c†qvR†b GWRvó Kiv|
- 3□ BÄ#bi †Z†ji AvWjZv cix¶v Kiv|
- 4□ Gqvi †Kbv cix¶v K†i cwi@vi Kiv|
- 5□ v - †e†ë i †Ubk b cix¶v K†i GWRvó Kiv|

c†Z 50 KvN>Uv AŠi KiYxq--

- 1□ ei†Wb K`vej cix¶v K†i †Zj c†qvM Kiv|
- 2□ †cQ†bi PvKvi G†· j I ej †eqv†is G MxR †`†Z nte|
- 3□ †Ubk b c†j†Z MxR †`†Z nte|
- 4□ UvY†gkb I †ivUvix †K†mi †Z†ji gvlv cix¶v K†i c†qvRb Ab†vq†x bZb †Zj †hvM Kiv|

c†Z 100 KvN>Uv AŠi KiYxq--

- 1□ Rvjwb †dëvi I jje#KUs †Z†ji †dëvi †c†Uvj †`†q a†q cwi@vi Kiv|
- 2□ †ivUvix UvY†gkb †PB†bi †Ubk b cix¶v K†i GWRvó Kiv|
- 3□ BÄ#bi fv†j †Kqv†iY cix¶v K†i g`v†q†j Ab†vq†x GWRvó Kiv|

c†Z 300 KvN>Uv AŠi KiYxq -

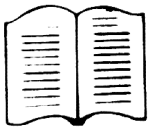
- 10 B|Ätbi †Zj cieZb Kiv| μ˘sK †Km cwi@wi K†i bZb †Zj f|Z
Kiv|
- 20 UvYngkb I †ivUvix †Km wW†Rj w˘†q a†q cwi@wi Kiv Ges bZb †Zj
f|Z Kiv|
- 30 wmwjÜvi tn†Wi bvU cix†v Kiv Ges c†qvR†b wb˘wKZ UK chš Gtū
w˘†Z n†e|
- 40 mvB†jY†i R†g _vKv Kveb cwi@wi Kiv| Gw†K L†j †UvKv w˘†q Kveb
c˘_ †ei K†i cwb†Z a†q wb†Z n†e|
- 50 c†qvR†b R†jwv w†dēvi, j†e†Kw†s †Z†ji w†dēvi cieZb Kiv|

M) $e_{\nu} m_{\nu} i K i \Upsilon_{\nu} \# e \Upsilon$

evrmw iK w fWĖZ c v l q v i w U j v i i ¶ Y v # e ¶ # Y K i Y x q --

- 10 G⁺·⁺j*i* I⁺qj⁺mj⁺,⁺tv cix⁺¶v Kiv Ges c⁺q⁺Rb Abj⁺i bZ⁺ I⁺qj⁺mj⁺
jvMv⁺bv|
- 20 G⁺·⁺j MxR jvMv⁺bv|
- 30 B⁺Ä⁺bi Iq⁺Uvi R⁺v⁺KU, Iq⁺Uvi U⁺vsK d⁺vk K⁺i a⁺q I c⁺vi⁺vi Kiv| h⁺
G⁺,⁺tv i⁺ fZi tK⁺vb A⁺v⁺ib c⁺i Z⁺e Ôc⁺vi⁺viK Zij⁺ (5 tK⁺W R c⁺vb⁺Z 0.3
tK⁺W R A⁺v⁺jKw⁺j) ⁺q Z⁺v c⁺vi⁺vi Ki⁺Z n⁺e| c⁺vi⁺vi Kivi mgq B⁺Ä⁺bK
GKevi D⁺P M⁺iZ⁺Z A⁺v⁺iKevi ⁺b⁺M⁺iZ⁺Z P⁺viZ Ki⁺Z n⁺e| hZ⁺¶Y bv c⁺vi⁺bi
Zvcg⁺¶v 70-80 ⁺W⁺M t⁺mj⁺m⁺qv⁺t⁺ t⁺Q| K⁺qK ⁺g⁺bu ci c⁺vi⁺viK Zij tei
K⁺i t⁺dj⁺Z n⁺e|
- 40 B⁺Ä⁺bi Bb⁺UK I GMRó fvj I fvj ⁺mU (Seat) cix⁺¶v Kiv Ges c⁺q⁺R⁺b
MvB⁺Üs Kiv|
- 50 KvP I te⁺Ki ⁺dKkb ⁺W⁺ t⁺c⁺Uvj ⁺q c⁺vi⁺vi Kiv|
- 60 Kv⁺bK⁺Üs i⁺Wi bvU AvUmvU Av⁺Q ⁺Kbv t⁺L⁺Z n⁺e| ⁺eq⁺wis ¶q n⁺q⁺Q ⁺Kbv
t⁺L⁺Z n⁺e|
- 70 Rvj⁺vb B⁺ÄKkb c⁺v⁺ú cix⁺¶v Ki⁺Z n⁺e|
- 80 2-3 erm⁺i GKevi cvIqvi ⁺Ujvi⁺¶K I fvinj (Overhaul) Kiv fvj|

Dc†iv³ 4 † †K 8bs chš i †bv†e†Y mqr†Aw†Á KwiMi ††q †Kvb IqvKk†c Kiv DiiPZ|



migg t B|Ä#b k|³ cv|lqvq ||Ujv#ii P|vKv| I N|Yqgvb K|b h#š |cšQ|b#KB cv|lqv|
UvY|gkb c#|Z e#j| cv|lqv| ev k|³ |v|vš#ii Rb" ||Mqv|, teē-cj I |Pbb-
#|ú#KU e"eüZ nq| cv|lqv| ||Ujv| m|žv#e c||Pv|jv| I i|Y|v#e|Yi Rb"
K#qK|U avc ev c#|c i#q#Q|G avc, #jv#Z KiYxq KvR, #jv m|VKfv#e
m|óv`b Ki#Z nq|



cvVvEi gj`vqb 3.2

mVK DĖi i cvk UK (√) Pý b|

1. bPi †KvbU cvlqvi Ujvii UvYgkb c×Zi Ask bq ?

- K. V- teë
- L. UvYgkb
- M. †gBb KvP
- N. †cQbi PiKv|

2. bPi †KvbUi mnnv`h UvYgkb †_K †ivUvix cvD-G k³ vbiši Kiv nq ?

- K. †gBb KvP
- L. óqwis KvP
- M. Ujs KvP
- N. †gBb cyj |

3. cvlqvi Ujvi†K Kv†Ri bgiĖ Pjbn Kivi mgq bPi †KvbU Kivi c†qvRb †bB ?

- K. MZ cieZK j fvi†K c†qvRbxq MZ†Z vcb Kiv
- L. †gBb KvP j fvi†K ax†i ax†i ÒAbôô Ae v†b Avbv
- M. dj†Ki MZ cieZK j fviU bDUvj †_K ÒD"Pôô ev Òbôô Ae v†b vcb Kiv
- N. G · jv†iUs j fvi†K Ny†q ÒAdôô cRk†b Avbv|

4. bPi †KvbU DvPZ bq ?

- K. XvjyAe v†b Ujvi†K w Kivbvi mgq teK e`envi Kiv
- L. †cQb Pjvi mgq Ujvii †cQbi Ask hv†Z Ic†i D†V bv hvq †mRb" †gBb KvP j fvi†K ax†i ax†i ÒAbôô Ae v†b Avbv
- M. †UBjvi mn Pjgvb Ae vq tgvo †Niv†bvi mgq iayóqwis nvZj e`envi Kiv
- N. †UBjvimn Pjgvb Ae vq Ujvii teK e`envi Kiv|

5. bPi †KvbU mVK bq ?

- K. b`b i Yvte Y mgn`bK KvR Kivi c†e I c†i múb Kiv nq
- L. b`ó KvN>Uv Aši th i Yvte Y Kiv nq Zv mvgqK i Yvte Y
- M. cZ 10 KvN>Uv Aši Rjvb dēvi ci v i Kiv
- N. cZ 300 KvN>Uv Aši BÄb †Zj cieZb Kiv|

K_L.I c jx Dbqb ⁻q̄

cV 3.3 Uv±ii tkYiefvM I e'envi

G cV tk[†]I Avcib —



- Uv±ii tkYiefvM KiZ cvi[†]eb|
- wefb ai[†]bi Uv±ii e'envi [†]jLZ cvi[†]eb|
- wefb ai[†]Yi Uv±ii weeY [†]jLZ cvi[†]eb|



Uv±i n[†]Q GK_U ⁻qsP[†]jZ (Self propelled) tg[†]kb, hv tevSv (Load) Uvbv ev tVjvi Rb[†] A_{ev} ⁻i Ae⁻vq tK[†]b KvR Kivi Rb[†] e'eüZ nq| Uv±ii k[†]3 i Drm n[†]Q GK_U B[†]Äb| Uv±ii mv_† mshy[†] ev Gi mvnv[†]h[†] P[†]jZ wefb hš ⁻q K_L, ebvqb, c[†]ienY, [†]bgvY BZ[†] ⁻††i[†] wefb KvR m[†]ú[†]b Kiv hvq| Uv±ii k[†]3 Gi [†]c.Ü. I. (Power Take Off) k[†]vdU, c[†]j, nvBw[†]jK [†]m[†]÷g Ges Wevi [†]†K e'eüZ nq| Avmb[†] Avgiv Uv±ii tkYiefvM I e'envi, [†]jv tR[†]b tB|

Uv±ii tkYiefvM I e'envi

Lvgv[†]i wefb ai[†]bi Kv[†]Ri c[†]qvRb t[†]gU[†]Z [†]fb [†]fb ai[†]bi Uv±i e'eüZ nq|

Kv[†]Ri cK_UZ, thgbt K_L, [†]bgvYKvR, ebvqb BZ[†] ⁻Abj[†]qx Uv±ii Mv[†]b I AvK_UZ wefb n[†]q ⁻v[†]K| Z[†]e GL[†]b Avgiv K_LKv[†]R e'eüZ Uv±ii g[†]a[†]B m[†]gve[†] ⁻vKe| Lvgv[†]i wefb ai[†]bi Kv[†]Ri c[†]qvRb t[†]gU[†]Z [†]fb [†]fb ai[†]bi Uv±i e'eüZ nq| [†]b[†] K_L.Kv[†]R e'eüZ Uv±ii tkYiefvM m[†]ú[†]K Av[†]jvPbv Kiv nj|

mvaviY [†]b[†]e[†]YZ [†]Zb[†]U c[†]×[†]Z[†]Z Uv±ii tkYiefvM Kiv hvq|

- K) W[†]Bf [†]m[†]÷g ev P[†]Kv Abj[†]qx
- L) e'envi Abj[†]qx Ges
- M) Akk[†]3 Abj[†]qx

Gevi Avmb[†], [†]we⁻wiZfv[†]e Dc[†]iv[†]3 tkYiefvM Ges K_L.Kv[†]R wefb ai[†]bi Uv±ii e'envi m[†]ú[†]K Av[†]jvPbv K[†]i|

K) W[†]Bf [†]m[†]÷g ev P[†]Kv Abj[†]qx tkYiefvM-

G ai[†]bi Uv±i Avevi K[†]qK cK[†]vi n[†]q ⁻v[†]K| thgbt P[†]Kvhy[†], c[†]Y U[†]vK we[†]kó, Aa U[†]vK we[†]kó|

1. P[†]Kvhy[†] (wheel type)

Z[†]zbvg[†]jK D[†]P M_UZ Ges Kg RvqMvq [†]Nviv[†]bvi Rb[†] G ai[†]bi Uv±i Dc[†]h[†]Mx|

G Uv±i, [†]jv[†]Z evq[†]Y ivev[†]ii P[†]Kv ⁻v[†]K| Z[†]zbvg[†]jK D[†]P M_UZ Ges Kg RvqMvq [†]Nviv[†]bvi Rb[†] G ai[†]bi Uv±i Dc[†]h[†]Mx| ivev[†]ii P[†]Kv ⁻v[†]Kvq GB Uv±i, [†]jv GK[†] [†]K thgb gv[†]V Pj[†]Z c[†]vi, Ab[†] ⁻†K [†]Zg[†]lb c[†]ienb KvR t[†]gU[†]iMv[†]ox PjvP[†]ji c[†]Kv iv⁻q[†]l Pj[†]Z c[†]vi| f[†]vg K[†]lb, gB [†]q[†]v, exR ecb, c[†]ienY BZ[†] ⁻Lvgvi Kv[†]R ivevi P[†]Kvhy[†] Uv±i te[†]k Dc[†]h[†]Mx|

G ai#bi Uv±i, t jv`jPvKv, ZbPvKv I Pvi PvkV veikó n#Z cv#i| mvaviYZ`jPvKv veikó
 Uv±i#K Ujvi ev cvIqvI Ujvi bvtgI A#finZ Kiv nq| tQvU AvKv#ii gv#V Pvl`#Z Ksev
 K#lcY" c#ien#Y G, #jv Avgv#`i t`#k KIK#`i gv#S tek Rb#cqZv cv#Q| ZbPvKv veikó
 Uv±i, #jv mvaviYZ`e#kl ai#bi KvR Kivi Rb", thgb- m#ie#fv#e jvMv#bv, dm#ji Avšt
 c#iPhv Kivi Rb" e"eüz nq| Z#e K#LKv#R mvaviYZ`jPvKv I Pvi PvkV veikó Uv±i#i
 e"enviB teik|

PvKvhy Uv±i Avevi`jPvKv P#jZ (Two wheel drive) I Pvi PvkV P#jZ(Four wheel
 drive) G`jai#bi n#q \_v#K| B#Ä#bi k#<sup>3</sup> hLb gv#`jUv Pvkvi gva#g chy n#q Uv±i#K
 Pvjbv K#i ZLb Zv#K`jPvKv P#jZ Uv±i ejv nq| Ab"v`#K PviPvkV P#jZ Uv±i#i t#j#
 B#Ä#bi k#³ PviU Pvkvi gva#g chy n#q Uv±i#K Pvjvq| Pvi PvkV P#jZ Uv±i#i Pvkvi
 AvK#Z.eo nq Ges Uvbi`lgZv (Traction) teik I gv#U#Z e#m hvq bv| big gv#U#Z Gi
 PvkV#cQ#j(Slippage) hvq bv Ges XvjyRvqMvq Gi`#q KvR Kiv m#eavRbK| k#³kvjx
 B#Äb _vKvq Pvi PvkV P#jZ Uv±i eo eo hšc#Z c#iPvjvq e"eüz nq| Z#e Avgv#`i
 t`#k K#LKv#R`jPvKv P#jZ Uv±i#i e"enviB c#ij#`qZ nq|

#PÎ 3.5 -G 2-PvkV P#jZ Uv±i Ges #PÎ 3.6 -G 4-PvkV P#jZ Uv±i#i Q#e t`Lv#bv n#jv|

#PÎ 3.5 ivev#ii Pvkvhv Uv±i (2-PvkV P#jZ)

¶PÎ 3.6 Pvkivhy Uv±i (4-PvKv PvjZ)

2. cYUvK ¶eikó (Full track type)

GvU big I †fRv gvuU±Z,
Xvjy fvg±Z ¶eiklvte
Dc±hvMx|

cvšnx b ̄qUv UvK Gi mnnvth G ai±bi Uv±i PvjZ n±q _vK| gvuUi ms±M UvKvKi
ms±hv±Mi †¶îdj teik _vKvq gvuU±Z chy Pvc Kg nq, ¶ú±cR Kg nq, gvuU±K fvj fvte
AvKto ai±Z cv±i| d±j GvU big I †fRv gvuU±Z, Xvjy fvg±Z ¶eiklvte Dc±hvMx| fvg
cvi Kvi Kiv ev cpi×vi Kv±R, Rvg±K tm±Pi Dchy Kiv, Mfxi fvte PvI †qvi hšcWZ
cviPvjbv Kv±R G ai±bi Uv±i eüZ nq| cY UvK ¶eikó Uv±iK í RvqMvq †Nviv±bv
hvq| ¶W±Rj BvÄb ¶eikó G ai±bi Uv±i mvaivYZ ¶eY G jvKvRjo, fvi× tevSivhy Ae vq
xN mgq a±i KvR Kivi Rb eüZ nq| ¶b± cY UvK ¶eikó GKvU Uv±i i ¶PÎ †qv nj|

¶PÎ 3.7 GKvU cY UvK ¶eikó Uv±i

3. Aa UvK ¶eikó (Half track type)

G cKvi Uv±i fvg Klv,
dmj KZb BZv KlvR
eüZ nq|

BDvU 3

ivev`ii PvkV I U`vKi mgšq G ai#bi Uv±i PvjZ nq_vK| AZ`š fviX ai#bi Uv±i G ai#bi e`e_v_vK| G cKvi Uv±i fvg Klb, dmj KZb BZ`w` KvR e`eüZ nq| tKvb tKvb KqvBb nvi#fóvi G ai#bi e`e_v_vK|

¶PÎ 3.8 GKU Aa-U`vK vekló Uv±i

L) e`envi Abjvqx tkYefvM

Kl.L.KvRi aib Abjvqx GšKK cKvi KvRi Rb` vekl ai#bi Uv±i ^Zix nq_vK|

mvaviYZ gvVi vekl fb ai#bi KvR, thgbt fvg Klb, gB t`qv, exR tevbi hš Pjbn,, dmj KZ#bi hš Pjbn G RvZxq KvR GB cKvi Uv±i Dc#hMx|

1| Av`k Uv±i (Standard tractor) : G, t\_jv metPq cvPxb ai#bi| mvaviYZ gvVi vekl fb ai#bi KvR, thgbt fvg Klb, gB t`qv, exR tevbi hš Pjbn,, dmj KZ#bi hš Pjbn G RvZxq KvR GB cKvi Uv±i Dc#hMx| G RvZxq Uv±i Zjv wBpznIqv mwiex dm#ji t¶t`e`envi Kiv hvq bv Zte Uvbn ai#bi hšcWZ PvjvZ k³ mieivn Kiv ev mg` ai#bi Wevi KvRi Rb` LqB KvKix|

¶PÎ 3.9 GKU Av`k Uv±i

2| mvaviY D#`K`RibZ Uv±i (General purpose tractor) : G ai#bi Uv±i K Row Crop type Uv±i I ejv nq| G cKvi Uv±i mwiexfvte Avev`KZ.dm#ji cwiPhv I ec#bi Rb`

G cKvi Uv±i mwiexfvte Avev`KZ.dm#ji cwiPhv I ec#bi Rb` vekl fvte %Zii|

Lvgvi hšcWZ

KuL.I c jx Dbqb ˉq

weʔklfvʔe ʔZii | G Uvʔi, tʔjv Ggbfvʔe ˆZii Kiv nq hvʔZ mʔiex weʔfb dmj, mʔi
weʔfb ckˉZv, Dʔæv ʔbPʔdmj BZˉv ˆ weʔfb Aeˉvq G, tʔjv Lvc LvBʔq KvR KiʔZ cvʔi | G
cKvi Uvʔi i Zjv tek DPʔZ ˉvʔK |

G aiʔbi Uvʔi mvgʔbi PʔKvi eˉv ʔZb iKʔgi nʔZ cvʔi, ˆØZ mʔi PʔKv weʔkó (ʔPĤ) hv
fʔv, Zʔv BZˉv ˆ dmʔj eˉvüZ nq, GKK mˉv PʔKv weʔkó- hv mʔKxY mʔiex dmʔj ev
ʔmPKZ.R ʔgʔZ eˉvüZ nq Ges ZZxqʔU, mgšqʔhvmˉ ckˉ mʔi GʔKʔj weʔkó-hv ʔbPʔdmj
ʔhgbt AvjyBZˉv ˆ dmʔji Rbˉ eˉvüZ nq | ckˉ Gʔˈj cvvvox XvjyʔgʔZ UvʔiʔK
ˉ ʔZkxj iʔL |

ʔPĤ 3.10 ˆØZ mʔi PʔKv weʔkó Uvʔi

3 | eúgbx Uvʔi (Utility tractor)

Lvgʔi weʔfb KvR ʔhgbt
ʔMvei ʔevSvB Kiv, ʔevSv Uvʔv
I cʔienY Kiv, kmˉevnx
IqvMb Uvʔv BZˉv ˆ ʔZI GʔU
Dcʔhvmx |

mʔiLi ˆ ʔPʔKv I ʔcQʔbi ˆ ʔPʔKvi gaˉKvi eˉeavb ˉi Aˉev mgšqʔhvmˉ Dfq aiʔbi gʔWjB
cvʔqv hvq | ˆ ʔPʔKvi gaˉKvi eˉeavb mgšq Kʔi weʔfb cKvi mʔiex dmʔj eˉenvi Kiv
hvq | Row crop gʔWʔji Uvʔi Aʔcʔv GʔUi Zjv AʔcʔvKZ. ʔbPʔ dʔj cvvvox XvjyʔZ
ˉ ʔZkxj ˉvʔK | Lvgʔi weʔfb KvR ʔhgbt ʔMvei ʔevSvB Kiv, ʔevSv Uvʔv I cʔienY Kiv,
kmˉevnx IqvMb Uvʔv BZˉv ˆ ʔZI GʔU Dcʔhvmx | GQvov gvʔvi weʔfb KvR, ʔhgbt weʔfb cKvi
cvD ˉ ʔq fʔg Kʔb BZˉv ˆ KvʔR cPʔ eˉvüZ nq |

Abjxjbx t Avcbvi GjvKvq KuL.KvʔRi Rbˉ ʔh mgˉ Uvʔi eˉenvi Kiv nq ʔm, tʔjvi GKʔU
ZvʔjKv cˉZ Kiʔb |



¶PÎ 3.11 GKU eûgkx Uv±i

4| avb PvIi Rb" ¶ekl Uv±i

G ai±bi Uv±iK Kv`v
gwU±Z KvR Kivi Rb"
¶ekl fvte Dc±hvMx|

mvaviYZ Kv`v gwU±ZB avb PvI Kiv n±q _v±K| ZvB cvwb±ivaK teK, ¶eqwis, ¶÷j ûBj
BZ`v` ms±hvR±bi e`e`v K±i G ai±bi Uv±iK Kv`v gwU±Z KvR Kivi Rb" ¶ekl fvte
Dc±hvMx Kiv nq|

5| dj evMv±bi Rb" ¶ekl Uv±i (Orchard tractor)

Mv±Qi mvi±i tkl cv±š `Z
±Nviv±bvi Rb" Ges Mv±Qi
dvkv `±q GtK tetK Pjvi
Rb" GvU Dc±hvMx|

dj evMv±b ev eb evMv±b mvi±i dvkv I vbp `±q ¶evfb KvR Kivi Rb" G cKvi Uv±i
¶ekl fvte ^Zvi Kiv nq| G ai±bi Uv±iK `jvKvi ga`eZx e`eavb Kg n±q _v±K| Pvj±Ki
Dc±i XvKv±b _v±K Ges Uv±i±i D`PZv Kg n±q _v±K| d±j Xvjyfig±Z GvU ¶Zkxj _v±K|
Mv±Qi mvi±i tkl cv±š `Z ±Nviv±bvi Rb" Ges Mv±Qi dvkv `±q GtK tetK Pjvi Rb" GvU
Dc±hvMx|

M) Akk³ Abjvqx tkvYefvM

Uv±i BvÄ±bi Akk³ ±K Uv±i±i Kv¶gZv m±úK GKUv aviYv cvlqv hvq| hv` I BvÄb
n±Z Drcb mg⁻ kv³ memgq mgvbfvte e`envi Kiv hvq bv Z_vic G c×vZ mnR I eûj
cPvjZ| Akk³ Abjvqx Uv±i±i tkvYefvM vbi±c n±Z cv±i|

- | | | | |
|---|------------------------------------|---|---------|
| 1 | 15 Akk ³ i Kg ¶gZv m±úb | - | ±QvU |
| 2 | 20-30 Akk ³ | - | gvSvix |
| 3 | 30-35 Akk ³ | - | eo |
| 4 | 50 Akk ³ i Dci | - | ep`vKvi |



mvigg t Kvqv±i ¶evfb ai±bi Kv±Ri Rb" ¶fb ¶fb Uv±i±i c±qvRb nq| cvZvU Uv±i±i Mv±b
I Kv±Ri cKvZ m±úY Avjv`v|



K₁L.1 c jx Dbqb $\overline{\text{q}}$

cV₁W₁E₁ g₁j₁vq₁ 3.3

m₁VK D₁E₁i₁ c₁v₁k₁ UK (√) P₁Y₁ $\overline{\text{b}}$ |

1| W₁B₁f₁ m₁÷₁g₁ A₁b₁q₁x U₁±₁i₁ t₁k₁Y₁e₁f₁v₁M₁ K₁i₁ h₁v₁q₁ -

K) $\overline{\text{b}}$ f₁v₁te

L) $\overline{\text{Z}}$ b₁f₁v₁te

M) P₁v₁i₁f₁v₁te

N) c₁v₁B₁f₁v₁te|

2| $\overline{\text{b}}$ ±₁P₁i₁ t₁K₁v₁b₁U₁ m₁VK b₁q₁ ?

K) i₁ev₁±₁i₁ P₁v₁K₁v₁h₁y₁ U₁±₁i₁, t₁j₁v₁ $\overline{\text{y}}$ P₁v₁K₁v₁, $\overline{\text{Z}}$ b₁P₁i₁K₁v₁ I P₁v₁i₁P₁i₁K₁v₁ $\overline{\text{e}}$ kó n₁±₁Z₁ c₁v₁±₁i₁|

L) g₁v₁U₁i₁ m₁s₁±₁M₁ U₁±₁v₁±₁K₁i₁ m₁s₁±₁h₁v₁M₁ t₁ŷ₁ŷ₁ t₁e₁k₁ n₁l₁q₁v₁q₁ c₁Y₁U₁±₁v₁K₁ $\overline{\text{e}}$ kó U₁±₁i₁ $\overline{\text{u}}$ ±₁c₁R₁ Kg n₁q₁, g₁v₁U₁±₁Z₁ ch₁y₁ P₁v₁c₁ Kg n₁q₁|

M) ÷³U₁W₁ U₁±₁i₁ U₁v₁b₁ ai₁±₁bi₁ h₁s₁c₁v₁±₁Z₁±₁Z₁ k₁³ t₁h₁v₁M₁±₁Z₁ Ges W₁ev₁i₁ K₁v₁±₁R₁i₁ R₁b₁ $\overline{\text{L}}$ y₁B₁ D₁c₁±₁h₁v₁M₁x₁|

N) $\overline{\text{e}}$ ŷ₁ŷ₁ B₁ f₁v₁te A₁ev₁±₁K₁Z₁.d₁m₁±₁j₁i₁ c₁v₁i₁Ph₁v₁ K₁i₁v₁i₁ R₁b₁ m₁v₁av₁i₁Y₁ D₁±₁ŷ₁k₁±₁R₁ib₁Z₁ U₁±₁i₁ e₁±₁ü₁Z₁ n₁q₁|

3| $\overline{\text{b}}$ ±₁P₁i₁ t₁K₁v₁b₁U₁ $\overline{\text{q}}$ ±₁v₁ ?

K) e₁ü₁g₁±₁x₁ U₁±₁i₁ $\overline{\text{y}}$ P₁v₁K₁v₁i₁ e₁±₁av₁b₁ m₁g₁s₁q₁ K₁±₁i₁ $\overline{\text{e}}$ ŷ₁ŷ₁fb₁ m₁v₁ie₁x₁ d₁m₁±₁j₁ K₁v₁R₁ K₁i₁v₁h₁v₁q₁|

L) d₁j₁ ev₁M₁±₁bi₁ R₁b₁ $\overline{\text{e}}$ ±₁k₁l₁ U₁±₁i₁ D₁±₁P₁Z₁ Kg n₁q₁ Ges $\overline{\text{y}}$ P₁v₁K₁v₁i₁ e₁±₁av₁b₁l₁ Kg n₁q₁|

M) A₁v₁±₁k₁ U₁±₁i₁ m₁v₁av₁i₁Y₁Z₁ m₁v₁ie₁x₁f₁v₁te A₁ev₁±₁K₁Z₁.d₁m₁±₁j₁i₁ c₁v₁i₁Ph₁v₁q₁ e₁±₁ü₁Z₁ n₁q₁ Ges f₁y₁g₁ K₁l₁±₁bi₁ D₁c₁±₁h₁v₁M₁x₁ b₁q₁|

N) m₁v₁av₁i₁Y₁ D₁±₁ŷ₁k₁±₁R₁ib₁Z₁ U₁±₁i₁ Z₁j₁v₁ t₁ek₁ D₁±₁ŷ₁ŷ₁ $\overline{\text{v}}$ ±₁K₁ Ges G₁ ai₁±₁bi₁ U₁±₁i₁±₁K₁ Row crop U₁±₁i₁l₁ ej₁v₁ n₁q₁|

cV 3.4 U₁±₁i₁ g₁j₁ Askmg₁±₁ni $\overline{\text{e}}$ ee₁i₁Y₁ I K₁v₁h₁c₁Y₁v₁j₁

G cV t₁k₁±₁l₁ A₁v₁c₁ib₁ —

BD₁ib₁U₁ 3



- Uv±i i gj Ask, jvi bvg ejZ cvi#eb|
- Uv±i i gj Ask, jvi eeiY jLZ cvi#eb|
- Uv±i i gj Ask, jvi KvR eYbv KiZ cvi#eb|

Uv±i i gj Ask, jv

Uv±i i gj Ask, jv K b j L Z f v t e f v M K i v h v q |



- 1| cvBg gyvi ev BÄb (Prime mover or Engine)
- 2| KvP (Clutch)
- 3| UvYgkb (Transmission)
- 4| PkV I Uvqvi (Wheel and tyre)
- 5| teK (Brake)
- 6| ÷ qvis (Steering)
- 7| nBw j K c x Z (Hydraulic system)
- 8| n n Ps c x Z (Hitching system)
- 9| ^ e ` y Z K m ÷ g (Electrical system)
- 10| Ab`vb` bqŠYKvix Ask mgr (Other controls for operation)

Gevi Avmb Dc i D j L Z Ask, jvi Mvb I KvhcYwj ms t c Av j v Pbv K i i |

1| **cvBg gyvi ev BÄb**- Uv±i i Rb` AŠ`vnx BÄb t KB cvBg gyvi n t m t e e`envi Kiv nq | BDu-1 I 2 G BÄb m u t K e i Z Av j v Pbv Kiv n t q t Q | Uv±i maviYZ W t R j BÄb e`envi Kiv nq | Uv±i i AvKvi Ges K t R i c K Z. Abjvqx e f b t g Zvi W t R j BÄb e`eüZ nq | BÄb U vcb Kiv nq Uv±i i mvg t bi ` t K d t j t c Q t b f v i x h Š c v Z m s t h v R b Kiv n t j f v i m v g` e R v q _ v t K |

2| **KvP** - KvP e`envi i gj D t I k` nj c t q v R b Abjv t i BÄb t bi k ³ UvYgk t b t c Š Q v t b v A _ ev BÄb t bi k ³ t K UvYgkb n t Z e Q b Kiv |

t k YiefvM- BÄb t bi c v l qvi UvYgkb c x Z Abjvqx Uv±i i KvP Zb c Kvi n t q _ v t K |

K) m t j KvP (Single clutch) : hLb GKB KvP i g v a t g BÄb t bi k ³ t K t g Bb UvYgkb I c, u, I UvYgk t b v b Š i Kiv nq ZLb Z t K m t j KvP e j v nq |

L) t h Š KvP (Dual clutch) : GLv b l t g Bb UvYgkb I c, u, I, UvYgk t bi Rb` GKB KvP e`envi Kiv nq | Kb e`envi i mgq ` j a t c KvP t c W t j P v c ` t Z nq | c _ g a v t c i a y t g Bb UvYgkb KvR K t i Ges ceeZ a v t c c, u, I UvYgkb KvR K t i |

M) ZŠ KvP (Separate clutch system) : G t t t t t g Bb UvYgkb I c, u, I, UvYgk t bi Rb` Av j v` v Av j v` v KvP e`eüZ nq |

Mvb I KvhcYwj

Mvb Abjvqx Uv±i i KvP e f b a i t bi n t q _ v t K | Z t e t h a i t bi KvP m P i v P i t e k e`eüZ nq t m a i t bi KvP m u t K Av j v Pbv Kiv h v K |

K_UL.I c jx Dbqb ⁻q̄

KvPi ⁻ŷUv Ae⁻vb _v†K| h_v t (1) hy I (2) gy | hy Ae⁻vq B_UÄ†bi k_U³ dvB ūBj
 †_†K KvPi gva†g Uvŷgkb k⁻vdU hvq Ges Gi gva†g Uvŷgkb †cšQiq| ^UKb gy
 Ae⁻vq B_UÄ†bi k_U³ Uvŷgkb n†Z ^Uel"Qb n†q hvq| Uv±i Pjgvb Ae⁻vq KvP hy Ae⁻vq
_v†K| ^UMqv i c^UieZ†bi mgq KvP†K gy Ae⁻vq Avbv nq|

1. μ⁻vsK k⁻vdU
2. dvB ūBj
3. ^UdKkb ^UW⁻
4. †cmvi †cU
5. KvP †cWvj
6. KvP ^Uús
7. Uvŷgkb k⁻vdU
8. _vó ^Ueq^Uis
9. BD_Wqvj ^Uj fvi
10. KvP nvD_URs

^UPÎ 3.12 GK_U KvP

hy Ae⁻vq KvP ^Uús †cmvi †c†Ui Dci Pvc c†qvM K†i Ges †cmvi †cU_U ^UdKkb ^UW^U†K
 dvB ūB†ji M†q †P†c a†i| ^UdKkb ^UW†⁻i Mv LmL†m c⁻v†_i ^Zix| d†j Zv dvB ūB†ji
 mv†_U ⁻p f††e †j†M _v†K Ges dvBūBj hLb N††Z _v†K ZLb IUvI N††Z _v†K| ^UdKkb
^UW⁻_U Uvŷgkb k⁻vd†Ui Dci em†bv _v†K e†j Uvŷgkb k⁻vdU_U dvBūBj I ^UdKkb
^UW†⁻i mv†_U N††Z _v†K Ges Uvŷgkb B_UÄ†bi k_U³ ⁻vbvš i K†i|

GLb h_U⁻ B_UÄ†bi k_U³ K Uvŷgkb n†Z ^Uel"Qb Kivi c†qvRb nq Z†e PijK KvP †cW†ji
 Dci cv ^U†q Pvc ††e| Gi d†j _vó ^Ueq^Uis dvB ūB†ji ^U†K ^UKQ_U G_UM†q hv†e Ges
 DB_Wqvj ^Ujfv†ii cv†š Pvc c†qvM Ki†e| ZLb DB_Wqvj ^Ujfv†ei Aci cv†š †cmvi
 †cU†K ^Uús Gi Pvc†i ^UecixZ ^U†K A_{vr} KvP nvD_URs Gi ^U†K †v†j ††e| d†j ^UdKkb
^UW†⁻i Dci †_†K †cmvi †c†Ui Pvc m†i hv†e| G Ae⁻vq ^UdKkb ^UW⁻ dvBūB†ji Mv †_†K
 m†i hv†e| A_{vr} ^UdKkb ^UW⁻ I dvB ūB†ji g†a⁻ Avi †Kvb ms†h_UM _vK†e bv| Zvb dvBūBj
 †_†K B_UÄ†bi k_U³ Uvŷgkb k⁻vdU I Uvŷgkb †h†Z cvi†e bv| G Ae⁻WUB KvPi gy
 Ae⁻v|

3| **Uvŷgkb** - B_UÄ†bi Drcb k_U³ Uv±ii Pvk I ^Uc_U.U.I. k⁻vdU †cšQ†bvB Uv±ii
 Uvŷgkb†bi KvR| h_U⁻ I Uv±ii Uvŷgkb L_U R_UUj Z†e tgš_UJK ^U†K †_†K Uv±i I cvIqv
^UUjv†ii Uvŷgkb cvq mgch†qi| Uv±ii Uvŷgkb ^Uelfb e†v†mi KZK_U†jv ^UMqv†ii mgš†q
 M_UVZ| B_UÄ†bi k_U³ G ^UMqv_U†jvi gva†gB GK k⁻vdU n†Z Ab⁻ k⁻vdU ⁻vbvš i Kiv nq|
 Uv±ii Uvŷgkb m^Uú†K cieZ_U cvV bs-3.5 Gi ^Uel⁻Wiz Av†jvPbv †_†K †R†b ^Ub†Z c^Uvi|

4| Pvk I Uqv- Uv±ii mvg±bi Pvk \jUv maviYZ A±c¶KZ.tQvU I tcQ±bi Pvk \jU
ep`vKv| tcQ±bi Pvk \jUv Uv±ii IR±bi AaKvsk enb K±i(maviYZ Kgc±¶ Uv±ii
IR±bi 60%)| tcQbi Pvk mavn±h"B Uv±i Pjvi MZ jvf K±i| mvg±bi Pvk maviYZ
÷q¶is Gi Rb" e"eüz nq|

PI 3.13 G Uv±ii Pvk wefb Ask,±jv t`Lv±bv nj| Pvk cavb Ask,±jv b±i|c-

PI 3.13 Uv±ii Pvk (ev±g) I Pvk c`±"Q` (W±b)

1. W⁻, 2. ig, 3. fvf, 4. UW, 5. dvB, 6. evqavik, 7. Pvk ck⁻Zv,
8. i±gi ck⁻Zv, 9. i±gi e"vm, 10. W⁻, 11. Pvk

(1) ūBj W⁻ - ÷±ji ^Zi tMvjvKZ. Uv±ii IRb enb K±i| W⁻i Ic±ii As±k igv
jvMv±bv _v±K|

(2) ig - W⁻i m±_ ig maviYZ I±q¶is K±i jvMv±bv _v±K| ÷±ji ^Zix i±gi M±q
Uqv jvMv±bv nq|

(3) Uqv- Uqv maviYZ ivev±ii ^Zi nq| Uqv±ii k³ I qZ e¶xi Rb" ivev i
mZvi ^Zi K±qKvU⁻i _v±K| i,±j±K cvB e±j| Uv±ii tcQ±bi Uqv±ii M±q A±bK,±jv
D±D±Ask _v±K| G,±jv±K UxW e±j| gU±Z fvf fvf Avk±to ai±Z G,±jv mnvqK|

ZbU mvs±KvZK Pý ¶q Uqv±ii AvKvZ. cKvK Kiv nq| D`vniY⁻i|c h¶ tKv Uqv±ii
M±q ±jLv _v±K 12.4-36-4 cvB| Zv±j tevSv hvte Uqv±iU 12.4 BvÂ ck⁻, i±gi
±fZ±ii ¶Kv e"vm 36 BvÂ Ges Uqv±iU 4 cvB weikó|

(4) UDe- ivev±ii ^Zi UDei KvR n±jv c±qvRbxq evZv±K a±i ivLv| GvU Uqv±ii
±fZ±ii ¶K⁻vcb Kiv nq|

(5) teK- Uv±i, cvIqvi Ujvi, tgvUiMvov BZ"¶ th tKv hvŠK hvb±K c±qvRb Avm±i
_vgv±Z ev Gi MZ bvqšY Ki±Z teK e"envi Kiv nq| Uv±i ¶ai±bi teK e"eüz nq-

KuL.I c jx Dbqb $\bar{q}$

iwbš teK (Running brake) - Pjgvb Uv±t*i* i MŁZ wqšY I _vgv±bvi Rb" iwbš teK e"envi Kiv nq|

cwKš teK (Parking brake)- Uv±i `vav±bv Ae $\bar{v}$ q wbi $\bar{v}$ cEvi Rb" G teK evenvi Kiv nq| XvjyRvqMvq Uv±i tK `w Kwi±q ivŁZ n±j Aek" B cwKš teK e"envi Ki±Z n±e|

cŁZŁU PŁKvi mv±_ _v±K GKŁU teK Wwq| teK Kivi mgq D³ teK Wwq±K tP±c ai±j I Uv Av i Ny±Z c±i bv, d±j PŁKv t_±g hvq| teK WwqŁU±K `jcxŁZ±Z tP±c aiv hvq- evB±i i w`K t_±K A_ev ±fZ±i i w`K t_±K| GRb" MVb Abjvqx teK jckvi nq|

K) ±fZi t_±K m±úmv iYkxj (Internal expansion type)

L) evB±i t_±K ms±KvPbkxj (External cotraction type)

Uv±i I tgvUiMvOX±Z ±fZi t_±K m±úmv iYkxj teKB teŁk e"envi Kiv nq| Kv±RB G ai±bi teK m±ú±KB Avg iv Av±jvPbv Kie|

±fZi t_±K m±úmv iYkxj teK

G ai±bi teK Avevi `jckvi n±Z cv±i, thgb-tgKwbK"vj teK I nvBWjK teK| w±± iay tgKwbK"vj te±Ki KvhcYwvj eYbv Kiv n±q±Q|

tgKwbK"vj teK - AŁaKvsk Uv±ti G ai±bi teK e"eüZ nq| wPG 3.14 G GKŁU tgKwbK"vj teK t`Lv±bv n±q±Q|

1. wUvb w $\bar{c}$ s
2. teK tcvwj
3. teK iW
4. teK wj fvi
5. teK K"vg
6. teK-±mv
7. teK Wwq

wPÎ 3.14 GKŁU tgKwbK"vj teK

teK tcvwj PŁc w`±j Zi i PŁYŁZ w`±K teK wjfv±i i Łci Uvb c±o| ZŁb teK K"vgŁU teK myjŁU±K teK Wwgi Mv±q t fZi i w`K t\_±K `pfvte tP±c a±i| teK myj Mv±q jvMv±bv _v±K LmŁ±m I mn±R Łq nq bv Ggb c`v±i ^Zi i teK jvBŁbs| teK myj PŁc teK WwqŁU w`i n±q hvq Ges Uv±i t_±K hvq| GLb teK tcvwj i Dci t_±K cv±qi PŁc mŁi±q w±j teK K"vgŁU tmvRv Ae $\bar{v}$ ±b P±j Av±m Ges teK mŁy Dci PŁc m±i hvte| G Ae $\bar{v}$ q wUvY w $\bar{u}$ s Gi Uv±b teK myjŁUv teK Wwq n±Z m±i Avm±e Ges Uv±t*i* i PŁKv teK gy n±e|

6| **÷qwis (Steering)** Pjš Ae⁻vq Uv±tⁱⁱ Pjvi [~]K c^{ie}Zb Ki±Z ev tgv^o tNvⁱ±Z
 ÷qwis Gi c^qRb| Uv±tⁱ [~]ai±bi ÷qwis c^xZ e^{eü}Z n±q [~]v±K- **A[~]vKvig[~]vb ÷qwis**
I c^lqvi ÷qwis c^xZ| m^vaviY Uv±tⁱ A[~]vKvig[~]vb c^xZi ÷qwis t^ek e^{eü}Z nq| [~]b±
 A[~]vKvig[~]vb ÷qwis c^xZi KvhcY[~]j Av±jvPbv Kiv nj|

KvhcY[~]j - [~]PÎ 3.15 G GK[~]U Uv±tⁱⁱ ÷qwis c^xZ [~]Lv±bv n±q±Q| aiv hvK PvjK evg
[~]±K Uv±tⁱ±K Ny±Z Pvb| ÷qwis ūBj±K evg [~]±K tNvⁱ±j ÷qwis [~]Mqvi KvR Ki±e Ges
[~]cUg[~]vb Av±gi Ic±ii c^vš [~]KQ[~] tCQ±b mi±e (Zxi [~]P[~]ýZ [~]±K)| d±j [~]cUg[~]vb Av±gi
 Aci c^vš W[~]M [~]jsK±K mvg±bi [~]±K tV±j t[~]±e| W[~]M [~]jsK bvKj Avg±K mvg±bi [~]±K
 tVj±e Ges Pvk evg [~]±K Ny±e|

1. ÷qwis ūBj
2. ÷qwis [~]Mqvi
3. [~]cUg[~]vb Avg
4. tWM [~]jsK
5. UvBiW
6. Pvk
7. bvKj Avg
8. bvKj k[~]vdu

[~]PÎ 3.15 Uv±i ÷qwis (A[~]vKvig[~]vb UvBc)

d±j Uv±i[~]U evg[~]±K tgv^o t[~]±e| Wb [~]±K tgv^o [~]b±Z n±j ÷qwis ūBj±K Wv±b tNvⁱ±Z
 n±e| d±j Dc±i eiYZ ciZ[~]U c[~]±[~]c [~]eci±Z [~]±K NU±e|

7| **n[~]BW[~]jk c^xZ (Hydraulic system)** Uv±tⁱⁱ n[~]BW[~]jk c^xZ cavbZ [~]b[~]±j[~]LZ KvR
 m[~]±v[~]b K±i|

K) fvi^x hšc[~]±Z IV±bv ev bvgv±bvi KvR|

L) Pv±Ii MfxiZv [~]bqšY Kiv|

M) A±bK Uv±tⁱ t[~]eK I ÷qwis Gi Kv±R n[~]DW[~]jk c^xZ e^{eü}Z nq|
n[~]BW[~]jk c^xZi [~]e[~]fb Ask

[~]PÎ 3.16 G Uv±tⁱⁱ n[~]BW[~]jk c^xZ I [~]e[~]fb Ask t[~]Lv±bv n±q±Q|

ǰPÎ 3.16 Uv±t̄ii nvBWijK c×iZ I ǰeifb Ask

1. ǰjdU Avg, 2. ǰjdU k̄vdU, 3. k̄vdU, 4. ǰcób, 5. nvBWijK ǰm̄ijŮvi,
6. KǰUvj ǰj fvi, 7. KǰUvj fvj f, 8. nvBWijK cǰáú, 9. nvBWijK †Zjvavi |

ǰb± nvBWijK c×iZi ǰeifb Ask, †jvi KvhcYv̄j m̄sǰǰB AvKv̄i eǰYZ nj |

1| **nvBWijK †Zjvavi** (Hydraulic oil reservoir) G†Z nvBWijK c×iZi Rb̄ c†hvRbxq
nvBWijK †Zj Rgv ivLv nq |

2| **nvBWijK cǰáú** (Hydraulic pump) GǰU †Zjvavi n†Z nvBWijK †Zj†K MnY K†i
KǰUvj fvj †cšQvq Ges nvBWijK †Zj†K c†qvRbxq Pvc m̄ó K†i |

3| **KǰUvj fvj** (Control valve)- GǰU cǰáú n†Z ǰm̄ijŮvi chš nvBWijK †Zj†i
M̄iZc_†K ǰbqšY K†i | GǰU nvBWijK c×iZi cǰY†K̄ | hLb Uv±t̄ii m̄v± m̄sthv̄RZ KuL.
hšc̄v̄Z†K Ic†i Iv̄†Z nq ZLb KǰUvj fvj cǰáú n†Z Pvc̄h̄ †Zj†K nvBWijK ǰm̄ijŮvi
†cšQvi iv̄ v̄ K†i †q | Avevi hLb m̄sthv̄RZ hšc̄v̄Z†K ǰb†P b̄gv̄b̄v̄ iKvi nq, ZLb
ǰm̄ijŮvi†i †fZi nvBWijK †Zj†i Pvc†K Kgv̄b̄v̄ ev ḡy Kivi ēē v̄ K†i †q | A_r
nvBWijK ǰm̄ijŮvi†i mḡ KvR†K KǰUvj fvj ǰbqšY K†i |

4| **KǰUvj ǰj fvi** (Control lever) G ǰj fvi†i m̄v̄v̄h̄ PvjK nvBWijK c×iZi KvhcYv̄j
ǰbqšY K†i | cKZ.c†ǰ nvBWijK †Zj†K ǰbqšY Kivi Rb̄ KǰUvj ǰj fvi†i m̄v̄v̄h̄ KǰUvj
fvj†K c†qvRbxq ǰb†k̄ c̄vb̄ Kiv nq |

5| **nvBWijK ǰm̄ijŮvi** (Hydraulic cylinder)- Gi †fZi GKǰU ǰc÷b_v†K Ges ǰc÷†bi
m̄v± GKǰU k̄vdU h̄y_v†K | k̄vd†Ui Aci cǰš- ǰjdU Av†gi m̄v± h̄y cǰáú n†Z Pvc̄h̄
†Zj KǰUvj fvj f ǰq ǰbq̄šZ n†q ǰm̄ijŮvi c†ek K†i Ges ǰc÷†bi Ici Pvc c†qvM
K†i |

6| **ǰjdU Avg** (Lift arm)- ǰjdU Av†gi m̄v±_B KuL.hšc̄v̄Z m̄sthv̄Rb Kivi ēēav_v†K |
ǰc÷†b nvBWijK †Zj Pvc ǰj (Zxi ǰP̄yZ ǰ†K) ǰjdU Av†gi Aci cǰš Ic†i DV†Z_v†K
Ges Pvc †Q†o ǰj ǰb†P †b†g Av†m |
nvBWijK c×iZi †k̄Yiefv̄M

Uv±t̄ii nvBWijK c×iZ ǰj†bi n†q_v†K |

1| **c̄Rkb KǰUvj c×iZ** (Position control system)- G c×iZ†Z Uv±t̄ii m̄v±
m̄sthv̄RZ hšc̄v̄Z†K ǰj fvi†i m̄v̄v̄h̄ GKǰU ǰb̄ó Ae_v†bi M̄fxiZvq_vcb̄ Kiv nq | big
gv̄U I mgZj R̄gi Rb̄ G c×iZ Pjbm̄B |

2| WdU KpUvj c×Z (Draft control system)- G c×Z Z KpUvj jfviK GK Ae⁻vb⁻ vcb Ki+j mshy hšU GKU ub^o WdU Gi Rb⁻ wcz nq| G c×Z DpzbPz Rig I k³ gvUi Rb⁻ Dc+hMx|

8| **wnPs ev ms+hvRb c×Z (Hitching system):**

KuL. hšcWZK Uv±+ii mv±₋ hy Kivi c×ZK wnPs ev ms+hvRb c×Z e+j | Uv±+ii mv±₋ KuL.hšcWZi ms+hvM c×Z Zb cKvi |

1| İayUvbi Rb⁻ ms+hvRb (Pull type) - G c×Z Z W ev+ii (Draw bar) mwnv+h⁻ hšK Uv±+ii mv±₋ AvU+K t⁻qv nq| G c×Z Z Uv±i hšUi IRb enb K+i bv ev IVv+bv I bvgv+bvi KivR K+ib bv| İayPvjbi Rb⁻ hšU+K tU+b tbq| **PÎ 3.17** G GB ms+hvRb c×Z t⁻ Lv+bv nj | G+^{††} Î IRb en+bi Rb⁻ hšcWZi wBR⁻ PvKv₋v+K|

PG 3.17 Uvbi Rb⁻ ms+hvRb

2| mivmii ms+hvRb (Direct mounting system)-

G c×Z Z wefb KuL.hš thgb- tgvⁱ tevW, w⁻ cvD BZ⁻ v⁻ K mivmii Uv±+ii ms+M hy Kiv nq (**PÎ 3.18**)| Uv±i hšUi m^u IRb enb K+i Ges hšU+K Ic+i DVv+bv I bvgv+bvi e⁻e⁻ v₋v+K|

PG 3.18 mivmii ms+hvRb

Uv±+ii mv±₋ KuL.hšWZi ms+hvR+bi⁻ vb Abjgq G c×Z Zb cKvi n+Z c+i |

K) mvg+b ms+hvRb

L) cv+k ms+hvRb

M) tCQ+b ms+hvRb

K_LL. I c jx Dbqb $\overline{\text{q}}$

†cQ†b ms†hvRb c×_LZ†Z _LZb_LU _Ljs†Ki gva†g K_LL.hš†K Uv†i i †cQ†b ms†hvRb Kiv nq |
ZvB G†K _L c†qU _Ln_LPs e†j |

3 | **igk c×_LZi ms†hvRb** (Semi - mounting type)

G c×_LZ†Z Uvb_L I mivm_Li ms†hvR†bi ms_Lgkb(_LPG 3.19) | G c×_LZ†Z Uv†i†K h†š_Li
_LKQ_LY IRb enb Ki†Z nq | Z†e G c×_LZ†Z ms†hv_LRZ h†š_Li †cQ†b P_LK_L _Lv†K hv A_LaK_Lisk
IRb enb K†i | †UBj_Lvi ev †Kvb †Kvb †ivUvix jvsMj Gfv†e ms†hvRb Kiv nq |

_LP^Î 3.19 **igk c×_LZi ms†hvRb**

9 | **e`ÿZK c×_LZ** (Electrical system)

GK_LU A_LaybK Uv†i i e`ÿZK c×_LZ†Z _Lbæ_LYZ Ask_L ,†j_L cavb f_LgK_L cvjb K†i |

K) e`vUvix (Battery)

L) AjUvib`vUi (Alternator)

M) †i_L ,†jUi (Regulator)

N) ÷vUvi (Starter)

O) †M_L cvM (Glow plug)

D†j_LLZ Ask_L ,†j_L m_Lú†K _Lb†P ms_L _Lβ Av†j_LPbv Kiv nj |

K) e`vUvix- e`vUvix GKcKvi m_LÂZ _Le`ÿZ k<sub>L</sub><sup>3</sup> i Drm | G<sub>L</sub>U ivmvq<sub>L</sub>ibK k<sub>L</sub><sup>3</sup>†K <sub>L</sub>e`ÿZ k_L³†Z
i|cvš_LiZ K†i | Uv†i i ÷vUvi, †gvUi, ev_LZ BZ`<sub>L</sub> As†k <sub>L</sub>e`ÿZ mieiv†ni K_L†R e`vUvix
e`üZ nq |

L) **AjUvib`Wi-** G<sub>L</sub>U AjUvib`vUs Kv†i>U (A.C.) Drcb K†i Ges W_L†qv f f_Lvj†fi gva†g
G Kv†i>U _LW_L,_Lm_L,†Z i|cvš_LiZ n†q Uv†i i _Le_Lfb As†k cev_LnZ nq | GLb ck R_LvM_L _Lv_Lf_Lw_LeK
e`vUvixB †Z<sub>L</sub> <sub>L</sub>e<sub>L</sub>fb c†qvRbxq As†k <sub>L</sub>W<sub>L</sub>,<sub>L</sub>m<sub>L</sub> <sub>L</sub>e`ÿZ mieiv_L Ki†Z cv†i Zvn†j AjUvib`vUi
†Kb? Gi DÊ†i ej_L hvq, †aye`vUvix h<sub>L</sub> <sub>L</sub>Uv†i i c†qvRbxq mg<sub>L</sub> <sub>L</sub>e`ÿZ mieiv_L K†i | Z†e
e`vUvix **Lg** Zvo<sub>L</sub>vZ<sub>L</sub>o m<sub>L</sub>ú†K <sub>L</sub>WmPvR n†q hv†e | ZvB e`vUvixi K_LvR nj ÷vUvi †gvUi†K P_Lvjy
Kiv Gs B_LÄb ÷vU †bqv_Li mv†_L mv†_L AjUvib`vUi <sub>L</sub>e`ÿZ k_L³ Drcb n†Z _Lv†K | GB _Le`ÿZ

Uv±t*i*i c±qvRb±q vebfb As±k mÂv±jZ nq Ges e`vUvix±KI PivR K±i | ZLb e`vUvix KZK
ve`yZ mieivn eÜ n±q hvq |

M) t*i*,±j*Ui*- Gi KvR nj AjUvib`vUi KZK.Drcb ve`yZ kv³±K v±bqšY Kiv | BvÄ±bi vba
ev D`P MvZ±Z AjUvib`vUi Kg ev tevk ±fv±ëi ve`yZ Drcb Ki±jI t*i*,±j*Ui* me Ae`vq
GKB ±fv±ëi ve`yZ vebfb As±k mieivn K±i |

N) ÷v*Ui* t*g*v*Ui*- GvU GK cKvi vW,vm e`yZK t*g*v*Ui* | BvÄ±bi ÷vU t`qvi Rb` GvU e`eüZ
nq |

O) tMv cM- VvÜv Ae`vq BvÄb ÷vU Ki±Z tek Amv±v nq | G Ae`vq BvÄ±bi v±c-Kvkb
±Pvvi Mig K±i v`±j BvÄb mn±RB ÷vU tbq | tMv cv±Mi mvinv±h` BvÄ±bi v±c-Kvkb ±Pvvi
Mig K±i t`qv nq |



mvigg t GKvU Uv±t*i*i A±bK,±jv Ask i±q±Q | Zte Gig±a` KZK,±jv n±jv Uv±t*i*i g±
Ask | G,±jvi g±a` K±qKvUi Avevi vebfb Ask i±q±Q |



cv#VwEi gf'vqb 3.4

mVK DĖi i cv#k UK (√) Pý 'b|

1. BĀi bi cv I qvi UvYigkb c×Z Abjvq Uv±i KZ cKvi |

K) Zb cKvi

L) Qq cKvi

M) cvP cKvi

N) `P cKvi

2. GKU Uvqv±i i mvs#K ZK Pn 12.4-36-4 cvB 'q K tevSvq ?

K) Uvqv±i U 12.4 BĀ ck⁻, Pvkvi e⁻vm 36 BĀ I 4 cvB weikó

L) ixg 12.4 BĀ ck⁻, Pvkvi ck⁻Zv 36 BĀ I 4 cvB weikó

M) Uvqv±i U 12.4 BĀ ck⁻, ixgi e⁻vm 36 BĀ I 4 cvB weikó

N) Uvqv±i U 12.4 BĀ ck⁻, ūBj W⁻i e⁻vm 36 BĀ I 4 cvB weikó

3. K_UL.hšcWZ#K Uv±i i mshy Kiv hvq|

K) cvP fvte

L) Zb fvte

M) `P fvte

N) Pvi fvte|

4. ÷qwis -Gi KvR Kx ?

K) Uv±i i Mzi 'K cieZb K*i*

L) Uv±i i mv₋ hšcWZ#K mshy K*i*

M) BĀi bi k³, UvYigkb t₋#K weiqb K*i*

N) BĀi bi k³ Pvkvi I c.U. I -tZ tcsQvq

5. evg'Ki mv₋ Wb'Ki DĖi ,j gijq bb|

K) nPs c×Z

L) UvYigkb c×Z

M) nBWjK c×Z

N) KvP

O) ÷qwis

i. BĀi bi k³ Pvkvi I cUI tZ tcsQvq

ii. Uv±i i Mzi 'K cieZb K*i*

iii. BĀi bi k³ UvYigkb t₋#K weiqb K*i*

iv. Uv±i i mshwRZ hšcWZ I Vv-bvgv Kivq

v. Uv±i i mv₋ hšcWZ#K mshy K*i*

cv 3.5 Uv±tii cvlqvi UvÝgkb c×Z, cwiPvjv I iŋYvteŋY

G cv tk±I Avcb —



- Uv±tii cvlqvi UvÝgkb eK PÎ I tiLvPÎ AvK±Z cvi±eb|
- Uv±tii UvÝgkb cavb Ask, ±jvi eYbv `±Z cvi±eb|
- Uv±i cwiPvjv eifb c`ŋc, ±jv ±jL±Z cvi±eb|
- Uv±tii eifb cKvi iŋYvteŋY eYbv Ki±Z cvi±eb|

Uv±tii cvlqvi UvÝgkb c×Z



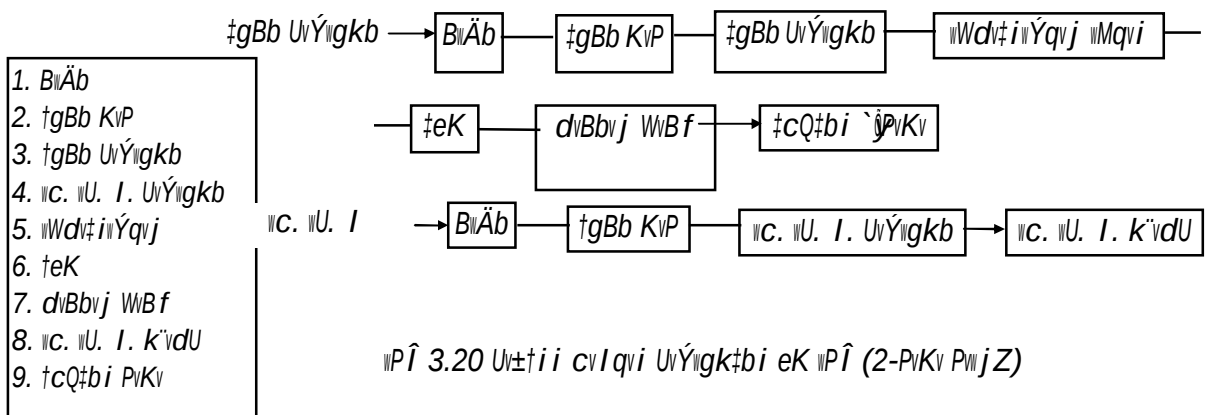
UvÝgkb c×Zi gva`tgB BiÄ±bi Drcb k<sup>3</sup> Uv±tii PvkV I c. u. I. k`vdU vbišiz nq| Pvkvi N±bi gva`tg Uv±i MvZ jvf K±i| Ab`±K c. u. I. k`vdUi N±bi gva`tg Uv±tii mv± ms`hviRZ eifb Kvl.hšcvZ, thgbt tñp cvú, tivUvix cvD BZ`±K Pvjv K±i| Uv±tii UvÝgkb gy`elq, ±jv ms`ŋc b± Av±jvPbv Kiv nj|

Uv±tii UvÝgkb c×ZK `jvM fñM Kiv hñq|

1| **tgBb UvÝgkb** - GB UvÝgkb gva`tg BiÄ±bi Drcb k<sup>3</sup> Uv±tii PvkV tçQq| `jvKv PñjZ (Two wheel drive) Uv±tii UvÝgkb gva`tg k<sup>3</sup> iaytçQbi `jvKv tçQq| Pvi PvkV PñjZ (Four wheel drive) Uv±ti tgBb UvÝgkb gva`tg BiÄ±bi k³ mv±bi I tçQbi Pvi PvkV±ZB tçQq|

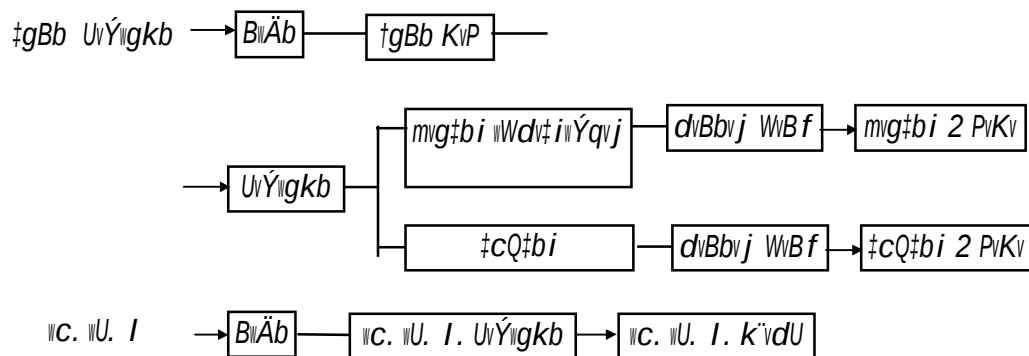
2| **c. u. I. UvÝgkb** - GB UvÝgkb mñvñh BiÄb n±Z Drcb k³ c. u. I. k`vdU vbišiz nq|

Uv±tii cvlqvi UvÝgkb c×Zi cavb Ask, ±jv nj KvP, tgBb UvÝgkb, WdñiÝqvj, dvBvj WbF I c. u. I. Gevi Avñ, t`Lv hvK BiÄ±bi Drcb k<sup>3</sup> Kfvte UvÝgkb gva`tg Uv±tii PvkV I c. u. I. tZ tçQq| G ai±bi c. u. I. UvÝgkbK ZŠ c. u. I. UvÝgkb e±j| Av±iK c×Z c. u. I. k`vdUi Rb Avj`v UvÝgkb v±K bv| tgBb UvÝgkb n±Z k³ c. u. I. k`vdU tçQq| b± c`tg eK PÎ Ges c±i tiLv P±i gva`tg 2-PvkV PñjZ Uv±tii cvlqvi UvÝgkb t`Lvñv nj|



¶PÎ 3.21 Uv±₁ii UvÝ₁gk₁bi †iL₁¶PÎ (2-PvK_v P₁jZ)

Avmb₁ Gevi 4-PvK_v P₁jZ Uv±₁ii cvlq₁i UvÝ₁gkb c×₁Z †₁L₁ hvK₁ | ¶b₁¶ c₁g eK ¶PÎ
Ges c₁i †iL₁¶PÎi gva₁g Pvi PvK_v P₁jZ Uv±₁ii cvlq₁i UvÝ₁gkb †₁L₁b₁v nt₁j₁|



¶PÎ 3.22 Uv±₁ii UvÝ₁gk₁bi e-K ¶PÎ (4 - PvK_v P₁jZ)

¶PÎ 3.23 Uv±₁ii UvÝ₁gk₁bi †iL₁¶PÎ (4 - PvK_v P₁jZ)

1. B₁Äb, 2. †gBb₁ KvP, 3. †gBb₁ UvÝ₁gkb, 4. ¶c. ¶U. I. UvÝ₁gkb, 5. †cQ₁bi
¶Wdv₁i¶Ýqv₁j, 6. mvg₁bi ¶Wdv₁i¶Ýqv₁j, 7. teK, 8. dvBbv₁j WvBf, 9. ¶c. ¶U. I.
k₁vdu, 10. †cQ₁bi PvK_v, 11. mvg₁bi PvK_v

UvÝ₁gk₁bi cavb Ask₁†j₁i ¶eeiY

1| tgBb UvYgkb - tgBb UvYgk#bi KvR n#jv tgBb Kv#Pi gva`tg cvB BvÄ#bi k³#K
c#qvRb Abm#i Kg NYb MvZ#Z Uv#t#i PvKvq t#cQv#bv (G Ae⁻vq ⁻Zš v.c.vU. I. UvYgkb
vK#e) A{ev} PvKv I v.c.vU. I. k`vd#U t#cQv#bv|

vPÎ 3.24 tgBb UvYgkb

velfb e`v#mi A#bK, #jv ⁻úv i vMqvi v#b#q tgBb UvYgkb MvZ| vPÎ 3.24 G GKvU Uv#t#i
tgBb UvYgk#bi vMqvi veb`vm t`Lv#bv nj| k`vd#Ui PvjK ev Bbcy k`vdU Gi gva`tg
BvÄ#bi k³ tgBb KvP n#Z UvYgk#b t#cQ| PvjK k`vd#Ui Dci tgBb Kv#Pi v`#K tQvU
n#Z eo e`v#mi vZbvU vMqvi <sup>-</sup>vqx fv#e AvUKv#bv Av#Q| v#b#P L k`vdU (PvjZ ev AvDU
k`dU) Gi Ici eo n#Z tQvU e`v#mi Av#i vZbvU vMqvi ⁻vcb Kiv Av#Q| PvjZ k`vd#Ui
Dci ⁻úvBb (LvB) KvUv Av#Q Ges vMqvi, #jv Gi Dci vj fv#i mrvn#h` Wv#b ev ev#g miv#bv
hvq (WU vPvYZ)| PvjK k`vd#Ui me#P#q tQvU e`v#mi vMqv#i miv#_ PvjZ k`vd#Ui me#P#q
eo e`v#mi vMqv#iU tgjv#j PvKvi NYb MvZ me#P#q Kg n#e| G Ae⁻v#K c_g vMqvi e#j|
Avev PvjK k`vd#Ui epEg e`v#mi vMqv#i miv#_ PvjZ k`vd#Ui v`žZg e`v#mi vMqv#iU
vgjv#j PvKvi NYb MvZ me#P#q tev k n#e| G Ae⁻v#K 3q vMqvi e#j| PvjK k`vd#Ui cv#k
Av#iKvU k`vdU \_v#K, hv#K veciZ k`vdU e#j| veciZ k`vd#Ui Dci l`žUv vMqvi emv#bv
_v#K| veciZ k`vd#Ui AvB#Wj (Idle) vMqv#i miv#\_ PvjZ k`vd#Ui vMqvi tgjv#j Uv#i
tQv#b ev veciZ v`#K Pj#e| veciZ v`#K k³ ⁻v#vš#i mgq c_g PvjK k`vdU n#Z
k³ veciZ k`vdU Ges c#i veciZ k`vdU n#Z PvjZ k`vdU hv#e|

AvaybK Uv#t#i mvg#b Pjvi Rb` 6 t\_#K 8vU Ges tQv#b Pjvi Rb` 2vU vMqvi Ae⁻v#_v#K|
Pv#li mgq v#vMvZi vMqvi Ae⁻v# Ges iv⁻vq c#ien#Yi mgq D`PMvZi vMqvi Ae⁻v#
e`envi Kiv nq|

2| **WdṡiṡYqvj** - R₁g₁Z K₁R K₁vi mgq U₁±i₁K A₁í R₁qM₁vq t₁g₁o ṡN₁vi₁Z nq| i₁ay
 ṡ÷q₁ṡis e₁ṡnvi K₁i Ggbf₁v₁ṡe t₁g₁o ṡN₁vi₁b₁v m₁ṡe nq b₁| GRb₁ṡ WdṡiṡYqvj M₁q₁vi e₁ṡnvi
 K₁iv nq| ṡv₁f₁w₁eK Ae₁ṡvq P₁j₁vi mgq U₁±i₁ii me₁,ṡj₁v P₁K₁vB mg₁v₁b M₁iZ₁Z N₁y₁Z₁ṡv₁K₁| K₁b
 t₁g₁o ṡN₁vi₁b₁vi mgq t₁g₁ṡoi t₁f₁Z₁ṡii ṡṡK₁i P₁K₁v,ṡj₁v ev₁B₁ṡii P₁K₁v,ṡj₁v A₁ṡc₁ṡv Kg M₁iZ₁Z
 N₁y₁| d₁ṡj U₁±i₁U t₁g₁o t₁bq| A₁vi ṡṡc₁v₁k₁i P₁K₁vi M₁iZ₁ g₁ṡa₁ṡ G Z₁d₁v₁ ṡZ₁i K₁iv nq
 Wdṡi₁b₁ṡYqvj Gi g₁ṡa₁ṡg|

1. W₁B₁f₁s k₁ṡv₁d₁U
2. ṡú₁v₁B₁i₁v₁j t₁e₁f₁j M₁q₁vi
3. ṡú₁v₁B₁i₁v₁j t₁e₁f₁j M₁q₁vi
4. WdṡiṡYqvj t₁KBR
5. WdṡiṡYqvj m₁v₁B₁U M₁q₁vi
6. WdṡiṡYqvj ṡc₁bq₁b k₁ṡv₁d₁U
7. WdṡiṡYqvj BqK k₁ṡv₁d₁U
8. WdṡiṡYqvj ṡc₁bq₁b M₁q₁vi
9. d₁v₁B₁b₁v₁j W₁B₁f₁ M₁q₁vi
10. t₁cQ₁ṡb₁i G₁ṡ·j

ṡP₁Ĥ 3.25 U₁±i₁ii WdṡiṡYqvj c₁x₁Z I ṡe₁f₁b Ask

GL₁v₁ṡb c₁ṡk₁Z W₁B₁f₁s k₁ṡv₁d₁U₁B c₁ṡe₁i ṡP₁Ĥ 3.24 Gi P₁w₁j₁Z k₁ṡv₁d₁U| G k₁ṡv₁d₁U₁i c₁v₁ṡṡ GK₁U₁
 ṡú₁v₁B₁i₁v₁j t₁e₁f₁j ṡc₁bq₁b Av₁Q| D₁³ ṡc₁bq₁v₁ṡj₁i ṡv₁Z,ṡj₁v eo ṡis M₁q₁vi (ṡú₁v₁B₁i₁v₁j t₁e₁f₁j
 M₁q₁vi) Gi ṡú₁Z₁i m₁v₁ṡ h₁y| Z₁v₁B, W₁B₁f₁s k₁ṡv₁d₁U₁i N₁y₁ṡb₁i m₁v₁ṡ ṡis M₁q₁viU₁I N₁y₁Z₁ṡv₁K₁ṡe|
 ṡis M₁q₁ṡii ṡṡc₁v₁k₁ ṡṡU₁v WdṡiṡYqvj BqK k₁ṡv₁d₁U Av₁Q| k₁ṡv₁d₁U ṡṡU₁vi GK c₁v₁ṡṡ
 WdṡiṡYqvj m₁v₁B₁W M₁q₁vi m₁v₁ṡ ṡis M₁q₁vi I Gi t₁KB₁ṡR₁i m₁v₁ṡ h₁y| WdṡiṡYqvj m₁v₁B₁W M₁q₁vi
 ṡṡU₁v Ave₁vi ṡṡU₁v WdṡiṡYqvj ṡc₁bq₁b ṡṡṡq h₁y| U₁±i h₁L₁b m₁v₁ṡṡb P₁j₁Z₁ṡv₁K₁ ZL₁b
 WdṡiṡYqvj BqK k₁ṡv₁d₁U ṡṡU₁v ṡis M₁q₁ṡii m₁v₁ṡ GKB N₁y₁b M₁iZ₁Z ṡN₁vi₁Z₁ṡv₁K₁| t₁g₁o
 N₁y₁ṡb₁vi mgq ṡ÷q₁ṡis Gi m₁v₁ṡṡh₁ṡ GK c₁v₁ṡk₁i P₁K₁v₁Z t₁e₁k₁ ev₁ṡi m₁ṡó K₁iv nq| d₁ṡj G
 c₁v₁ṡk₁i WdṡiṡYqvj BqK k₁ṡv₁d₁U₁U c₁ṡe₁i t₁P₁ṡq Kg M₁iZ₁Z ṡN₁vi₁ṡe| Ab₁ṡṡṡK WdṡiṡYqvj
 ṡc₁bq₁b ṡṡU₁v t₁g₁o N₁y₁vi ṡṡK₁i WdṡiṡYqvj m₁v₁B₁W M₁q₁vi n₁ṡZ t₁e₁k₁ ev₁ṡi c₁v₁ṡṡe| d₁ṡj Z₁v A₁ci
 ṡṡK₁i WdṡiṡYqvj m₁v₁B₁W M₁q₁ṡii I ci P₁c t₁ṡṡe| G Ae₁ṡvq G WdṡiṡYqvj m₁v₁B₁W M₁q₁vi I
 k₁ṡv₁d₁U₁U c₁ṡe₁i t₁P₁ṡq t₁e₁k₁ M₁iZ₁Z ṡN₁vi₁Z₁ṡv₁K₁ṡe| d₁ṡj U₁±i t₁g₁o t₁bṡe|

DB₁y₁b₁P₁Z₁ṡg₁Z P₁vi K₁ivi mgq ṡK₁se₁v X₁v₁j₁y₁R₁q₁M₁vq I V₁b₁v₁g₁v K₁ivi mgq A₁ṡb₁K t₁ṡṡĤ₁ṡĤ GK₁ṡṡK₁i
 P₁v₁K₁v₁Z t₁e₁k₁ ev₁ṡi Av₁ṡm Ges Ab₁ṡṡ ṡṡK₁i P₁v₁K₁v₁Z Kg ev₁ṡṡṡv₁K₁| G Ae₁ṡvq WdṡiṡYqvj
 e₁ṡṡṡv₁ K₁vhK₁ix ṡv₁K₁ṡj U₁±i₁U Ab₁ṡṡf₁ṡc₁Z₁f₁v₁ṡe t₁g₁o ṡN₁vi₁Z₁ P₁ṡṡe| d₁ṡj ṡṡU₁b₁v₁ NU₁ṡZ c₁v₁ṡṡi| G
 Ae₁ṡvq WdṡiṡYqvj j₁K e₁ṡnvi K₁i WdṡiṡYqvj₁i K₁vhṡṡg₁Z₁v e₁Ü i₁v₁L₁v nq|

3| **d₁v₁B₁b₁v₁j W₁B₁f₁ t** U₁±i₁ B₁i₁ṡṡb₁i N₁y₁b M₁iZ₁ L₁y t₁e₁k₁ ṡv₁K₁| K₁b U₁±i₁K A₁ṡb₁K t₁ṡṡĤ₁ṡĤ L₁y
 ṡṡb₁ṡM₁iZ₁Z K₁iR K₁i₁Z₁ nq| Z₁v₁B B₁i₁ṡṡb₁ d₁v₁ ũ₁B₁ṡṡj₁i N₁y₁b M₁iZ₁K K₁ig₁ṡq P₁v₁K₁vq t₁c₁ṡQ₁ṡb nq|
 N₁y₁b M₁iZ₁ Kg₁v₁ṡb₁vi c₁ṡṡṡq₁U K₁ṡqK av₁ṡc m₁ṡó₁b nq| c₁ṡṡg t₁g₁B₁b U₁ṡṡY₁ṡg₁k₁ṡb ṡKQ₁y₁ Kg₁v₁ṡb₁v nq,
 Z₁vi₁ci WdṡiṡYqvj₁i Ges me₁ṡk₁ṡI d₁v₁B₁b₁v₁j W₁B₁f₁ M₁q₁ṡii g₁ṡa₁ṡg N₁y₁bM₁iZ₁K Av₁ṡiv K₁ig₁ṡq
 U₁±i₁ii P₁v₁K₁vq c₁v₁ṡṡb₁v nq|

4| **¶c.¶U.¶I. k'vdu** - Bſ†iR†Z G†K(Power take off shaft) e†j| c¶Z¶U Uv†i i †cQb ¶`†K GK¶U ¶c.¶U.¶I. k'vdu \_v†K| ¶e†fb K¶Lhš †hgbt †ivUvix cvD, eiR ecb hš, †mP cvaú BZ`¶` N¶b M¶Zi gva`†g P¶jbvi Rb` ¶c.¶U.¶I. k'vdu e`eüZ nq|

UvYgkb Abſſ¶x ¶c,¶U,¶I `jckvi|

K) **¬Zš ¶c.¶U.¶I.** (Independent P.T.O.) -G ai†bi e`e`vq ¶c.¶U.¶I. k'vd†Ui Rb` Avjv`v UvYgkb e`envi Kiv nq| Gi KvKvixZv †gBb UvYgk†bi Dci ¶bfikxj bq| d†j Uv†i†K ¶`i †i†LI ¶c,¶U,¶I e`envi Kiv hvq|

L) **Mdû ¶c. ¶U.¶I.**(Ground P.T.O.) - G ai†bi ¶c.¶U.¶I. e`e`v †gBb UvYgk†bi Dci ¶bfikxj| d†j †gBb UvYgkb eÜ _vK†j A_vr Uv†i M¶Zkxj bv _vK†j ¶c.¶U.¶I. Kiv K†ibv|

Uv†i c¶iPj bv

Uv†i c¶iPj bv Kv†j Uv†i I PvjK D†qiB ¶bivcEv ¶bſðZ Kiv D¶PZ| mZKZv I ¶bqgg¶dK c¶iPj bv Kiv bv n†j †h †Kvb ai†bi gvivZK `¶Ubv N†U †h†Z c¶i| ZvB, m¶VK I ¶bivc†` Uv†i c¶iPj bv Rb` KiYxq c`†¶c,†jv n†`Q|

**K. ce c`¶Z** - Kv†R hvevi Av†M ^`b`b ¶KQyeIq cix¶¶v K†i ¶b†Z n†e| †m,†jv ¶bajc t

1| Rvj¶wb U`vs†K c†qvRbxq Rvj¶wb Av†Q ¶Kbv cix¶¶v K†i c†qvRbxq Rvj¶wb mieivn Kiv | Rvj¶wb Xvjvi mgq QvKb e`envi Kiv D¶PZ|

2| B¶Ä†bi µ`vsK †K†m c†qvRbxq jye†K¶Us †Zj Av†Q ¶Kbv cix¶¶v Kiv| c†qvR†b †Zj mshvM Kiv |

3| i`¶W†qu†i c†qvRbxq c¶wb Av†Q ¶Kbv Zv †`Lv Ges c†qvR†b c¶i@vi c¶wb mshvM Kiv |

4| d`vb †e†ë i Uvb ¶VK Av†Q ¶Kbv cix¶¶v Kiv|

5| evqyc¶i`Kv†i i †Z†ji gvîv cix¶¶v K†i c†qvR†b †Zj mshvM Kiv |

6| †eK I KvP ¶VKgZ KvR K†i ¶Kbv cix¶¶v Kiv|

7| P¶Kvi evq¶vc †`L†Z n†e|

**L. ÷vU †`qv Kv†j KiYxq** - iagvî WvB¶fs c¶Rk†b e†mB ÷vU ¶`†Z n†e| ÷vU †`qv mgq ¶baj¶LZ c×¶Z AbſſiY Ki†Z n†e|

M. mvg†bi ¶`†K Pvj bv Kv†j KiYxq - Pvj bv Kivi Av†M Uv†i i mvg†b †Lqvj Ki†Z n†e Ges ¶baj¶LZ c×¶Z AbſſiY Ki†Z n†e|

1| Uv†i i mshvM mivm¶i mshvM RZ hšc¶Z _vK†j K†Uvj ¶j fv†i i mshvM hšU†K I c†i I V†bv|

2| KvP c`¶W†j Pvc ¶`†q Dc-¶Mqvi c¶ieZK ¶j fvi I ¶Mqvi c¶ieZK ¶j fvi†K h_v`v†b ¶vcb Kiv |

- 3| ʷóqʷis nʷZʃj nʷZ ʃiʃL PZǂʃK fʷj fʷʃe j ʃʷ Kʃi axʃi axʃi KvP cʷʷʷʃj I ci ʃ_ʃK Pvc mʷiʃq ʷbʃZ nʃe Ges GKB mʷʃ_ BʷÄʃbi MʷZ eʷovʃZ nʃe| GʃZ Uʷʃi mʷgʃbi ʷʃK PjʃZ ʃiʃ Kiʃe|

N. ʃcQʃbi ʷʃK Pjʃbi Kvʃj KiYxq

- 1| hʷʃ_ Uʷʃi mʷgʃbi ʷʃK PjʃZ _ʷʃK ZLb KvP cʷʷʷʃj I ʃeK cʷʷʷʃʃK axʃi axʃi I k³ fʷʃe ǂcʷʷʃ_ʃq ʃPʃc aʷv Ges Gʷʃ_ jʷʃiUʃi Pvc ʷKQʷʷ Kgʷʃbi |
- 2| ʷMqʷi cʷʷʷʃZK ʷj fʷʃiʃK ÓʃcQbÓ(Reverse) Aeʷʷʃb ʷvcʷb Kiʷv |
- 3| ʃcQʃb fʷj fʷʃe ʃLqʷj Kʃi KvP cʷʷʷʃj I ʃeK cʷʷʷʃʃj Dci ʃ_ʃK cʷ axʃi axʃi mʷiʃq ʷbʃZ nʃe| GʃZ Uʷʃi ʃcQʃbi ʷʃK PjʃZ _ʷʃKʃe|
- 4| ʃcQʃbi ʷʃK Pjʃʷʃbi mgq GKʷU nʷZ ʷóqʷis nʷZʃj Dci Ges Abʷ nʷZ ʃcQʃb Uʷʃi eʷʷi Dci ʃiʃL ʷʃóʃK ʃcQʃbi ʷʃK iʷLʃZ nʃe|
- 5| ʃcQʃbi ʷʃK Pjʷi mgq Uʷʃʃi MʷZ Kg iʷLv|

O. eÜ Kiʷ Kvʃj KiYxq

- 1| KvP cʷʷʷʃj I ʃeK cʷʷʷʃʃK ʃPʃc aʃi Pjʃ UʷʃiʃK _ʷgʷʃbi |
- 2| Gʷʃ_ jʷʃiʷʷʃ ʷj fʷʃiʃK Kʷgʃq BʷÄʃbi MʷZ Kgʷʃbi |
- 3| ʷMqʷi cʷʷʷʃZK ʷj fʷʃiʃK ÓʷbDUʷjÓ -G ʷbʃq Avʷʷʃ|
- 4| KvP cʷʷʷʃj I ʃeK cʷʷʷʃʃj Dci ʃ_ʃK Pvc mʷiʃq ʃbqʷʃ|
- 5| ÓKʷU- Ad beÓ (Cut-off knob) ʃUʃb Uʷʃi BʷÄb eÜ Kiʷv |
- 6| Ócʷʷʃs ʃeKÓ eʷʷʷʃ Kiʷv |

P. Uʷʃi Pjʃbi mgq mZKZʷ

- 1| KvP cʷʷʷʃj ʃ_ʃK cʷ mʷʃʷʃbi mgq Lǂ axʃi axʃi mʷʃʃZ nʃe| nʷʷʃ Kʃi cʷ mʷiʃq ʷbʃj Uʷʃi jʷd ʷʃq DVʃe|
- 2| Uʷʃʃi Uʷʷʷgkb ʃgʷʷi Mʷoxi Uʷʷʷgkb Aʃcʷʷʷʃ ʷKQʷʷʷʃb| ZʷB MʷZ cʷʷʷʃZʃbi mgq UʷʃiʃK gʷʃʃZi Rbʷ _ʷgʃq ʷMqʷi cʷʷʷʃZb KiʃZ nʃe| ʷMqʷi cʷʷʷʃZb Kivi mgq Aekʷʷʷʃ KvP cʷʷʷʃj Pvc ʷʃZ nʃe|
- 3| Pjʃ UʷʃiʃK _ʷgʷʃʷʃi Rbʷʷʷʃ ʃeK cʷʷʷʃj Pvc ʃʷʷʃi mʷʃ_ mʷʃ_ KvP cʷʷʷʃj I PvcʃZ nʃe|
- 4| Uʷʃʃi ʷʷb I evgʷʷʷʃKi Pʷʷʃi ʃeK cʷʷʷʃj Avʷʷʷʃ_ʷʷʃK| iʷʷʷʃ Pjʷi mgq ʃeK cʷʷʷʃj ʷʃUʷʃK jʃKi mʷʷʷʃhʷʷʃ GKʃĤ AvʷʷʃK ʷʃZ nʃe| RʷgʃZ eʷʷʷʃ Kivi mgq jKʷU mʷiʃq ʷbʃZ nʃe Ges ʃh ʷʃK ʃgʷʷ ʃbʃe ʃmʷʷʃKi ʃeK cʷʷʷʃj PvcʃZ nʃe|
- 5| ʃgʷʷ ʃNʷʷʃi mgq Uʷʃʃi MʷZ Kʷgʃq ʷbʃZ nʃe|

Uv±i i qYvte qY

mVK hZ I i qYvte qY Uv±ii KvKix RxbK thgwb ewoq t`q tZgwb Gi tgi vZ LiPl
Ktg hvq| ZvB gf`evb Uv±ii h\_vh\_ i qYvte qY e`vcv i mPZb nZ nte| cZU Uv±ii
i qYvte qY I hš mÚK c`ZKviKi ciPvjbv wb`kKvq we`wiz wb`kbv _vK| tm
Abjvqx e`e`v wbq e`enviKvixK Uv±i e`envi KiZ nte| Avmb, Avgiv Uv±ii
i qYvte qY e`fb c`q c, jv wbq AvjvPbv Kvi|

Uv±ii hZ I i qYvte qY c`q c, jvK Zb fvM fvM Kiv hvq|

K) maviY hZ I i qYvte qY

L) `bK i qYvte qY

M) mvgqK i qYvte qY

wb± i qYvte qY c`q c, jv AvjvPbv Kiv nqv|

K) maviY hZ I i qYvte qY - e`enviKvixi e`³MZ mPZbZv I maviY ÁvbB Gi Rb`
h±ó| thgb t KvRi tkI Uv±iK azq gqQ wivc` _vfb ivLv, Pvjvbi mgq mZKZv
Aejab Kiv BZ`w`|

**L) `bK i qYvte qY** - cZv`b KvR hvIqvi cte I cti KZK, jv c`q c`Z nq|
G, jvB `bK i qYvte qY| `bK i qYvte qY Uv±ii KvKvixZv i qYv Rb` , iZcY| wb±
Uv±ii `bK i qYvte qY mÚK AvjvKvZ Kiv nqvQ|

Uv±i Pjvbi cte KiYq -

- 1| Rvjwb U`vsK cqvRbxq Rvjwb AvQ wKbv cix qv Kiv|
- 2| Rvjwb bji tKvb Astk Rvjwb Pqv wKbv t`Lv Ges cqvRb Abjvqx tgi vZ
ev cwieZb Kiv|
- 3| i`wWtqUi c`bi gvÎv wVK AvQ wKbv t`Lv| cqvRb v`ycwb mshvM Kiv|
i`wWtqUi K`vc fvj fve GtU t`qv|
- 4| d`vb tetëi tUbkb cix qv Kiv| tetëi wePZZ 10-20 wgtgt gta` _vKv
DwPZ|
- 5| BwÄbi tZji gvÎv cix qv Ges cqvRb mshvRb Kiv| tZji AvWjZv wVK
AvQ wKbv cix qv Kiv|
- 6| mvgbi I tcQbi Pkvq evqy Pvc wVK AvQ wKbv cix qv Kiv|
- 7| KvP I teK c`Wvj wVKgZ KvR KiQ wKbv cix qv Kiv|

Pvjvbi mgq KiYq-

- 1| c`bj tevWi wefb wgv i tZji Pvc, c`bi ZicgvÎv BZ`w` wKfvte
wb`kZ AvQ wKbv cix qv Kiv|
- 2| wMZ tawvi is chte qY Kiv| tek cwigv m`v M`vm, wóob wis qv nq
hvIqv Ges tek Kvjv M`vm Rvjwb mÚYbv Rjvi wPy enb Kti|

K₁L. I c j_x Dbqb ⁻q̇

eÜ Kivi ci KiYxq -

- 1| Kv†Ri †k†I Rvj_{vb} U^vsK Rvj_{vb} ^{||}†q c†K†i i_vL_v D_{||}PZ|
- 2| Uv††i i Mv †₋†K ^{ayj}v-e_{||}j, Kv_{||} c_{||}i_{||}i Kiv |

M. mvgqK i ¶Y†e¶Y-

K. c_{||}Z 10 N_{||}Uv Kv†Ri ci KiYxq

L_y ^{ayj}v_{||}jc†Ae⁻vq KvR Ki†j evqyc_{||}i_{||}i †Zj e⁻j_v†b_v | i_{||} ai†bi evqyc_{||}i_{||} K_{||}viK
n†j ^{ayj}v_{||}j c_{||}i⁻K_{||}vi Kiv |

L. c_{||}Z 50 N_{||}Uv Kv†Ri ci KiYxq

- 1| d^vb te†ë i †U_bkb cix[¶]_v Kiv Ges c†q_vR†b ^{||}VK Ae⁻vq A_v†Z n†e (te†ë i
^{||}eP_{||}Z 10-20 ^{||}gt_{||}gt)|
- 2| Uv^Y_{||}gkb †Z†j i gv^{||}_v cix[¶]_v Kiv |
- 3| e^vU_vi_x, †gvUi, AjU_vib^vU†i i U_{||}gb_vj , †j_v†K f_vj f_v†e G_{||}U ^{||}†Z n†e|
- 4| Rvj_{vb} ^{||}dëv†i i Zj_vq R†g ₋vKv Rvj_{vb} ev c_{||}vb tei Kiv |
- 5| †c†U_vj B_{||}Äb n†j ⁻ú_vK c_vM c_{||}i_{||} K_{||}vi Kiv |

M. c_{||}Z 120 N_{||}Uv Kv†Ri ci KiYxq

- 1| B_{||}Ä†bi †Zj c_{||}ieZb Kiv |
- 2| Rvj_vb_x I †Z†j i ^{||}dëvi c_{||}ieZb Kiv (c_{||}ieZb †h_vM⁻ n†j)|
- 3| mg⁻ M_x_{||}Rs c†q_vU_{||} ^{||}j†Z M_xR ^{||}†q g_{||}jk Kiv |

N. c_{||}Z 750 N_{||}Uv Kv†Ri ci KiYxq

- 1| Uv^Y_{||}gkb †Zj c_{||}ieZb Kiv|
- 2| B†ÄKkb c_v†_vú_i n_vD_{||}Rs, ^{||}óq_{||}is ^{||}Mq_vi n_vD_{||}Rs Gi †Zj c_{||}iZb Kiv|

0. cIZ GK - `pemi Aši KiYxq

- 1| mvg#bi I tCQ#bi Pvkvi G#`j weqv#is c#i⁻Kvi K#i Avevi jvMv#bv| c#qvR#b weqv#is cvëv#Z n#e|
- 2| tiW#qU#ii mg⁻ c#b tei K#i fvjfv#e c#i@vi Kiv|
- 3| B#Ä#bi fvj #ús U#v#cU #Kqv#iÝ ciX#v K#i c#qvR#b #Kqv#iÝ #VK Kiv|
- 4| c#qvRb n#j mg⁻ U#±i B#Äb#K A#fÁ IqvKk#c I fvin#js(Overhauling) Kiv|



m#igg t cvIqv i UvÝ#gkb c×#Zi gva#g B#Ä#b Drcb k#³ Uv±#ii Pvkvi I #c.#U. I. k#vd#U #bvš#iZ nq|



c_v†WĖi g_f˘vqb 3.5

mVK DĖ†i i c_v†k UK (√) Pý ˘b|

1| Uv††i UvYgkb c×Z ˘U n†Q-

- K) †gBb I WbF ūBj
- L) †gBb Ges ˘c.˘U. I.
- M) ˘c.˘U. I. Ges ˘Wd†i ˘Yqvj
- N) d†Bbvj WbF ˘c,˘U, I

2| ˘b†Pi †KvU Uv††i i c_v†qv i UvYgkb c×Zi Ask bq ?

- K) †gBb UvYgkb
- L) ˘c.˘U. I.
- M) ˘Wd†i ˘Yqvj
- N) Wevi

3| ˘b†Pi †KvU mVK bq ?

- K) Uv††i i †gBb UvYgkb ˘wfb e˘v†mi KZ, †jv ˘Mqvi ˘b†q MvZ
- L) Uv††i K Aí RvqMvq †gvo Njv†Z mvrnh˘ K†i ˘Wd†i ˘Yqvj
- M) d†Bbvj Wb†fi KvR nj NQYb MvZ†K ewo†q Pvkq †cŠQb
- N) D†bP†R†g†Z KvR Kivi mgq ˘Wd†i ˘Yqvj jK e˘envi Ki†Z nq|

4| Uv††i i ˘c,˘U, I k˘vd†Ui KvR nj

- K) ms†h˘RZ hšc˘Z †U†b ˘b†q hvIqv
- L) UvYgkb †_†K k˘³†K Pvkq ˘b†q hvIqv
- M) ms†h˘RZ K_UL.hšc˘Z†Z Njv MvZ mieivn Kiv
- N) ms†h˘RZ K_UL.hšc˘Z†K Dc†i DV†bv ev ˘b†P jvgv†bv|

5| ˘b†Pi †KvU mVK bq ?

- K) Uv††i K ÷vU †˘qv i Av†M MvZ c˘ieZK ˘j fvi†K ÓbDUv†jÓ ivL†Z n†e|
- L) B†Äb eÜ Kivi mgq ÓKvU-Ad beÓ Uv†Z n†e|
- M) iv˘vq Pjvi mgq Uv††i i Wb I evg Pkvi teK c˘vWvj ˘U i jK mvi†q ˘b†Z n†e|
- N) Uv†i Pvjbv i mgq KvP c˘vWvj †_†K ax†i ax†i c_v miv†Z n†e|

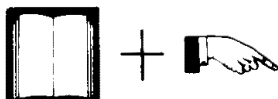
6| b†Pi †KvU ˘˘˘bK i ˘Y†e ˘Y†i AvI Zvf,³ bq ?

- K) KvR †k†I RvjvU U˘˘˘sK c†K†i ivLv
- L) B†Ä†bi †Z†ji gvÎv cix˘v Kiv
- M) Pvjbv Kv†j Uv††i i c˘v†bj tev†Wi ˘wfb ˘gUv†i †Lqvj ivLv
- N) B†Ä†bi †Zj e˘ jv†bv|

e'enwIK

cv 3.6 cvlqvi wUjv`ii wfb As`ki cwiPZ I cvlqvi wUjvi PvjkiY

G cW tk`I Avcb —



- cvlqvi wUjv`ii wfb As`ki bvg ej`Z cvi`eb|
- cvlqvi wUjv`ii wfb Ask mbv<sup>3</sup> Ki`Z cvi`eb|
- GKwU cvlqvi wUjvi ÷vU w`Z cvi`eb|
- cvlqvi wUjvi`K mvg`bi w`K Pvjbv Ki`Z cvi`eb|
- cvlqvi wUjvi`K tcQ`bi w`K Pvjbv Ki`Z cvi`eb|

cvlqvi wUjv`ii wfb As`ki cwiPZ-

wb`a Qiei mwnv`h" GKwU cvlqvi wUjv`ii wfb As`ki cwiPZ I Ae⁻vb t`Lv`bv n`q`Q|



wPÎ 3.26 cvlqvi wUjv`ii mvariY `k" (KwLhš ms`hwiRZ bq)

$\mathbb{P}\hat{I}$ 3.27 $\dagger i v U v i x m n$ c v l q v i $\mathbb{U} j v i$

c v l q v i $\mathbb{U} j v i$ P v j b v i

c v W 3.2 G e $\mathbb{W} Y Z$ c v l q v i $\mathbb{U} j v i$ P v j b v i c $\dagger e$ K i Y x q $\mathbb{W} e l q, \dagger j v$ $\dagger L q v j$ K $\dagger i$ $\mathbb{W} b \dagger \alpha v^3$ c $\times \mathbb{W} Z \dagger Z$
c v l q v i $\mathbb{U} j v i \dagger K$ $\div v U$ $\mathbb{W} \dagger Z$ n $\dagger e$ |

B $\mathbb{A} b$ P v j b v i c $\dagger e$ c $\bar{W} Z$

- 1 $\square$ c v l q v i $\mathbb{U} j v i i$ e v g n $\dagger Z \dagger j i$ m v g $\dagger b$ A e $\bar{W} Z$ $\dagger g B b$ K v P $\mathbb{W} j$ f v i $\mathbb{U} \dagger K$ $\mathbb{W} b \dagger R i$ $\mathbb{W} \dagger K$ U v b
 $\mathbb{W} \dagger q$ $\acute{o} g y \acute{o}$ (disengage) A e $\bar{W} \dagger b$ i v L b |
- 2 $\square$ M $\dagger Z$ c $\mathbb{W} i e Z K$ $\mathbb{W} j$ f v i $\mathbb{U} \dagger K$ $\acute{O} \mathbb{W} b D U v j \acute{o}$ A e $\bar{W} \dagger b$ i v L b |
- 3 $\square$ W b $\mathbb{W} \dagger K i$ n $\dagger Z \dagger j i$ D c i e m v $\dagger b v$ G $\mathbb{W} \acute{J}$ v $\dagger i \mathbb{U} s$ $\mathbb{W} j$ f v i $\dagger K$ N $\mathbb{W} o i$ K v U v i $\mathbb{W} e c i x Z$ $\mathbb{W} \dagger K$
N y $\dagger q$ $\acute{o} \div v U \acute{o}$ A e $\bar{W} \dagger b$ A v b |
- 4 $\square$ c v l q v i $\mathbb{U} j v i i$ m $\mathbb{W} \dagger L$ A e $\bar{W} Z$ e v $\mathbb{W} \acute{u} v i \mathbb{U} \dagger K$ $\mathbb{W} b \dagger P$ b v g v b g $\mathbb{W} \mathbb{U} \dagger Z$ $\dagger \bar{u} m$ $\dagger \bar{q} v i$ R b |
- 5 $\square$ G e v i $\mu \bar{v} s \mathbb{W} K s$ n $\bar{v} \dagger \hat{U} j$ n v $\dagger Z$ $\mathbb{W} b \dagger q$ B $\mathbb{A} \dagger b i$ $\mu \bar{v} s \mathbb{W} K s$ M $\dagger Z$ (B $\mathbb{A} \dagger b i$ m $\mathbb{W} \dagger L$ $\mathbb{W} \dagger K$ W b
c v $\dagger k$ G $\mathbb{U}$ A e $\bar{W} Z$) e m v b |
- 6 $\square$ B $\mathbb{A} \dagger b i$ $\dagger c Q b$ $\mathbb{W} \dagger K$ A e $\bar{W} Z$ $\dagger Q v U$ $\acute{O} \mathbb{W} K \dagger \mathbb{W} \acute{u} k b \acute{o}$ $\mathbb{W} j$ f v i $\mathbb{U}$ e v g n v $\dagger Z i$ e $\times \frac{1}{2} \mathbb{W} j$ $\mathbb{W} \dagger q$
 $\dagger P \dagger c$ a i $\dagger b$ G e s W b n v $\dagger Z$ $\mathbb{W} \dagger q$ $\mu \bar{v} s \mathbb{W} K s$ n $\bar{v} \dagger \hat{U} j \mathbb{U}$ m $\dagger R v \dagger i$ N y $\dagger Z$ $\bar{v} K b$ |
- 7 $\square$ e v i N y $\dagger b v i$ c i $\bar{v} f \mathbb{W} e K$ M $\mathbb{W} Z R o Z v$ $\bar{v} K v$ A e $\bar{v} q$ $\acute{O} \mathbb{W} K \dagger \mathbb{W} \acute{u} k b \acute{o}$ $\mathbb{W} j$ f v i $\mathbb{U}$ $\dagger Q \dagger o$ $\mathbb{W} \dagger b$,
 $\mathbb{W} K b W b$ n v $\dagger Z i$ n $\bar{v} \dagger \hat{U} j \mathbb{U}$ $\dagger Q \dagger o$ b v $\mathbb{W} \dagger q$ m g v b Z v $\dagger j$ A v $\dagger i v$ 2/3 e v i N y $\dagger b$ |
- 8 $\square$ G $\dagger Z$ B $\mathbb{A} b$ $\div v U$ $\mathbb{W} b \dagger e$ G e s $\mu \bar{v} s \mathbb{W} K s$ n $\bar{v} \dagger \hat{U} j$ A v $\dagger \bar{W}$ K $\dagger i$ m $\mathbb{W} i \dagger q$ A v b | m i g $\dagger b i$ e v $\mathbb{W} \acute{u} v i \mathbb{U}$
D c $\dagger i$ Z $\dagger j$ i v L b | G $\mathbb{W} \acute{J}$ v $\dagger i \mathbb{U} s$ $\mathbb{W} j$ f v i $\dagger K$ $\mathbb{W} K Q v$ K i g $\dagger q$ A v b |

c v l q v i $\mathbb{U} j v i \dagger K$ m $\mathbb{W} \dagger L$ P v j b v i $\dagger i v U v i x$ P v j b v i

9. MZ cweZK j fviK tKvb Mqviii mv_ hy (Enage) Kib| mvaviYZt Rig Pvi li
Rb 1 t_K 3 b i Mqvi Ges cwenb KvR D"PMZ bevpb Kiv thZ cv i |
10. Gevi tgBb KvP j fviK Av Avm ÓhyÓ (Enage) Ae vb Avb A_vr j fviU#K
mvg#bi v`K vcb Kib|
11. GLb cvlqvi Ujvi mvg#b PjZ ii Ki#e|
12. Gevi tivUvixi MZ cweZK j fviU#K ÓbDUvjÓ Ae vb t_K ÓD"PÓ ev ÓbáÓ
Mzi Mqviii mv_ hy (Enage) Kib (RigZ_vKv Ae_vq) mvaviYZ k³ gvU#Z
ÓbáÓ MZ Ges big ev Kv`v gvU#Z ÓD"PÓ MZ bevpb Kiv nq|

cvlqvi UjviK tcQ#b Pj b

- 1□ tgBb KvP j fviK ÓAdÓ (gyÓ) Ae vb Avb
- 2□ MZ cweZK j fviK Ói fvmÓ (Reverse) Ae vb nvcb Kib| cvlqvi UjviK
tcQb v`K 1g ev 2q Mqviii Pj b Kiv hvq|
- 3□ Geivi cvlqvi Ujviii n`vÓj ev i b#Pi v`K Pvc ti#L tgBb KvP j fviU#K ax i
ax#b ÓAbÓ (hy) cRk#b bb| GZ cvlqvi Ujvi tcQ#b PjZ iiyKi#e| KvP
j fviU ax i ax i QvoZ n#e bZv tcQ#bi Ask Ic i D#V hv#e|



cvWËi gjvqb 3.6

wbai Abkxb, jv Abkxb Kib|

1| GKU cvIqvi Ujvii mvgb Avmb Ges Gi ewinK wefb Ask, jv mb³ Kib|

2| GKU cvIqvi Ujvii mvgb Avmb| Gevi Gi BÄbK óU w`b|

3| cvIqvi UjviUk wefb Mqvi Ae⁻v^b mvgb Pvjbv Kib|

4| cvIqvi Ujvi ÷vU t`qv I Pvjbvi avc, jv e'enwiK LvZvq wjLb|

cV 3.7 Uv±ii cavb Askmgñ-mbv³KiY

G cV tkñI AvCib —



- Uv±ii cavb Ask,ñjvi bvg ejñZ cviñeb|
- Uv±ii cavb Ask,ñjv mbv³ KiñZ cviñeb|

Uv±ii cavb Askmgñ-mbv³KiY



wbñ Qie i mñvñhñ GKU Uv±ii weñfb Asñki bvg I Aeñvb ñ`Lvñbv ñqñQ|

ñPñ 3.28 (K) GKU Uv±ii weñfb Ask

- 1ñ ñcQñbi PñKv (Rear wheel)
- 2ñ mñU (Seat)
- 3ñ nñPñjZ Gññ jññiñUs ñj fñi (Hand accelerating lever)
- 4ñ Rñjñb cñññi gñ (Fuel tank inlet)
- 5ñ iññWñqUññi cññbi cñek cñ (Radiator cooling water inlet)
- 6ñ ñevñbU (Bonnet)
- 7ñ ñnWñjñBU (Head light)
- 8ñ evññi (Bumper)
- 9ñ mñgñbi PñKv (Front wheel)
- 10ñ ñZñji ñdñvi (Engine oil filter)
- 11ñ nñBñWññjK ñZñji ñdñvi (Hydraulic oil filter)
- 12ñ Rñjñb ñdñvi (Fuel filter)
- 13ñ ñek ñcWñj (Brake pedal)

¶PÎ 3.28 (L) U_v±_†i i ¶e¶fb Askmgñ

- 14| ¶óq¶is n_vZj (Steering Handle)
- 15| n[˘]vÛ †iBj (Hand rail)
- 16| †dÛ_vi (Fender)
- 17| †cQ_†bi ¶i_†dKUi (Rear reflector)
- 18| W_b ¶j dU iW (Lift rod right)
- 19| ¶b_†Pi ¶jsK (Lower link)
- 20| Sžš W evi (Swinging draw bar)
- 21| †WM ¶jsK (Drag link)
- 22| U_vB iW (Tie rod)
- 23| ÷_vU_vi (Starter)
- 24| W_vqb_v†g_v (Dynamo)
- 25| g_vdj_vi (Muffler) A_{_}ev m_vB_†j Ý_vi (Silencer)
- 26| m_vg_†bi c_vk m_s†K_†Zi e_¶Z (Front turn signal lamp)
- 27| †cQ_†b †[˘]L_vi A_vqb_v (Rear view mirror)



c#WĖi gĵ'iqb 3.7

- 1| GKU Uv±i i mvg±b Avmb| Gi wefb Ask,†jv mbv³ Kib|
- 2| Uv±i i caib Ask,†jvi bvg e'envi K LvZiq jice× Kib|



Poiš gĵ'iqb

iPbvġK ck

- 1□ cvlqvi Ujv±i i b±j LZ Ask,†jvi Kvhejx jLbt
tgBb KvP j fvi, G' jv±i Us j fvi, óqv is KvP j fvi, dj±Ki MZ cieZK j fvi |
- 2□ cvlqvi Ujv±i i UYgkb c×Zi eK PĪ Avk Ges wefb Ask,†jvi KvR eYbv Ki |
- 3□ cvlqvi Ujv±i i BĀb ÷vU t`qv I cvlqvi Ujv±i K mvg±b c i Pj b Kv±j KiYxq, KvR,†jv K K?
- 4□ cvlqvi Ujv±i i i Yv±e Y i i Z K? mvgqK i Yv±e Y m±úK eYbv `b |
- 5□ Uv±i i tkvYefvM Kib| e'envi Abvqx tkvYefvM,†jv ms± Y c eYbv Kib|
- 6□ Uv±i i gĵ Ask,†jvi bvg jLbt ms± Y c GKU Kv±Pi Kvhc×Z eYbv Kib|
- 7□ PĪmn GKU tgKv bK`vj te±Ki Kvhc×Z eYbv Kib|
- 8□ eK PĪi mrvn`h` jvKv PwjZ GKU Uv±i i cvlqvi UYgkb c×Z t`Lvb |
- 9□ UxKv jLbt Wdv±i Yqv j c.U. I.
- 10□ c i Pj b Kv±j Uv±i ÷vU t`qv i avc,†jv eYbv Kib|
- 11□ Uv±i Pj v±bvi mgq K K mZKZv Ae j±b Ki±Z nte ?
- 12□ Uv±i i i Yv±e Y i i Z K? Uv±i i mvgqK i Yv±e Y,†jv eYbv Kib|

BDıbU -3

DĖigvjv

- c#WĖi gĵ'iqb 3.1 t** 1| L, 2| M, 3| N, 4| L
- c#WĖi gĵ'iqb 3.2 t** 1| N, 2| M, 3| N, 4| N, 5| M
- c#WĖi gĵ'iqb 3.3 t** 1| L ; 2| N ; 3| M
- c#WĖi gĵ'iqb 3.4 t** 1| K+v ; L+ i ; M + iv ; N + iii ; 0 + ii
2| M ; 3| L
- c#WĖi gĵ'iqb 3.5 t** 1| L ; 2| N ; 3| M ; 4| M ; 5| M ; 6| N



mnvqK Mšvejx

1. GllMKvjPvivj BllÄlbqwis - Uv±i(c_g LÛ) Wt tgv t mvt jK Dİxb
2. Lvgyi hšcwlZ Kll.móumviY Alla`Bi
3. Lvgyi hwlšKxKiY Kll.móumviY Alla`Bi I evsjv`k Kllimix llk¶v teWl
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BDu** 1**
Rg** K**l** b h**š** c**v** Z**

BDwbU 4 Rwg Klb hšcwZ

G BDɪbʊ fɪg KIʔb e'eüz ʔ kx I DbZ hšcwɪZ mʌʔÜ AvʔjvPbv Kiv nʔqʔQ| G
BDɪbUuʊZ ʔgvU 6uU cvV iʔqʔQ| Gi gʔaʔ ʔkʔli ʔʔv cvV hšcwɪZ ʔjvi e'envi mʌúKZ|
c_g cvʔV iʔqʔQ ʔKv`vj, ʔ kx jvʔj, DbZ ʔ kx jvʔj I cɪ PwɪjZ DbZ ʔgvʔeW jvʔʔji
weeiY I KvhcYwɪj | ʔZxq cvʔV kw³PwɪjZ ʔgvʔeW cvD Ges wW ʔ cvDʔqi ʔkwɪefwM,
weeiY I KvhcYwɪj iʔqʔQ| ZZxq cvʔV AvʔjvKcvZ Kiv nʔqʔQ ʔivUvix cvDʔqi weeiY I
KvhcYwɪj mʌúʔK| PZZ cvʔV wW ʔ nʔʔiv, ʔvBKUz nʔʔiv Ges w ʔúsUz nʔʔivi weeiY I
KvhcYwɪj AvʔjwPZ nʔqʔQ|

cÂg cv#V i#q#Q t`kx jv½j, DbZ t`kx jv½j, tgv i#eW cvD#qi gvW chv#q KvHkwiZv
ch#e¶Y msµvš Av#jPbv| lô cv#V i#q#Q tivUvix cvD l wW n¨vivi wefb Ask
mbv³KiY l gvW chv#q KvHkwiZv ch#e¶Y|

civ 4.1 †Kv`vj, †`kx jv½j I DbZ †`kx jv½†ji weeiY I KvhcYwvj

G c_vV †k‡I A_vc_wb —



- †Kv\`vjji weeiY wjL†Z cvi#eb|
- †`kx jv½†ji `ewkó” wjL†Z cvi#eb|
- jv½†ji Wwdu, †úmwdk Wwdu, W evi nmcvIqvi I gvW ¶lgZvi msÁv w`†Z cvi#eb|
- DbZ †`kx jv½†ji weeiY w`†Z cvi#eb|
- cï PwjjZ DbZ †gvi#ew jv½†ji Mvb I KvhcYwjj Ges wef b As†ki gvc wjL†Z cvi#eb|

 $\dagger K_V \setminus v_j$ 

tKv`vj evsjv`#k meĭ cvlqv hvq| GĭU GKĭU gwU KvUvi hš (Implement)| Gi`xuv
Ask, h_v- KvUevi Rb` t jvnvi ^Zix teW (†fZĭi ĩ`#K mvgvb` evK; ĩPĭ 4.1) Ges aievi
Rb` nvZj (Kv#Vi ev evtki ^Zix)| ĩbvqx Kvgi GĭU ^Zix Ki#Z cv#i Zte †QvU †QvU
KivLvbi#Zi Zv ^Zwi Kiv n#g_v#K| Gi gj` cvq 75-125 UvKv|

K₁L.1 c jx Dbqb ⁻q̄

GKRb cYeq ⁻ m̄y t jvK
tKv`vj w`q ^`bK 7-8
NÈv K₁R K₁i 0.015-
0.025 t_{n±i} Rigi g₁U
K₁b K₁iZ c₁i|

GKRb cYeq ⁻ m̄y t jvK G₁U P₁v jvZ c₁i| K₁K₁i_v R₁g ^Z₁i_i K₁vR, A₁M₁Q₁ I N₁m t₁Z₁j₁v₁i
K₁vR e`en<sub>1</sub>i K<sub>1</sub>i| Z<sub>1</sub>e g<sub>1</sub>U K<sub>1</sub>U<sub>1</sub> I m<sub>1</sub>i<sub>1</sub>v<sub>1</sub>b<sub>1</sub>v<sub>1</sub>i K<sub>1</sub>vR, R<sub>1</sub>igi A<sub>1</sub>B<sub>1</sub> ^Z<sub>1</sub>i<sub>x</sub>, `B m₁w₁i₁i g₁a`eZ₁x
R₁g K₁z₁t₁q t`q<sub>1</sub>, M<sub>1</sub>v<sub>1</sub>Q<sub>1</sub>i t<sub>1</sub>M<sub>1</sub>v<sub>1</sub>o<sub>1</sub>i g<sub>1</sub>U A<sub>1</sub>v<sub>1</sub>J<sub>1</sub>M<sub>1</sub> K<sub>1</sub>i<sub>v</sub> BZ`₁w₁` K<sub>1</sub>vR Ges K<sub>1</sub>I<sub>1</sub>K<sub>1</sub>i M<sub>1</sub>p`₁v₁j₁x K₁vR I
e`eüZ n<sub>1</sub>q| G<sub>1</sub>U m<sub>1</sub>v<sub>1</sub>a<sub>1</sub>v<sub>1</sub>iYZ 2-4 er<sub>1</sub>m<sub>1</sub>i e`en₁i K₁i_v h₁v₁q| GKRb cYeq ⁻ t jvK tKv`vj w`q
^`bK 7-8 N₁U₁ K₁R K₁i 0.015 - 0.025 t_{n±i} Rigi g₁U K₁I₁Y K₁iZ c₁i| G₁i I R₁b
c₁v₁q 2.5-3 t₁K₁U₁R (n₁vZ₁j m₁n)| G₁i t₁eW 25-30 t₁m.ig. j₁o₁v I 20-25 t₁m.ig. P₁l₁o₁v Ges 1-3
ig.ig. c₁y₁ n₁t₁q _v₁t₁K| c₁U₁Z eQ₁iB G₁i t₁eW₁t₁K K₁v₁g₁v₁i w`q VK K₁i₁ w₁b₁Z n₁q| Z₁v b₁v n₁t₁j K₁vR
K₁i₁v m₁g₁q A₁m₁y₁e₁a₁v n₁q| t₁Kv`vj w`q m₁v₁a₁v₁iYZ D₁c₁o₁ n₁t₁q K₁vR K₁iZ n₁q| A₁e₁k` g₁a₁z₁y Mo I
c₁v₁eZ` P<sub>1</sub>E<sub>1</sub>M<sub>1</sub>g G<sub>1</sub>j<sub>1</sub>vK<sub>1</sub>vq A<sub>1</sub>t<sub>1</sub>bK m<sub>1</sub>g<sub>1</sub>q t<sub>1</sub>Q<sub>1</sub>vU t<sub>1</sub>Q<sub>1</sub>vU t<sub>1</sub>Kv`vj e`eüZ n<sub>1</sub>q h<sub>1</sub>v w`q e₁t₁m₁I K₁vR K₁i_v
h₁v₁q|

t`k_x j_{v½j}

w₁e₁f₁b a₁i₁t₁b₁i t`k<sub>x</sub> j<sub>v½j</sub> t`L₁Z c₁v₁l₁q₁ h₁v₁q| R₁ig P₁v₁t₁l₁i R₁b` m<sub>1</sub>v<sub>1</sub>a<sub>1</sub>v<sub>1</sub>iYZ G hš e`eüZ n₁t₁q
_v₁t₁K| G₁i w₁e₁f₁b A₁s₁k w₁P₁Î 4.2 G t`L₁v₁t₁b₁v n₁t₁j₁v|

w₁P₁Î 4.2 G K₁U t`k_x j_{v½j}

t`k<sub>x</sub> j<sub>v½j</sub> e`eüZ K₁L
hšc₁w₁Z₁i g₁a` m₁e₁t₁P₁t₁q
c₁y₁Z₁b| e₁v₁s₁j₁v₁t`₁k G₁U
G₁L₁b₁I m₁e₁t₁P₁t₁q t₁e₁k e`eüZ
K₁I₁b hš|

t`k<sub>x</sub> j<sub>v½j</sub> e`eüZ K₁L.hšc₁w₁Z₁i g₁a` m<sub>1</sub>e<sub>1</sub>t<sub>1</sub>P<sub>1</sub>t<sub>1</sub>q c<sub>1</sub>y<sub>1</sub>Z<sub>1</sub>b| c<sub>1</sub>U<sub>1</sub>\_e<sub>1</sub>x<sub>1</sub>i m<sub>1</sub>e<sub>1</sub>t`₁k₁B K₁v₁t₁Vi ^Z₁i₁ j₁v₁½₁j
c₁v₁l₁q₁ h₁v₁q| Z₁e Z₁v₁t`₁i A₁v₁K₁vi I a₁i₁b w₁f₁b w₁f₁b| R₁v₁g₁v₁b₁x₁i t₁n₁v₁t₁n₁b₁n₁v₁B₁g w₁e₁k₁w₁e`<sub>1</sub>v<sub>1</sub>j<sub>1</sub>t<sub>1</sub>q<sub>1</sub>i h<sub>1</sub>v`₁M₁t₁i
c₁U₁_e₁x₁i m₁e t`₁k₁i j₁v₁½₁j I Z₁vi w₁e₁eZ₁b w₁K₁f₁v₁t₁e n₁t₁q₁t₁Q Z₁v m₁s₁i w₁Q Z A₁v₁t₁Q| e₁v₁s₁j₁v₁t`₁k G₁U
G₁L₁b₁I m₁e₁t₁P₁t₁q t₁e₁k e`eüZ K<sub>1</sub>I<sub>1</sub>b hš| e<sub>1</sub>v<sub>1</sub>s<sub>1</sub>j<sub>1</sub>v<sub>1</sub>t`₁k₁i w₁e₁f₁b G₁j₁vK₁vq w₁e₁f₁b A₁v₁K₁vi A₁v₁K₁U₁Z₁i
t`k<sub>x</sub> j<sub>v½j</sub> t`L₁v h₁v₁q| g₁U₁i w₁e₁f₁bZ₁v, M₁i₁z₁i A₁v₁K₁vi BZ`<sub>1</sub>w<sub>1</sub>` K₁vi₁t₁Y j₁v₁½₁t₁j₁i A₁v₁K₁vi-A₁v₁K₁U₁Z₁i
w₁e₁f₁b n₁t₁q _v₁t₁K|

†`kx jv½†ji ^ekó

- G jv½j gwU Dëv†Z cv†i bv| Pjvi c†_ jv½†ji djvi `P av†i gwU †d†j|
- Gi mvin†h" KllZ gwUi Lv` (Furrow) V-AvKlZi| d†j Pvl Kivi mgq `jlv Lv†`i gv†S AKllZ RvqMv †_†K hvq| AKllZ Rlg Pvl Kivi Rb" chvq AvovAwio Pvl †_†Z nq|
- Pvl†i MfxiZv m†ev" P 7-8 †m.ig. Ges ck¯Zv 15-17 †m. ig. |
- Gi mvin†h" cllZ NvUvq 0.02-0.025 †n±i Rlg†Z GK Pvl †`qv hvq|
- Pvl Kivi mgq jv½j Ic†i ev †b†Pi †_†K P†j hvq| d†j jv½j Uvb†Z Mi†i tek Amjeav nq| G†Z Kv†Ri gvb Lv†vc nq|
- Mi†i jv½j Uvbvi mgq mgMlZ†Z nll†Z cv†i bv|
- jv½j I Mi†i gv†S Uvbvi jwä ej †iLv GKB †_†K †_†K bv|
- GlU ^Zwi Kiv mnR Ges Ab"vb" jv½j A†c†v †_†g Kg|

MfxiZv mgšqKib

Pvl†i MfxiZv mvaviYZ C†ki †N" evlo†q ev Klq†q †bqšY Kiv nq| C†ki ^N" evov†j Pvl†i MfxiZv evote Ges ^N" Kgv†j Pvl†i MfxiZv Kg†e|

†`kx jv½†ji WdU

Rlg Pvl Kivi mgq jv½†ji Dci chy Uvb (Pull) Gi clligvY Wbbl†gllgUvi (Dynamometer) †_†q †bYq Kiv m†e| jv½†ji Pjvi †_†K GB Uv†bi Aby†gK Dcvsk†K WdU e†j| †b†i m††i mvin†h" Zv †ei Kiv hvq|

$$\begin{aligned} &\dagger`kx jv\frac{1}{2}\dagger ji WdU \\ &D = P \cos \theta \end{aligned}$$

$$D = P \cos \theta \dots\dots\dots (1)$$

GLv†b, D - WdU, †KlR-ej
P- jv½†ji C†ki Dci Uv†bi clligvY, †KlR-ej
θ- Aby†g†Ki m†_ C†ki ^Zix †KvY, †WMx

†_†m†dK WdU (Specific Draft)

jv½j †_†q KllZ Lv†`i GKK †††d†j chy WdU†K †_†m†dK WdU e†j| A_vr

$$D_s = \frac{D}{L_v\text{'`i } c\text{'`†}Q\text{'}}$$

$$D_s = \frac{D}{L_v\text{'`i } c\text{'`†}Q\text{'}} \dots\dots\dots (2)$$

GLv†b, Ds -†_†m†dK WdU, †KlR ej/†m.ig.²

D - WdU, †KlR-ej

$$L_v\text{'`i } c\text{'`†}Q\text{'} = L_v\text{'`i } MfxiZv (\dagger m.ig.) \times ck\text{'`Zv } (\dagger m.ig.), \dagger m.ig.^2$$

K₁L₁ c j_x Dbqb $\bar{q}$

Wevi nmcvIqvi (Drawbar Horsepower)

j_vUv_bZ Gi Uv_bU_h th $\bar{q}$ gZvi c_qvRb Zv_hK Wevi nmcvIqvi e_j | $\bar{b}$ _hi m_hi m_vn_h Zv tei Kiv hvq |

Wevi nmcvIqvi

$$DBHp = \frac{D \times S}{3.6}$$

$$DBHp = \frac{D \times S}{3.6} \dots\dots\dots (3)$$

GL_vb, DBHp - Wevi nmcvIqvi

D - W_dU, t_KR

S- j_vU_vU_h i M_hZ, $\bar{K}$. $\bar{q}$.N_vUv

g_v $\bar{q}$ gZv (Field Capacity)

K_vhK_ix g_v $\bar{q}$ gZv

$$= \frac{SW}{10} \times \frac{E_f}{100}$$

GKK mg_hq j_vU_vU_h $\bar{q}$ gZv K_hI_Z R_hgi c_hig_vY_hK Gi g_v $\bar{q}$ gZv e_j | G_hK t_n±i/N_vUv A_hev G_Ki/N_vUvq c_Kv_k Kiv nq | $\bar{b}$ _hi m_hi m_vn_h Zv tei Kiv hvq |

$$K_{vh}K_{ix} g_v \bar{q}gZ_v = \frac{SW}{10} \times \frac{E_f}{100} \dots\dots\dots (4)$$

GL_vb, K_vhK_ix g_v $\bar{q}$ gZv, t_n±i/N_vUv

S - j_vU_vU_h i M_hZ, $\bar{K}$. $\bar{q}$.N_vUv

W - P_vh_i i c_K⁻Zv, $\bar{q}$ gU_vi

E_f - j_vU_vU_h i g_v $\bar{q}$ gZv, %

DbZ t_hk_x j_vU_vU_h

eZg_vb K_iK_iv th ai_hbi t_hk_x j_vU_vU_h e_hen_vi Ki_hQ Zv te_hk_x $\bar{b}$ t_UK_mB n_hQ bv | g_vÎ 2-3 g_vm e_hen_vi i d_hj t_kq_vi ev d_hjv I j_vU_vU_h i k_ix $\bar{q}$ gZv n_hq hvq | G_hZ thgb K_vh_i AcP_q n_hQ m_vU_h m_vU_h U_vK_v I mg_hqi AcP_q n_hQ |

$\bar{P}$ Î 4.3 GK_hU DbZ t_hk_x j_vU_vU_h

Abgib Kiv n`Q h` Nj
t`cvKv bv a`i ev c`P bv hvq
Zvn`j jv`jU 50 eQ`iii
teik mgq a`i e`envi Kiv
hvte| mgq mgq iay`jvni
cv`Zi g`mb e`j`q bZb
cvZ `q`Z nte|

G mg` Am`eavi Kvi`Y bZb ai`bi jv`j D`weZ n`q`Q| G`Z cy`Zb jv`j`ji AvKvi ev
aib t`Kv KQ`y c`ieZb Kiv nq`b| iay`Kl`bi mgq t`kx jv`j`ji th Ask g`Ui m`v`
Kl`bi d`j q`c`B nq Zv A`i g`j`i t`jvni cvZ `q`g`q t`q`v nq| (P` 4.3) G`Z
jv`j`ji H Ask, t`jv mn`R q`c`B nq bv Ges e`u`b ch`S jv`j`jU`K e`envi Kiv hvq|
Abgib Kiv n`Q h` Nj t`cvKv bv a`i ev c`P bv hvq Zvn`j jv`jU 50 eQ`iii teik mgq
a`i e`envi Kiv hvte| mgq mgq iay`jvni cv`Zi g`mb e`j`q bZb cvZ `q`Z nte|
t`jvni cv`Zi g`mbi d`j jv`j`ji Z`vi m`v` g`Ui NIY K`g hvte Ges Mi` A`i c`ik`g
Kl`bi KvR Ki`Z cvi`te I Kg k`i c`q`Rb nte|

c`P`jZ DbZ tgv`i`teW jv`j

G jv`j`ji m`v`h` N`Uvq
cvq 0.08 t`n`i Rig P`I
Kiv hvq| t`kx jv`j`ji
m`v`h` thL`b Kgc`q
c`U P`I c`q`Rb nq
t`mL`b G jv`j`ji m`v`h`
gv` Zb P`iU P`IB h`_o|

G jv`j`jU evsjv`k Kl`L`ekie``vj`qi Kl`L`k`³ I h`S wef`M KZK D`wev Kiv n`q`Q|
ekie``vjq Lvgi Ges gv`v chv`q Kl`K`i gv`S cix`q c`P`jZ t`kx jv`j A`c`q G
jv`j`ji Kv`Kv`Zv (Performance) A`bK fv`jv cg`YZ n`q`Q| G jv`j`ji m`v`h` N`Uvq
cvq 0.08 t`n`i Rig P`I Kiv hvq| we`kIZ i`Kbv Rig`Z G jv`j e`env`i c`Z KIK`i
h`\_o AvMn c`ij`qZ n`q`Q| cix`q cvB Z`v`b`q GUv `u`o th c`P`jZ t`kx jv`j
A`c`q G tgv`i tevW jv`j`ji m`v`h` A`i mg`q teik Rig A`c`qKZ`teik MfxiZvq P`I
Kiv hvq| G`Z GKB c`ig`v Rig P`I Mi`i c`ik`g Kg nq| t`kx jv`j`ji m`v`h` thL`b
Kgc`q c`U P`I c`q`Rb nq t`mL`b G jv`j`ji m`v`h` gv` Zb P`iU P`IB h`_o|
GQ`ov Av`iK`U m`eav n`jv Ic`ii Nvm ev AveRbv g`Ui w`b`P P`cv c`o `Re m`v`i c`iYZ
nq|

W`P` 4.4 c`i P`jZ DbZ tgv`i`teW jv`j



Abj`bx t GK`U t`kx jvsMj I GK`U c`i P`jZ DbZ tgv`i`teW jvsM`ji g`a` MvbmZ I
KvhMZ c`\_K` jLb|

c`i P`jZ DbZ tgv`i`teW jv`j`ji wef`b Ask

KuL.I c jx Dbqb ̄z

¶PÎ 4.5 G c i Pw j Z G tgv i teW j v 2 j i we fb Ask t`Lv b n q q Q | G , t j v n t " Q j v 2 j i Z j v , d j v , C k , n v Z j , K v V i m s t h v R K , t j v n v i m s t h v R K Ges Ask , t j v A v U K v b v i R b " c t q v R b x q b v U - t e v è |

¶PÎ 4.5 c i Pw j Z D b Z tgv i teW j v 2 j i we fb A s t k i A e - v b

tgv i teW j v 2 j i M V b I K v h c b w j

j v 2 j i U i M V b A t b K U v t ` k x j v 2 j i g Z B | Z t e G i n v Z j I Z j v ` j U v A v j v ` v K v V i m g š t q - j t K v t Y m s h y K t i g j Ask ^ Z i i K i v n t q t Q | G t ¶ Î C k U n v Z j e i v e i L w b K U v I c t i G K U c v U v t j v n v i m s t h v R t b i m v n t h " A v U K v b v n q | R i g P v t l i R b " j v 2 j i g j Ask (t j v n v i d j v m n j v 2 j i Z j v I n v Z j) I C t k i g t a " f v i m v g " i ¶ v i R b " G K U K v V i m s t h v R K Z j v n t Z C t k i g v S i g w S U v b v U v i b A e - v q A v U K v b v _ v t K |

we t k l f v t e e v K v t b v Ges tek P l o v d j v U G j v 2 j i g j we t k l Z | G K t R i o v e j t ` i m v n t h " G j v 2 j U v b v n q Ges P v j K n v Z j i g y i m v n t h " j v 2 j i f v i m v g " i ¶ v K t i |

we t k l f v t e e v K v t b v (twisted) Ges tek P l o v d j v U G j v 2 j i g j we t k l Z | ¶ Z b U ̄ z m v n t h " d j v U Z j v I n v Z j i I c i A v U K v b v _ v t K | t ` k x j v 2 j i d j v i Z z b v q G U v A v K v t i A t b K e o | t j v n v i c v t Z i ^ Z i i d j v U G g b f v t e e v K v t b v h v t Z P v t l i m g q K i Z Z g v U W b w ` t K D t è c t o |

j v 2 j i C t k i m v g t b i w ` t K i L v B K v U v A s t k t R v q v j m s h y K i v n q | G K t R i o v e j t ` i m v n t h " G j v 2 j U v b v n q Ges P v j K n v Z j i g y i m v n t h " j v 2 j i f v i m v g " i ¶ v K t i | t R v q v t j i m v t _ C t k i m s t h v M t K m v g t b t c Q t b K i v Q v o v I C t k i I c i K v V i m s t h v R K i t W i A e - v b c i e Z b K t i g v U K v U v i M f x i Z v K g - t e i k K i v h v q |

c _ g P v t l G j v 2 j g v U i P v c o v t K t U D w è t q W b w ` t K t d t j t ` q | d t j I c t i i N v m e v A i e R b v g v U i w b t P P v c v c t o ^ R e m t i c i i Y Z n q | c i e Z x t Z ¶ Z x q Ges c i e Z x P v t l P v c o v , t j v t f t 1 2 , t o v n t q h v q | d j v i m v g t b K Z b a v i (cutting edge) c t - 2.5 t m . w g . n t j l µ g v š t q Z v t e i k c k - Z v q K v R K t i |

tgv i teW j v 2 j i we fb A s t k i g v c

n v Z j i R b " c t q v R b 7.5 t m . w g . c - , 6 t m . w g . t e a w e i k ó 90 t m . w g . j a v K v V i d j K h v i I c t i i w ` t K µ g k ¶ K Q v m i z |

nvZj t nvZtji Rb" c†qvRb 7.5 tm.ig. c⁻, 6 tm.ig. tea weikó 90 tm.ig. j^{av} Kv†Vi djK hvi Ic†ii w`†K μgk WKQW mi#| nvZtji w†Pi As†k LvB †K†U jv†tji Zjvi Abyc Lv†Ri mv†\_ G†K AvUKv†bv nq| nvZtji gv\_v †cQ†b 5 tm.ig. e`v†mi GKU gw jvMv†Z n†e|

jv†tji Zjvi Rb" 10 tm.ig. DPy6 tm.ig. c⁻ I 45 tm.ig. j^{av} Kv†Vi djK`iKvi|

jv†tji Zjv t jv†tji Zjvi Rb" 10 tm.ig. DPy6 tm.ig. c⁻ I 45 tm.ig. j^{av} Kv†Vi djK`iKvi| dj†Ki †cQ†bi w`†K KvUv Lv†R nvZj ewm†q †z mrvn†h" k³ K†i Ggbfv†e AvUKv†bv nq hv†Z nvZj gwUi mv†_ cvq 125 WmX †Kv†Y †cQb w`†K tn†j\_v†K| Zjvi mvg†bi AskU Xvj†v†e †K†U †dj†Z n†e hv†Z ev†bv †jv†vi djv`wv †z mrvn†h" GB KvUv As†k Ges Ac i GKU †z mrvn†h" nvZtji w†f†M AvUKv†bv hvq|

GU Kv†Vi ^Zi Ges †`kx jv†tji gZ n†j I Gi w†b cvš nvZtji gvSvgs †b 2.5 tm.ig. ck⁻ cvUv †jv†vi f†Ri gva†g AvjMv†e AvUKv†Z n†e|

**Ck ev`Ů t** GU Kv†Vi ^Zi Ges †`kx jv†tji gZ n†j I Gi w†b cvš nvZtji gvSvgs †b 2.5 tm.ig. ck⁻ cvUv †jv†vi f†Ri gva†g AvjMv†e AvUKv†Z n†e| Pv†li mgq Ck I jv†tji g†As†ki fvimvg" eRvq iLv i Rb" 5 tm.ig. D"pZv I 2.5 tm.ig. tea weikó 76 tm.ig. j^{av} GKU Kv†Vi ms†hvR†Ki mrvn†h" Ck†K Zjvi mv†_ tevë w`†q AvUKv†Z n†e|

3 ig.ig. cy† †jv†vi cvZ w`†q GU ^Zi Kiv nq|

djv t 3 ig.ig. cy† †jv†vi cvZ w`†q GU ^Zi Kiv nq| ev†bv c†e †jv†vi cvZUi AvKv I c†igvc w†PÎ 4.6 G †Lv†bv nj| G †jv†vi cvZUi nvZw w`†q c†U†q w†b`ó AvKv. w`†Z n†e (Wb w`†K †gv†bv) Ges w†ZbU †z mrvn†h" g†As†ki mv†\_ AvU†K†q w`†Z n†e|

w†PÎ 4.6 ev†bv c†e djvi AvKv



mvigg t †Kv`vj, †`kx jv†j, DbZ †`kx jv†j me, †jvB fvg KIY hšcwZ w†m†e Kg-†ek e`eüZ n†q Avm†Q| †`kx jv†j w`†q c†Z NÈvq 0.025-0.025 tn±i Rlg Pvl Kiv hvq| Avi c†Pw†j DbZ †gv††evW jv†j w`†q c†Z NÈvq 0.08 tn±i Rlg Pvl Kiv hvq| gv †lgZvi mrvn†h" jv†j w`†q KvIZ Rlg c†igvY w†Yq Kiv hvq|



K_{IL}.I c j_x Dbqb $\overline{q}$

c_vW_Ei g_j^vqb 4.1

m_{IK} D_Ei i c_vk _{UK} (√) _{IPY} _b |

1. GKRb c_yeq⁻ († j_vK †K_v^vj _W†q [^]_WbK 7-8 N_Uv K_vR K_†i K_x c_{ig}vY R_{ig} P_{vl} K_i†Z c_v†i?

K. 0.5- 1 t_n±i

L. 0.15- 0.25 t_n±i

M. 0.35-0.45 t_n±i

N. 0.015-0.025 t_n±i

2. †⁻k_x j_v½†j i †††[†] _Wb†P i †K_vb_U mZ^{''} b_q ?

K. G i W⁻†q K_{IL}Z L_v†⁻ i A_vK_{IL}Z.ÔVÓ G i gZ

L. ⁻W_v L_v†⁻ i g_v†S A_K_{IL}Z f_{ig} †₋†K h_vq

M. G j_v½j g_UU†K †K†U D_W†q †⁻q

N. A_K_{IL}Z f_{ig} P_{vl} K_iv i R_b^{''} c_hi_vq A_vo_vA_Wo P_{vl} _W†Z n_q

3. j_v½†j i W_dU e_j†Z K_x †e_vS_{iq} ?

K. j_v½†j i D_ci ch_y _Uv_b†K (pull) W_dU e_j

L. j_v½†j i D_ci ch_y _Uv_bi A_by_{ig}K D_cv_sk†K W_dU e_j

M. j_v½†j i P_jv i _W†K j_v½†j i D_ci ch_y _Uv_bi A_by_{ig}K D_cv_sk†K W_dU e_j

N. j_v½†j _Uv_b†Z G i _Uv_bv⁻†Ô †h †gZ_vi c_†q_vR_b Z_v†K W_dU e_j |

4. c_iP_WjZ D_bZ †g_vi †e_vW j_v½†j i †††[†] _Wb†P i †K_vb_U mZ^{''} b_q ?

K. j_v½j_U e_vs j_v†⁻k K_{IL}._Wek_We⁻^{''}v j_†q i K_{IL}.k_W³ I hš _We_fvM KZK.D[™]_WeZ

L. R_{ig} P_v†I i m_gq g_UU†K †K†U G_K c_v†k D_W†q †⁻q

M. G†Z D_c†i i N_{vm} e_v A_veR_bv g_UU i _Wb†P P_vc_v c_†o⁻Re m_v†i c_WiYZ n_q

N. †⁻k_x j_v½j A_†c_†_v G j_v½†j K_g M_fx_iZ_vq G_es _Wb_W⁻ó m_g†q K_g c_Wig_vY R_{ig} P_{vl} K_iv h_vq |

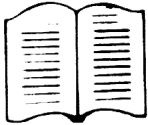
cV 4.2 tgv i teW cD Ges W W cVD tqi tk Yief VM, weeiY I KhcY Vj

G cV tk I Avcb —



- tgv i teW cVD tqi tk Yief VM ej Z cvi eb |
- tgv i teW cVD tqi we fb Ask Ges Avby K Ask, t jvi KvR j L Z cvi eb |
- tgv i teW cVD tqi m vBR, cVD tqi m yeav I mxgve xZv ej Z cvi eb |
- W W cVD tqi tk Yief VM ej Z cvi eb |
- W W cVD tqi mgšq m u K ej Z cvi eb |
- th mKj Ae vq W W cVD e`envi Kiv tkq Zv j L Z cvi eb |

tgv i teW cD



tgv i teW cD GK U cV gK fvg K Ib hš | G U m vaviYZ Uv i P v j Z | G Z tgv Pov t b v
c p t` k i m v t\_ K Z b c v š h y \_ v t K h v g v U t K t K t U D v e t q t` q | P I 4.7 G tgv i teW
cVD tqi we fb Ask t` L v t b v n t j v |

P I 4.7 tgv i teW cVD tqi we fb Ask

Kll. l c jx Dbqb $\overline{q}$

c\D†qi	Zjvi	eb"mi
Dci	f\Ē	K†i tgvìteW
c\D`	ai†bi	n†Z c†i

tkYiefvM

cVD†qi Zjvi (Plough bottom) ‖eb`v†mi Dci ‖f‖Ě K†i tgv`ì†ewW cVD`ÿai†bi n†Z c†i |
1| GKgja cVD: g‖U†K †K†U ïagvĪ GK‖`†K, m‖aviYZ Wb‖`†K (†cQb ††K †`L†j)
 ‖b†¶c K†i |

2| ‖Ńgja cVD: G†Z evg Ges Wb Dfaggja Zjv ‖v†K | G ai†bi cVD ‖`†q P†IKZ.R‖gi
 Dci†i f‖M mgZj ‖v†K |

Uv±i ev k‖³i Dr†mi m‖v†_ mshy† nevi ai†bi Dci ‖bfi K†i ‖b‖j‖LZ fv†el tgv`ì†ewW
 cVD†K †k‖YiefvM Kiv †h†Z c†i |

Uv±i ev k‖³i Dr†mi m‖v†_ mshy† nevi ai†bi Dci ‖bfi K†i tgv`ì†ewW cVD ‖Zb ai†bi |

**1| gvD†UW tgv`ì†ewW** : G‖U Uv±†ii m‖v†\_ GKB BD‖bU ‖n†m†e e`eüZ nq Ges c‖iP†jbn Kiv
 mnR | Uv±i G‖Ui m‖ú† IRb enb K†i |

2| tm‖g gvD†UW : G‖U A†c¶vKZ.fvix Ges Uv±†ii n‖BW‖jK ‖m†ó†gi m‖n‖v†h” P††li
 MfxiZv ‖bqŠY Kiv hvq |

3| c†y UvBc : G‖U L†vB fvix Ges Uv±†ii †cQ†b P†Kvi m‖n‖v†h” Uvbn nq |

tg‖v`ì†ewW I †kqv†ii ai†bi Ici ‖f‖Ě K†i I G cVD†K ‖P‖yZ Kiv n†q ‖v†K | ‖PĪ 4.8 G
 tgv`ì†ewW cVD†qi ‖e‖fb cKvi Zjv (bottom) †`Lv†bn nj |

‖PĪ 4.8 tgv`ì†ewW cVD†qi ‖e‖fb cKvi Zjv

K₁L₁ I c jx Dbqb $\bar{q}$

tgvi₁teW cvDtqi **we₁fb As₁ki K₁R**

tgvi₁teW cvDtqi **we₁fb Ask** **we₁fb K₁R** K₁i $\bar{v}$ K | **wb₁ G₁⁺ i K₁R**, **†j₁ v eYbv K₁ v nj** -

tgvi₁teW cvDtqi **we₁fb**
Ask dM, **†kqvi**, **tgvi₁teW**,
j⁺v₁U₁m₁BW, **†dg** |

dM- cvDtqi Zjvi gvSLvb eivei $\bar{t}$ ₁K G₁U cvDtqi Ab⁺vb⁺ Ask, **†j₁v₁K hy₁ K₁i** GK₁U BD₁bU **†n₁m₁†e K₁R K₁i₁Z mn₁vqZ₁ K₁i** |

†kqvi- G₁U gv₁U₁K **wb₁ P₁ $\bar{t}$ ₁K $\bar{t}$ ₁K₁U** **úvBm ^Z₁i K₁i** |

tgvi₁teW- G As₁ki **bigvbm₁†iB j₁v₁2j₁U₁i bigK₁iY K₁ v n₁q₁†Q** | **†kqvi₁i $\bar{t}$ ₁cQ₁†bB Gi** Ae⁺ vb Ges **d₁†Mi m₁v₁† $\bar{t}$ ₁ev₁ë K₁ v $\bar{v}$ K** | G₁U K₁ZZ gv₁U₁K D₁ë₁†q GKc₁v₁k **†d₁j $\bar{t}$ ₁q** | GQ₁ov K₁ZZ gv₁U Gi Dci **† $\bar{v}$ ₁q N₁†I hv₁Iqvi mgq $\bar{v}$ KQ₁⁺ **†eP₁b nq** |**

j⁺v₁U₁m₁BW- G₁U cvDtqi Zjvi evg₁⁺†K (**†cQ₁b $\bar{t}$ ₁K $\bar{t}$ ₁L₁†j**) **d₁†Mi m₁v₁† hy₁ GK₁U P⁺v₁P₁ v j₁av avZe L₁U₁ | K₁ZZ gv₁U D₁ë civi mgq cvD₁†q th cvk P₁v c†q₁M K₁i**, **j⁺v₁U₁m₁BW Z₁ v c₁†ZnZ K₁i** | G₁U K₁ZZ L₁v₁†⁺ i **† $\bar{t}$ ₁qvj** (Furrow wall) **†N₁†I P₁†j Ges cvD₁†K $\bar{p}$ f₁v₁†e $\bar{t}$ m₁v₁R₁ P₁†Z mn₁vqZ₁ K₁i** |

†dg- cvDtqi Zjv I Av₁b₁y₁†K Ask, **†j₁v₁K avib K₁i** Ges cvD₁†K U₁b₁v₁i Rb⁺ **Uv₁†₁i i m₁v₁† hy₁ K₁i** |

tgvi₁teW cvDtqi **Av₁b₁y₁†K** (Accessories) **Ask₁m₁gn-**

tgvi₁teW cvDtqi K₁R†K mnR I **f₁v₁j f₁v₁†e m₁†žb K₁i v Rb⁺ Gi mn₁vqK **†n₁m₁†e $\bar{v}$ KQ₁y₁š₁isk** cvDtqi m₁v₁† hy₁ $\bar{v}$ K | G₁, **†j₁v₁K cvDtqi mn₁vqK ev Accessories e₁†j | thgb- $\bar{t}$ K₁v₁ëvi**, **R₁†q₁U₁vi**, **†MR ūBj | $\bar{v}$ P₁† 4.9 G $\bar{t}$ K₁v₁ëvi I R₁†q₁U₁vi $\bar{t}$ ₁L₁v₁†bv n₁q₁†Q** |**

$\bar{v}$ P₁† 4.9 $\bar{t}$ K₁v₁ëvi I R₁†q₁U₁imn **tgvi₁teW** cvD
Av₁b₁y₁ Gevi G₁⁺ i Ae⁺vb I K₁R m₁†ú₁†K **†R₁†b $\bar{t}$ bB** |

†K₁v₁ëvi (Coulter)

†K₁v₁ëvi e⁺en₁†i i d₁†j
j₁v₁2j₁ U₁b₁v₁i Rb⁺ k₁³ Kg
j₁v₁†M | G₁U₁i m₁vBR 35-45
†m₁.wg. chš n₁†q $\bar{v}$ K |

G₁U m₁v₁av₁iYZ P₁iK₁Z Av₁K₁Zi Ges cvDtqi Zjvi **$\bar{v}$ VK I c₁†i m₁v₁g₁†bi $\bar{v}$ ₁†K evg cv₁†k Ae⁺vb** K₁i | M₁†o₁†q P₁j₁vi mgq G₁U m₁v₁g₁†b GKc₁v₁k $\bar{t}$ ₁†K gv₁U I AveR₁b₁v **†K₁U $\bar{t}$ ₁q** | d₁†j evg cv₁†k L₁v₁ov, c₁†i⁺†i L₁v₁†⁺ i **† $\bar{t}$ ₁qvj** (Furrow wall) **^Z₁i nq Ges K₁ZZ d₁v₁i₁ v₁†Bm evg cvk $\bar{t}$ ₁†K** c₁†i⁺†i f₁v₁†e **tgvi₁teW D₁†V Av₁†m I AveR₁b₁v₁mn W₁b₁†⁺†K D₁ë c₁†o** | Gi e⁺en₁†i i d₁†j j₁v₁2j₁ U₁b₁v₁i Rb⁺ k₁³ Kg j₁v₁†M | G₁U₁i m₁vBR 35-45 **†m₁.wg. chš n₁†q $\bar{v}$ K** | KL₁†bv KL₁†bv Gi c₁†i⁺†i a L₁UR K₁v₁U₁ $\bar{v}$ K | A₁†bK mgq G₁U Q₁y₁ i Av₁K₁Zi n₁†q $\bar{v}$ K |

BD₁bU 4

RtqUvi (Jointer)

RtqUviii Dtk" n"Q, gj
cvD Zjvi mvgtb GKU
tQvU, cvZjv dlviv uvBm
Dte t`qv|

GU cvDti Zjvi Dcti tKvviiv cvk emvbn tQvU AvtiKU cvDti gZ| RtqUviii
Dtk" n"Q, gj cvD Zjvi mvgtb GKU tQvU, cvZjv dlviv uvBm (Furrow slice) Dte
t`qv| gj dlviv uvBmi Dcti evg w`K t`K GB tQvU dlviv uvBmU (5-6 tm.wg. Mfxi)
tKU Dvbn nq| GtZ gwUi Ictii AveRbv mduY Dte Mtq Lv`i (Furrow) Wb`K
wbP Pvcv cto| RtqUvitiK tKvviiv mvt_ GKt e`envi Kiv nq|

D"P MvZtZ Pjvi mgq cvDti KvhKvixZv tKvvi I RtqUvi w`q eujvsk ex cvq|

tMR uBj (Gauge Wheel)

KltYi MfxiZv mgšq Kivi Rb" tMR uBj ctqvRb| cvD extgi cvk GU jvMvbn _vK|

tgviteW cvDti mBR

tgviteW cvDti mBR Gi
ck_Zv w`q cKvk Kiv
nq|

tgviteW cvDti mBR Gi ck_Zv w`q cKvk Kiv nq| cvDti tkqvi DBs t`K
j"vUmbW chš `tZ tgc GU wbyq Kiv nq| GRb" t`jU j"vUmbWi mvt_ mgKvY
(Perpendicular) aiZ nte| Uvi w`q Uvbn cvDti mBR 25, 30, 35, 40 I 45 tm.wg.
ntq _vK|

Gevi Avmb Avgiv tRtb tbb tgviteW cvD e`enviii mear I mxgveXZv, tjv wK wK|

mear

- PvlIi mgq KZZ gwUtk mduY Dte t`q| dtj Ictii AvMQv, AveRbv
BZ" w` gwUPvcv cto Re mvti ciiYZ nq|
- G cvD PvlIi mgq AvqZKvi Lv`i mjo Kti Ges `B Lv`i gta" tKvb AKwIZ
fvg _vK bv|
- RtgK Mfxi fvt Pvl Kiv hvq|

mxgveXZv

- gwUtz cv_tii Ukiv, MvtQi k³ wKko _vKtj tgviteW jvzj e`envi
AmearRbK|
- gwU h" tfrv Avvvtjv nq Zte G jvzj e`envi Kiv hvq bv|
- Pvjvbi Rb" Uvi ev cvlqv Ujviii ctqvRb nq|

th mg _vbt tgviteW ev
Ab" jvzj e`envi Kiv hvq
bv, tmLvbt w` jvzj
e`envi mearRbK|

w` cvD

GU GKU cv_wgK KIY hš| th mg _vbt tgviteW ev Ab" jvzj e`envi Kiv hvq bv,
tmLvbt w` jvzj e`envi mearRbK| GU GK ev eUzjv (Bottom) wlkó ntZ cvti| GU
ci ev Uvi PmijZ ntZ cvti|

tkviefm

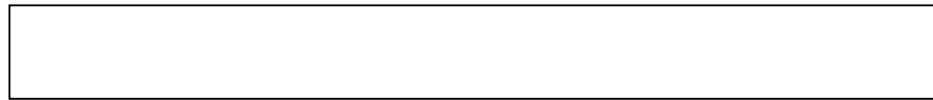
cavbZ w` cvD `jai#bi ntq _vK|

K₁L.1 c jx Dbqb ⁻q̇

W⁻ c_vD cavbZ ⁻ckvi,
⁻vŪW I f_WUK⁻vj W⁻
 c_vD |

1| ⁻vŪW W⁻ c_vD (Standard disc plough) - G_WUi ⁻e_Wkó⁻ n₁j_v th c_WZ_W W⁻ Avj_v⁻
 Avj_v⁻ f_vte _WR⁻ A₁¶_Wi Dci tNvi₁Z c_v†i Ges c₁q_vR₁b P_v†li tK_vY (Angle) c_WieZb ev
 mgšq Kiv h_vq |

W₁P¹ 4.10 GK_WU ⁻vŪW W⁻ c_vD



2| f_WUK⁻vj W⁻ c_vD (Vertical Disc Plough) - GKB ⁻†Ūi m_v†_ A₁bK₁†j_v W⁻ GKm_v†_
 j_vM_v†b_v _v†K Ges ⁻†Ūi Dci me₁†j_v W⁻ GKB m_v†_ †N_v†i | GL_v†b me₁†j_v W⁻ L_vov_vf_vte
_v†K |

k_W³i Dr₁mi m_v†_ m₁†h_vM Abj_vq_x W⁻ c_vD†qi cK_vi†f⁻

Ave_vi k_W³i Dr₁mi m_v†_
 m₁†h_vM Abj_vq_x W⁻ c_vD _WZb
 ai₁†bi |

1| W₁B₁†i₁ g_vD₁†UW c_vD (Direct Mounted Plough) - K_vR K_vi m_gq G_WUi m₁†U₁ IRb
 k_W³i Drm enb K₁i |

2| t_Wm_g g_vD₁†UW c_vD (Semi Mount Plough) - K_vR K_vi m_gq Gi A_vs₁kK IRb k_W³i Drm
 enb K₁i |

3| t_WB₁j_W c_vD (Trailed Plough) - G_WUi t_WK_vb IRb k_W³i Drm enb K₁i_b _WKš i_Wag₁¹
 U_vb_vi e⁻e_v Av₁Q |



Abj_vjb_x t Avcb_vi Gj_vK_vq t_Wg_vi₁†e_WW c_vD I W⁻ c_vD -Gi g₁†a⁻ t_WK_vb_WU e⁻en_vi Kiv n_q
 Ges t_WKb ?

W⁻ t_We_W

BD_Wb_W 4

G W⁻i m⁻h 10-36
tm.ig. MfxiZvq Pvl t`qv
mæe|

cvD⁺qi AvKvi m⁻YZ Gi W⁻i e⁻vm I cyZ`q cKvk Kiv nq| thgb : 65 tm.ig.×
5 ig.egjZ t⁻evSvq W⁻i e⁻vm 65 tm.ig. I cyZ 5 ig.ig. | W⁻i e⁻vm m⁻YZ 60-
80 tm.ig. _vK| W⁻, t⁻jv m⁻YZ AeZj n⁺q _vK| G W⁻i m⁻h 10-36 tm.ig.
MfxiZvq Pvl t`qv mæe| A⁺bK mgq teW, t⁻jvi cvŠ LvBKvUv _vK⁺ cv⁺i | GvU m⁻YZ
AvMvQv ev AveRbv f⁻vj f⁻te KvU⁺Z cv⁺i |

W⁻ cvD⁺qi W⁻ tKvY I
Uë tKvY mgŠ⁺qi gva⁺g
Zv Kiv nq|

W⁻ cvD⁺qi mgŠ⁺q mab
Rig Pvl Kivi mgq KI⁺Yi MfxiZv I ck⁻Zv mgŠ⁺q Kivi c⁺qvRb nq| W⁻ cvD⁺qi W⁻
tKvY (Disc angle) I Uë tKvY (Tilt angle) mgŠ⁺qi gva⁺g Zv Kiv nq| Gevi Avmly
tR⁺b t⁻bB W⁻ tKvY I Uë tKvY W⁻ K ?

Uv⁺i Pjvi W⁻Ki m⁻
W⁻i m⁻ Zj th tKvY
Drcb K⁺i (Aby⁻gK Z⁺j), Z⁺K W⁻
tKvY e⁺j | m⁻YZ G tK⁺Yi gvb
35⁰-45⁰ n⁺q _vK|

W⁻ tKvY (Disc angle) - Uv⁺i Pjvi
W⁻Ki m⁻ W⁻i m⁻ Zj th tKvY
Drcb K⁺i (Aby⁻gK Z⁺j), Z⁺K W⁻
tKvY e⁺j | m⁻YZ G tK⁺Yi gvb 35⁰-
45⁰ n⁺q _vK|

PI 4.11 W⁻ tKvY

W⁻ tK⁺Yi gvb evov⁺Z _vK⁺j K⁺IZ Lv⁺`i (Furrow) ck⁻Zv evov⁺Z _vK Ges cvD Uv⁻vi
k⁺ I te⁻k jv⁺M | W⁻ tKvY i⁻b n⁺j Lv⁺`i m<sup>-</sup>ó bv n<sup>+</sup>q cvD i<sup>-</sup>ayg<sup>-</sup>U<sup>+</sup>Z`vM tK⁺U h⁻te|

Uë tKvY (Tilt angle)-- f⁻c⁺ô⁺i Dj⁺
tiLv⁺i m⁻ W⁻i m⁻ Zj th tKvY
tnjv⁺bv _vK (Dj⁺ Z⁺j), Z⁺K Uë tKvY
e⁺j | G tK⁺Yi gvb m⁻YZ 15⁰-20⁰
nq| Z⁺te f⁻UK⁻vj W⁻ cvD⁺q G tKvY
_vK bv|

PI 4.12 Uë tKvY

Uë tK⁺Yi gvb evov⁺Z _vK⁺j P⁺li MfxiZv Kg⁺Z _vK Ges G tK⁺Yi gvb Kg⁺ P⁺li
MfxiZv ev⁺o|

th mKj Ae⁻vq tgv⁺i teW cvD⁺qi tP⁺q W⁻ cvD e⁻envi Kiv tkq

KuL.I c jx Dbqb ̄z

1□ thLv#b AvenvIqv i® Ges gvu k³ I KsKigq|

2□ AvW#jv, fviX K`g gvu I AvjMv te#j gvu#ZI W̄ cVD fvj KvR K#i|
Gu AveRb#K gvuI Ic#iB iv#L d#j gvuI Av`Zv msiW̄ Z nq|

3□ Lg te#k AvMvQv AvμvŠ, k³ kKohy R#g#Z W̄ cVD cva#b" cvq|

4□ Abvev`x R#g#K Avev#`i AvIZvq Avbvi w#g#E Mfxi Pvl t`qvi Rb" G cVD
Dchy|



migg t tgv i#evW cVD I W̄ cVD Df#qB Uv#i Pw#jZ cv_wgK fvg Klb hš| w#fb ai#bi
tgv i#evW I W̄ cVD i#q#Q| AvW#jv, fviX K`g, k³, AvMvQv hy I KsKigq
gvu#Z Ges i® AvenvIqvq tgv i#evW cVDtqi #P#q W̄ cVD e`envi Kiv tkq|



cvWĖi gj`qb 4.2

mVK DĖĖi cvk UK (√) Pý `b|

1. cvD†qi Zjvi web`vm Abjvqx tgv`i tevW cvD Kx ai†bi n†q _v†K ?

K. Djā I AbyvgK

L. GKgkx I Øgkx

M. gvD†UW I tmg gvD†UW

N. ÷`vŪW I fVUK`vj

2. vb†Pi tKvbU tgvjtevW cvD†qi j`vŪmvB†Wi KvR ?

K. KZZ gvi ūvBm†K D†Ė t`qv

L. cvD†K gviU†Z ex Kiv

M. cvD†qi Dci KZZ gviU†c c†kPvc c†ZnZ Kiv

N. tkv†i evg cvk gviU†Z `vM tK†U hv Iqv

3. vb†Pi tKvbU tgv`i tevW cvD†qi Rb` c†hvR` bq ?

K. Pv†I mgq GvU KZZ gviU†K m†ú†D†Ė t`q

L. `ŷv Lv†`i (Furrow) gv†S AKIZ`vb _v†K bv

M. gviU†Z Mv†Qi k³ kKo _vK†j G cvD e`envi Kiv D†PZ bv

N. R†g†Z Mfxi fv†e PvI t`qv hvq bv

4. W` cvD m†aviYZ K†cKvi ?

K. gvD†UW I tUBjW

L. Djā I AbyvgK

M. ÷`vŪW I fVUK`vj

N. GKK W` I eû W` m†úb

5. vb†Pi tKvbU W` cvD†qi t††Ė mVK bq ?

K. GvU AveRbv†K gviU†c†iB iv†L d†j gviU†c†iB Av`Zv i††Z nq

L. AvMvQv Avμvš, k³ kKoh† R†g†Z G cvD Dc†hvMx bq

M. Abvev`x R†g†Z Mfxi PvI t`qv Rb` GvU Dc†hvMx

N. AvW†jv, fvix K`g gviU†Z G cvD fvj KvR K†i

KuL.I c jx Dbqb ˉq̣

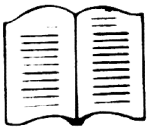
cW 4.3 tivUvix cvD†qi weeiY I KvhcYwJ

G cW tk†I Avcwb —



- tivUvix cvD†qi weeiY I KvhcYwJ wjL†Z cvi†eb|
- tivUvix cvD†qi wefb As†ki bvg ej†Z cvi†eb|
- tivUvix cvD†qi tkYwefwM Ki†Z cvi†eb|
- tivUvix cvD†qi Klb dj†Ki wefb cKvi webˆwM I PwIKZ.Rwgi Aeˆv eYbv Ki†Z cvi†eb|
- tivUvix cvD†qi myeav I Amyeav,†jv ej†Z cvi†eb|

†ivUvix cvD



GwU GKwU kw³ PwJZ cv_wgK KIYhš Z†e A†bK mgq wZxq chv†qi KIYhš wn†m†eI eˆenvi Kiv nq| KvˆvgwU ev cwb R†g _vKv R†g†Z †ivUvix cvD LwB KvKix e†j avb Pw†Ii Rbˆ G jv†j LwB Dc†hwMx| GQvovI c_g Pw†Ii ci gwUi eo †Xjv†K †f†½ ,ov Ki†Z I GwU eˆeüZ nq|

KvˆvgwU ev cwb R†g _vKv R†g†Z †ivUvix cvD LwB KvKix e†j avb Pw†Ii Rbˆ G jv†j LwB Dc†hwMx|

mvaviYZ †ivUvix cvD (wUjvi) cvlqvi wUjvi ev Uv††ii †cQ†b eˆenvi Kiv nq| †ivUvix wUjvi w.c. wU. I. wˆ†q PwJZ ev BwAb †_†K kw³ c_g G†.j I c†i Zv †_†K †PB†bi mwnv†hˆ cwiPwJZ n†q _v†K|

wPÎ 4.13 GKwU †ivUvix cvD



wPÎ 4.13 G GKwU maw†† †ivUvix cvD †ˆLv†bv n†q†Q| GKwU Abw†ygK ˆ†ûi Mw†q A†bK,†jv UvBb (tyne) ev djK jvMw†bv _v†K| GwU PwJv†Z Uv††ii †Kvb Uvbw kw³ i

c†qvRb nq bv eis ‖bR A†¶i Dci G†K ‡Nviv†Z nq| ZvB G†K ‡btMuf WdU hš e†j|
Z†e G‖U Pvjv†Z A‖aK c‖igvY k‖³ c†qvRb| ‡ivUvix ‖Ujv†ii UvBb ev teW ‖b‡i|c n†Z
cv†i|

- ‡nv UvBc teW (hoe type blade)
- Gj -AvK‖Zi teW (L- shaped blade)
- ûK AvK‖Zi teW (hook shaped blade)
- ‖cK UvBc teW (pick type blade)

R‖gi Ae⁻vbyqx teW e`eüZ n†q \_v†K| m‖aviYZ k<sup>3</sup> g‖Ui Rb` ‡nv UvBc ev ûK UvBc
teW Ges big ev Kv`vg‖Ui Rb` L - AvK‖Zi teW e`eüZ nq| Uv†i ‡ivUvix cvD†K hLb
mvg†bi ‖`†K ‡U†b ‖b†q hvq ZLb G‖U ‖bR A†¶i Dci N†bi g‖a`†g g‖U†K Lg fvj fv†e
†K†U , ‡ov K†i | GK P†I R‖g cvq m‡úY`Z†i n†q hvq| ‖Ujv†ii teW m‖aviYZ GKB ‖`†K
†Nv†i (P‖K‖i N†bi ‖`†K)| ‡ivUvix cvD Pvjv†Z Uv†ii m‖\_ `†cKv†ii m†h‖M ‖`†Z nq|
c_gZ jv†j†K mvg†b ‡U†b ‖b†q hv†qv Rb` G†K Uv†ii ‖Zb‖U ‖js†Ki m‖_ h† Ki†Z
nq| ‖ØZxqZ ‡ivUvix k`vdU†K ‡Nviv†b‖i Rb` Uv†ii P.T.O. (Power Take Off) Gi m†½
GK‖U k`vd†Ui g‖a`†g ‡ivUvix cvD†qi ‖Mqvi e·†K msh† Ki†Z nq| N†b M‖Z Uv†ii
‖c.‖U.I. n†Z ‖Mqvi e†· Av†m Ges GK‖U k`vdU†K ‡Nvivq| Gi m†M ‡PB†bi m‖nv†h` g†
KIY Ask‖U†K ‡Nviv†b‖i nq|

g‖U†K Av†j‖oZ Kivi c‖igvY ‖bfi K†i KvUvi MfxiZv, ‡ivUvixi N†bi c‖igvY, te†Wi
AvK‖i , g‖Ui cK‖i I Ae⁻vi Dci| G‖U 70 -500 ‡m.‖g. ck⁻ n†q _v†K| k`vdU hZ eo
n†e ZZ te‖k k‖³i c†qvRb n†e| te†Wi ,bmZ g‖bi Ici ‖bfi Ki†e KZ‖`b teW‖U†K
e`envi Kiv hv†e|

‡ivUvix cvD†qi carb Ask,†jv

‡ivUvix cvD†qi carb
Ask,†jv - UvBb ev K‖b
djK, k`vdU, Uv†gkb
†Km, ej ‖eq‖is, I†qj
‖mj, ‡cQ†bi P‖K‖, ‖Mqvi
e·, XvKbv|

UvBb ev K‖b djK - G‖U ‖`†q g‖U KvUv nq| KIY dj†Ki th cvš aviv†jv ‡mB cvš ‖`†q
g‖U†K KvUv I ,ov Kiv nq|

k`vdU- G `†ûi P‖ic†K K‖b djK,†jv b‖U-†evë ‖`†q AvUK‖bv \_v†K| djKmn k`vdU
N†bi g‖a`†g g‖U†K Kv†U| k`vd†Ui Dfq cvš ej ‖eq‖is Gi Dci Uv†gkb ‡K†m ‖vcb
Kiv nq|

Uv†gkb ‡Km- G Ave× ‡K†m Uv†gkb ‡Z†ji g†a` ‡PBb I ‡úv†KU _v†K| ‖Mqvi e· n†Z
N†b M‖Z ‡PBb I ‡úv†K†Ui m‖nv†h` ‡ivUvix k`vd†U ‡ci†qv|

ej ‖eq‖is- k`vd†Ui `†cv†š `†v ej ‖eq‖is Gi Ici e†m _v†K| G‖U P†Ii mgq AbeiZ
‡Nviv†Z _v†K|

I†qj ‖mj- Uv†gkb ‡K†mi ‖b†Pi ‖`†K ‡ivUvix k`vdU‖U ‡fZ†i ‡XvK‖bv nq| ZvB Uv†gkb
†Km ‡_†K Uv†gkb ‡Zj hv†Z P‡v†Z bv cv†i ‡mRb` k`vdU ‡XvK‖bv ‖Q` c_ I†qj ‖mj
‖`†q fvj fv†e eÜ K†i ‡`qv nq|

†cQ†bi P‖K‖- ‡cQ†bi P‖K‖K Ici ‖b†P I‖vbgv K‖i†q P†Ii MfxiZv ‖bqš Y Kiv nq|
A†bK mgq P‖K‖i e`†j Kv`vi Ici ‖cQ†j P‖vi Rb` `†v†k ‡d‖U e`envi Kiv nq|
G†¶†I G‖U†K I‖vbgv Kiv†b‖i g‖a`†g P†Ii MfxiZv evov†bv ev Kg†bv hvq|

K_UL.I c jx Dbqb $\overline{q}$

«Mqvi e - - «Mqvi e† · i gva³g «c.«U. I. n†Z NŸb M_UZ †ivUvix k³vd†U $\overline{v}$ bvš_iZ nq|

XvKb_v- P†Ii mgq djK «³q «b«³ŸB g«U†K AvU†K †i†L «b†P co†Z eva³ K†i |

†k«Yief_vM

†ivUvix cvD cavbZ $\overline{q}$ cKvi n†q $\overline{v}$ †K- †K³ P_UjZ (Centre drive type) / cvk P_UjZ (Side drive type)

UvŸ_Ugkb †K_UU †ivUvix
†K†³ ms†h_URZ $\overline{v}$ †K|

1| †K³ P_UjZ †ivUvix - G ai†bi †ivUvix cvD†q UvŸ_Ugkb †K_UU †ivUvix †K†³ ms†h_URZ $\overline{v}$ †K| d†j Uv±i ev cvIqvi «Ujvi † $\overline{v}$ †K AvMZ k_U³ †ivUvixi †K³ n†Z Dfq cv†k mÂ_UjZ nq| «PÎ 4.14 G †K³ P_UjZ †ivUvix cvD † $\overline{v}$ Lv†bv n†q†Q| Uv±i n†Z †ivUvix k³vd†Ui M_UZ mÂ_Uj†bi c $\overline{v}$ Zxi «PŸ³ «³q † $\overline{v}$ Lv†bv n†q†Q|

«PÎ 4.14 Uv±imn †K³ P_UjZ †ivUvix (Ici † $\overline{v}$ †K † $\overline{v}$ Lv)



G ai†bi †ivUvix cvD†qi m_Uea_v n†jv c†qvRb Ab_U†i Dfq cv†k A_UZi³ k³vdU I Klb djK ms†h_UM K†i †ivUvixi $\overline{v}$ N³ evov†bv hvq| Am_Uea_vi g†a³ i†q†Q †ivUvixi †K†³ P†Ii MfxiZv Kg nq Ges k³ g_UU†Z G ai†bi †ivUvix e³envi Dc†h_UMx bq|

UvŸ_Ugkb †K_UU †ivUvixi
GKcv†k $\overline{v}$ †K|

2| cvkP_UjZ †ivUvix- G cKv†ii †ivUvix cvD†q UvŸ_Ugkb †K_UU †ivUvixi GKcv†k $\overline{v}$ †K| Uv±i ev cvIqvi «Ujv†ii k_U³ GK cvk «³q †ivUvix k³vd†U mÂ_UjZ nq| «PÎ 4.15 G

cvkPwjZ tivUvix cvD t`Lv#bv n#q#Q| Zxi wPy w`#q k³ mAvj#bi MvZ c_ w#b`k Kiv
n#q#Q|

PI 4.15 Uv±imn cvk PwjZ tivUvix (Ici t_#K t`Lv)



G cKv#ii tivUvix w`#q KIZ Rv#Z tivUvixi ^`N" eivei P#li MfvZv mgvb _v#K| Gi
Mvb k³ I gReZ|

Klb dj#Ki web`vm

k`vd#Ui Ici Klb dj#Ki
web`vm I Klb dj#Ki
ev#bv AMfv#Mi w`K
c#ieZb K#i tivUvix
jv#ji e`envi#K eûg#
Kiv hvq|

we#klfv#e ev#bv Klb djK, #jv tivUvix k`vd#Ui Dci PµvKv#i web` K#i bvU-#evë
w`#q AwUKv#bv \_v#K| k`vd#Ui Ici Klb dj#Ki web`vm I Klb dj#Ki ev#bv AMfv#Mi
w`K c#ieZb K#i tivUvix jv#ji e`envi#K eûg# Kiv hvq|

wb#Pi K bs PÎv#q Klb djK, #jv web` K#i Rv Pvl Ki#j KIZ Rvgi Dc#fvM
mgZj n#e| mvaviYfv#e Rv ^Zii Rb" Klb djK, #jv Gfv#eB web` Kiv nq|

L bs PÎv#q web` Kiv n#j tivUvix cvD#qi gvSLvb eivei Avj (Ridge) ^Zii nq| Dëz
#eW ^Zii Rb" G web`vm Dc#hvMx|

M bs PÎv#q mvr#j I Avj (Ridge) ^Zii nq| Z#e G t#Î tivUvixi gvSLvb eivei
Lv#i m#ó nq Ges `ÿcv#Š `ÿv Av#ji Aavsk ^Zii nq|

wb#Pi N bs PÎ c`kZ web`vm Ab#q mviexfv#e Pvl Kiv dm#ji `ÿm#ii gvSLv#b
AŠteZxKvxb Pvl t`qv hvq|

K_uL.I c jx Dbqb ⁻q̇

¶PÎ 4.16 G †ivUvix cvD†qi Klb dj†Ki ¶ebfb cKvi ¶ebvm †`Lv†bv n†jv|

¶PÎ 4.16 †ivUvix cvD†qi Klb dj†Ki ¶ebvm



Abjajbx t ms†¶†c GK_uU †ivUvix cvD†qi KvhcYw j ¶jLb|

†ivUvix jv½j e`env†i mjeav I Amjeav

mjeav

1□ Kv`vgwU A\_ev cwb R†g \_vKv R†g†Z Pv†Ii Rb` †ivUvixB me†P†q KvKix
k_u³ Pw jZ Klb hš|

2□ mgKvh¶gZv mšúb †gv†evW ev ¶W` cvD†qi Z†bq †ivUvix cvD Uvb†Z
Kg k_u³ i c†qvRb nq|

3□ R†g†Z Avj (Ridge) ev Lv` ^Z¶i i Rb` GwU Dc†hwMx|

4□ †gv†evW ev ¶W` cvD ¶†q R†g†Z cv\_¶gK Pvl †`qvi ci gwUi eo eo
†Xjv†K †fs†M Py¶ePy Kivi Rb` †ivUvix cvD e`eüZ nq| G†¶†Î GwU ¶ØZxq
chv†qi KIY hš ¶n†m†e ¶e†e¶PZ nq|

5□ ¶eklfv†e ¶eb` K†i m¶iex fv†e Pvl Kiv dm†ji `¶m¶i i gvSLv†b
AšteZxKvxb Pvl †`qv hvq|

Amjeav

1□ tivUvix cvD KllZ gllU#K Dëv#Z cv#i bv|ZvB i@ cllZZ Rlg#Z tivUvix ll#q
cv_lgK Pvl t`qv DllPZ bq| KviY G#Z AvMvQv, AveRbv BZ`vll` ctP ^Re mvi
nevi cllie#Z illK#q hvq|

2□ tivUvix cvD#qi iYv#eY LiP telk| KviY G#Z l#qjllmj, ejllqllis mgq
mgq cvëv#Z nq Ges UvYllgkb tK#m llbqllgZ tZj mshvM Ki#Z nq|



migg t tivUvix cvD kll³ PlljZ Klbhš| avb Pvl#li Rb" GllU Lp Dc#hvm| tivUvix cvD
cavbZ `jail#bi n#q \_v#K| Klb dj#Ki web`v#mi Dci llfllË K#i tivUvix cvD
llwfb ail#bi Kv#R eëüZ n#q _v#K| tivUvix cvD e`env#ii cavb Amvav n#jv
GllU KllZ gllU#K Dëv#Z cv#i bv Ges Gi iYv#eY LiP telk|



cvWĒi gf'vqb 4.3

mVK DĒi i c#k UK (√) Pý 'b|

1. mVK DĒi tKvbU ?

K. k³ cv_{igq}, kKoh⁹ g_{U#Z} cv_{igK} P_{li} Rb[~] t_{ivUvix} cvD Dc_{hV}Mx
 L. K_vvg_{U#Z} L_{gB} K_{vhKix} e_j a_{vb} P_{li} t_{ivUvix} cvD Dc_{hV}Mx
 M. GK_U A_bg_Ug_K `Ũi M_vq A_bK, t_{jv} W⁻ ev P_{vK}z j_{vMv}b_v _v_qK
 N. t_{ivUvix} cvD_K U_vi 'q iay_{U#b} b_q #M_jB P_{li} m_úb nq|

2. b_{pi} tKvbU t_{ivUvix} cvD_{ti} Ask bq ?

K. ej weq_{is} I M_{qvi} e.
 L. k_vdU
 M. U_vY_{gkb} t_{Km}
 N. t_{iv}c_{vi}|

3. t_{ivUvix} cvD cavbZ K_{ai}b_i ?

K. GK_g I Ũ_g
 L. t_{nv} U_vBc I ŨLÓ A_{vK}z_i
 M. t_K`P_vj_z I cv_{kP}j_z
 N. g_{vD}UW I t_mg_vD_{UW}

4. b_{pi} tKvbU mVK bq ?

K. t_{ivUvix} cvD_K U_vi 'q #N_{iv}z_{nq}
 L. mg_{Kvh}g_z m_úb Ab[~] j_vz_j i Z_{zbvq} t_{ivUvix} U_vb_z Kg k³ i c_qv_{Rb} nq
 M. KIY d_jz_{Ki} eb[~]v_{mi} g_{va}g_{Avj} ev L_v ^Z_{vi} K_{iv} h_{vq}
 N. t_{ivUvix} cvD K_{IZ} g_Uz_K D_ě t_q

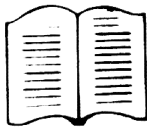
cV 4.4 W̄ n̄v̄iv, úBK Uz n̄v̄iv Ges W̄cs Uz n̄v̄ivi weeiY I KvhcYwj

G cV tk†I Avcb —



- wefb cKvi W̄ n̄v̄ivi big ej†Z cvi†eb|
- wefb cKvi W̄ n̄v̄ivi KvhcYwj jL†Z cvi†eb|
- wefb cKvi W̄ n̄v̄ivi cigvc ej†Z cvi†eb|
- úBKUz n̄v̄ivi weeiY jL†Z cvi†eb|
- úsUz n̄v̄ivi weeiY jL†Z cvi†eb|

W̄ n̄v̄iv



W̄ n̄v̄iv mvariYZ gwU fv̄zv , ,ov Kiv, AvMvQv bqšb Kiv I KIZ Rigi DcivfVM tgvUvgv mgZj K†i exR ec†bi Dchy Kivi Kv†R ēeüz nq| h̄ I GU GKU ØZxq chv†qi Klbhš Z†e tKvb tKvb big gwU†Z cv_wgK Klbhš n†m†eI ēeüz n†q _v†K| GU†Z GKU k̄vd†U A†bK,†jv W̄ jvMv†bv _v†K| W̄,†jvmn G†KKU k̄vdU†K M̄vs e†j| GKU W̄ n̄v̄iv†Z GK ev GKwaK M̄vs _vK†Z cv†i|

W̄ n̄v̄iv wefb cKvi n†Z cv†i| thgb -

K) m†½j GKUs

L) tUb†Wg

M) Ad†mU

wb† PÎ 4.17 G wefb cKvi W̄ n̄v̄iv t̄ Lv†bv nj|

W̄ n̄v̄iv mvariYZ gwU
fv̄zv , ,ov Kiv, AvMvQv
bqšb Kiv I KIZ Rigi
DcivfVM tgvUvgv mgZj
K†i exR ec†bi Dchy
Kivi Kv†R ēeüz nq|

PÎ 4.17 wefb cKvi W̄ n̄v̄i

m†½j GKUs W̄ n̄v̄iv

GKU ev `†v W̄ M̄vs
_v†K| Gi ēenvi Kg|

GU†Z GKU ev `†v W̄ M̄vs _v†K| KvR Kivi mgq gwU ev AveRbv evB†ii w̄†K t†j
t̄q| d†j `†v M̄vs Gi gv†S Lv†i m†p nq| Kl†bi ci Rigi DcivfVM DpzbPznq| Gi
ēenvi Kg|

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Uz n'viv

Pviv jvMvbi AvM GU
 dlbks hš nmte Ges
 Quq tev exRk Xvvi
 Rb" e"üz nq _vK|
 AbK mgq Pviv MRvbi
 ci Ges eocvZi ci
 Icii gUi k³ Av iYK
 fvzi Rb" I AvMv `gb
 Kivi Rb" e"üz nq|

GK Uz n'viv ejv nq| KviY Gi gU AvjwoZ Kivi `vZ, t jv t`LZ Uz ev
 Kivi gZ| GK WvM n'vivI ejv nq| KlYi ci gUi tXjv t f½, ov Kiv, AvMvQv
 Ivbv I GKÎZ Kiv, Icii gUk mgZj, gmb I AvUvU (Compact) Kivi Rb" e"üz
 nq| Pviv jvMvbi AvM GU dlbks hš nmte Ges Quq tev exRk Xvvi Rb" e"üz
 nq _vK| AbK mgq Pviv MRvbi ci Ges eocvZi ci Icii gUi k³ Av iYK
 fvzi Rb" I AvMv `gb Kivi Rb" e"üz nq| GU 5 tm.ig. Mfxi chš gUk AvjwoZ
 KiZ cvi| GZ GKwaK tmKkb cvkvc k hy Kiv hvq| mvaviYZ GKkU tmKkb 1-2
 gUvi ck nq Ges 25-35U Uz n'viv

PÎ 4.19 Uz n'viv



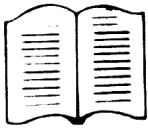
Abjbx t W n'viv, Uz n'viv I us Uz n'viv -Gi gta" KvMZ cv_K" jceX
 Kib|

us Uz n'viv

GU Uz n'viv gZ
 KvR K i Ges mvaviYZ
 exRjv Zii Rb" e"üz
 nq| c e KIZ gUz mxW
 Wxj e"envii c e gUk
 AvjMv Kivi Rb" I e"üz
 nq|

GU Uz n'viv gZ KvR K i Ges mvaviYZ exRjv Zii Rb" e"üz nq| Gi
 djK, jv (Tyne) mvaviYZ jckvi nq _vK- jdU vBc I tUBjs vBc| jdU vBc
 mvaviYZ v i PwjZ nq _vK Ges KvRi tk I Rv t _vK mivbi mgq v i `q DPZk i
 vbq Avm hvq| G RvZq n'viv GK t _vK ZbU tmKkb _vKZ cvi| ciZU tmKkb 90
 tm.ig. chš ck nq _vK| tUBjs vBc n'vivK mvaviYZ tUb vbq hvIqv nq Ges
 Ic i Ivbv hvq bv| G RvZq n'viv `ycv k `t v ivb i i (Runner) Dci fi K i P j|
 cs Uz n'viv mvaviYZ Avv jv, cv i hy gU I eo AvMvQv hy gUz Ges DPZbPz
 RvZ e"envi Dc hvMx| c e KIZ gUz mxW Wxj e"envii c e gUk AvjMv Kivi
 Rb" I e"üz nq|

ı̇Pî 4.20 ı̇ús Uz n̂ı̇ıv



mvigg t ı̇Ŵ c n̂ı̇ıv mvaviYZ Rı̇gi DĉııfvM mgZj K̂ıı exR eĉıbi Dchŷ KîıZ êeüZ
nq| ı̇úvBK Uz n̂ı̇ıv Pı̇ıv jı̇Mv̂ııvı ĉıe ı̇dı̇ıks ĥı ı̇n̂ı̇ıe Ges ı̇Qı̇Uı̇q ı̇cı̇ıvı
exR̂ıK Xı̇Kı̇ıvı Kı̇ıR êeüZ nq| ı̇ús Uz n̂ı̇ıv ı̇úvBK Uz n̂ı̇ıvı gZB Kı̇ıR K̂ıı|
Gı̇U mvaviYZ exRZjı̇ ^Zı̇ıı Kı̇ıR êeüZ nq|



cvWĖi gj`qb 4.4

mVK DĖi i cvk UK (√) Pý b|

1. bPi †KvbU W̄ n`viv cKvif` bq ?

K. ūBK Uz

L. AdmU

M. †UbWg

N. m½j GKUs

2. bPi †KvbU mVK bq ?

K. †UbWg W̄ n`viv `†q PvIKZ.Rgi Dc i fvM mgZj _v†K

L. AdmU W̄ n`viv `†q Uv±i i GK cvk †_†K Mv†Qi bP chš Pvl Kiv hvq

M. W̄ n`viv GKU cv_gK KIY hš

N. m½j GKUs W̄ n`viv `†q Pvli ci Rgi Dc i fvM DžbPznq

3. bPi †KvbU ūBK Uz n`viv I ūsUz n`viv ††† c†hvR` bq ?

K. ūBK Uz n`viv†Z djK,†jv Kvi gZ

L. ūs Uz n`viv† djK,†jv ev†bv

M. G,†jv gviUi †Xjv fv½v, AvMvQv `gb I Ic†i i gvU†K gmY Kiv Rb` e`eüZ nq

N. Uv±i i P.T.O. †_†K NŸb k³ i mrv†h` G,†jv†K Pj bv Kiv nq

e'enwiK

cV 4.5 ǂ`kx jv½j, DbZ ǂ`kx jv½j, tgvǂteW cVD I Wǂ cVDǂqi gvV
chvǂq KvHKixZv chteǂY

G cV ǂkǂI Avcǂb —



- ǂ`kx jv½j, DbZ ǂ`kx jv½j i gvV chvǂq KvHKixZv chteǂY KiǂZ cviǂeb
- kǂ³ PǂjZ tgvǂteW cVDǂqi weǂfb Ask, ǂjv mbv³ KiǂZ cviǂeb
- tgvǂteW cVDǂqi mǂBR I KvHKix gvV ǂgZv ǂbYq KiǂZ cviǂeb
- Wǂ cVDǂqi weǂfb Ask, ǂjv mbv³ KiǂZ cviǂeb
- Wǂ cVDǂqi KvHKix gvV ǂgZv ǂbYq KiǂZ cviǂeb |

ǂ`kx jv½j I DbZ ǂ`kx jv½j t

gvV chvǂq KvR Kivi mgq ǂbǂi QK cǂY Kiǂb|

PvI msLǂv	AbyǂgǂKi mǂǂ _— Cǂki mǂ ǂKǂY, ǂWMx	PǂIi MǂxiZv ǂm.ǂg.	ckǂZv, ǂm.ǂg.	NǂUǂ cǂZ Rǂg PǂIi cǂigǂY, ǂnǂi
1				
2				
3				

tgvǂteW cVD

- 1□ kǂ³ PǂjZ GKǂU tgvǂteW cVDǂqi weǂfb Ask, ǂjv mbv³ Kiǂb|
- 2□ PǂIi mgq gvU Dǂvǂbvi cKǂZ I mǂ Lvǂ`i (Furrow) AvKǂZ chteǂY
Kiǂb|
- 3□ tgvǂteW cVDǂqi mǂBR ǂgǂc tei Kiǂb|
- 4□ PǂIi mgq KIǂYi MǂxiZv I ckǂZv, cǂZ NǂUǂq PǂIKZ.Rǂgi cǂigǂv
(KvHKix gvV ǂgZv) ǂnǂi tei Kiǂb| (Bǂ½Zt PǂIKZ.Rǂgi cǂigǂY ÷ PǂIi
mgq)

Wǂ cVD

- 1□ kǂ³ PǂjZ GKǂU Wǂ cVDǂqi weǂfb Ask, ǂjv mbv³ Kiǂb|
- 2□ Wǂǂ`i eǂvm I ǂKǂ` AeZǂji cǂigǂY ǂgǂc tei Kiǂb|
- 3□ Wǂ ǂKǂY I ǂUǂ ǂKǂY ǂgǂc tei Kiǂb|
- 4□ PǂIi mgq Lvǂ`i (Furrow) ckǂZv tei Kiǂb|
- 5□ cǂZ NǂUǂq PǂIKZ.Rǂgi cǂigǂY ǂnǂi tei Kiǂb|

cV 4.6 tivUvix cVD I W⁻ n`v`ivi wefb Ask mbv³ KiY I gvV chv`q KvHKwiZv ch`eY

G cV tk`I AvCib —



- tivUvix cVDtqi wefb Ask, jv mbv³ KiZ cvi`eb|
- tivUvix cVDtqi KvHKwiZv ch`eY KiZ cvi`eb|
- W⁻ n`v`ivi wefb Ask mbv³ KiZ cvi`eb|
- W⁻ n`v`ivi cKvif`, M`vs msL`v, W<sup>-</sup> msL`v ch`eY KiZ cvi`eb|
- W⁻ n`v`ivi KvHKwiZv ch`eY I KvHKix gvV gZv byq KiZ cvi`eb|

tivUvix cVD

- K) tivUvix cVDtqi ck⁻Zv, Ub`bi msL`v I AvKwZ. ch`eY Ki`i jw`cex Ki`b|
- L) Pv`li MfxiZv I Pv`li cKwZ. ch`eY Ki`b|
- M) KvHKix gvV gZv tn`i/NvUvq byq Ki`b|

W⁻ n`v`iv

- K) GKwU W⁻ n`v`iv ch`eY Ki`i tmwU tKvb cKv`ii Zv mbv<sup>3</sup> Ki`b|
- L) M`vs msL`v, W⁻ i msL`v I G`i ck⁻Zv byq Ki`b|
- M) cWZ NvUvq PvIKZ. Rgi ci`igvY (KvHKix gvV gZv) tn`i tei Ki`b|



Povš gj'vqb BD₁bU 4

iPbv_gjK ck

- 1| $\dot{t}^k k j^{1/2} j i \hat{e} k \acute{o}'' , \dot{t} j v e Y b v K i \# b |$
- 2| $G K \# U \dot{t}^k k j^{1/2} j I c i P \# j Z D b Z \dot{t} g v \dot{t} \# e v W j^{1/2} j i Z \# b v g j K A v \# j v P b v K i \# b |$
- 3| $m s \acute{A} v \# j L \# t j^{1/2} j i W d U , \dot{t} \overline{u} \# m d K W d U , W e v i n m c v I q v i I g v V \# g Z v |$
- 4| $G K \# U 2 e U g 20 \dot{t} m . \# g . \dot{t} g v \dot{t} \# e v W c v D \# \dot{t} q R \# g P v I K i v i m g q G \# U 5 \# K . \# g . / N \# U v M \# Z \# Z P v j b v K i v n \# Q | h \# \dot{t} g v \# \# g Z v 70 \% n q Z \# e c v D \# U i K v h K i x g v V \# g Z v \# b Y q K i \# b |$

$$[B^{1/2} Z t G L v \# b , c v D \# U i c k \overline{Z} v , w = 2 \times 20 = 40 \dot{t} m . \# g . = 0.40 \# g U v i$$

$$M \# Z \# e M , s = 5 \# K . \# g . / N \# U v$$

$$g v V \# \# g Z v , e = 70 \%$$

GLb c_vW-4.1 G $\dot{t}^k q v K v h K i x g v V \# g Z v i m \# b v g j K Z v \# b Y q K i \# b |$

- 5| $\# P \hat{I} m n G K \# U k v \# P \# j Z \dot{t} g v \dot{t} \# e v W c v D \dot{t} q i \# e v f b A s \# k i K v R e Y b v K i \# b |$
- 6| $U x K v \# j L \# t K . \dot{t} K v \# v i ,$
 $L . \# W \overline{c} c v D \dot{t} q i \dot{t} k \# Y \# e f v M ,$
 $M . \# W \overline{c} \dot{t} K v Y I \# U \# \dot{t} K v Y |$
- 7| $\dot{t} i v U v i x c v D \dot{t} q i m \# e a v , A m \# e a v , \dot{t} j v e Y b v K i \# b |$
- 8| $\# P \hat{I} m n \# e v f b c K v i \# W \overline{c} n \# v \dot{t} i v i e Y b v \# \# b |$



m₁VK D_Ėi BD₁bU 4

c_vt_vW_Ėi gj'vqb - 4.1 t 1) N, 2) M, 3) M, 4) N |

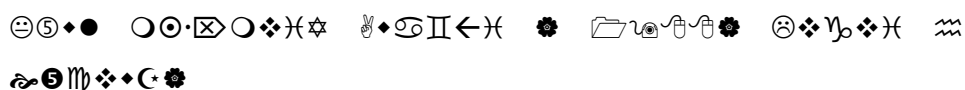
c_vt_vW_Ėi g j'vqb - 4.2 t 1) L, 2) M, 3) N, 4) M, 5) L |

c_vt_vW_Ėi g j'vqb - 4.3 t 1) L, 2) N, 3) M, 4) N |

c_vt_vW_Ėi g j'vqb - 4.4 t 1) K, 2) M, 3) N |

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BDwBU 1
†ivcY, AvštcwIPhv I
km" i¶vKviX miÄvg I
hšcwZ

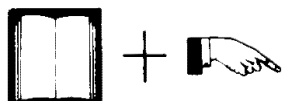
BD_WU 5 †ivcY, Avštc_WiPh_v I km[”] i¶_vKvix miÄvg I hšc_WZ

G BD**ḡ**U me**ḡ**gvU m**ḡ**Z**ḡ**U c**ḡ**V i**ḡ**q**ḡ**Q h**ḡ**vi g**ḡ**ta' t**ḡ**k**ḡ**l**ḡ**i **ḡ**Z**ḡ**b**ḡ**U c**ḡ**V e'en**ḡ**ḡ**ḡ**iK m**ḡ**á**ḡ**KZ| k**ḡ**m**ḡ**i
exR ec**ḡ**b, Pr**ḡ**iv t**ḡ**ivc**ḡ**Y, Pr**ḡ**iv MR**ḡ**i**ḡ**b**ḡ**i c**ḡ**ieZ**ḡ** c**ḡ**ḡ**ḡ**iPh**ḡ** A**ḡ**_r A**ḡ**M**ḡ**Q**ḡ** `gb Ges **ḡ**ḡ**ḡ**Z**ḡ**K**ḡ**i**ḡ**K K**ḡ**xU-
cZ**ḡ**ḡ**ḡ**i n**ḡ**Z t**ḡ**_k**ḡ** dm**ḡ**j**ḡ**k I **ḡ**ḡ**ḡ**V**ḡ**k**ḡ**i' t**ḡ**h mg**ḡ** hš**ḡ**c**ḡ**mZ e'eüZ n**ḡ**q t**ḡ**m, **ḡ**j**ḡ**v m**ḡ**á**ḡ**k A**ḡ**v**ḡ**j**ḡ**vK**ḡ**c**ḡ**Z
K**ḡ**iv n**ḡ**q**ḡ**Q G BD**ḡ**b**ḡ**U**ḡ**U**ḡ**Z| BD**ḡ**ḡ**ḡ**U**ḡ**i c**ḡ**_g c**ḡ**v**ḡ**V m**ḡ**x**ḡ**W**ḡ**W**ḡ**j I a**ḡ**v**ḡ**b**ḡ**i Pr**ḡ**iv t**ḡ**ivc**ḡ**Y hš**ḡ** m**ḡ**á**ḡ**k
A**ḡ**v**ḡ**j**ḡ**P**ḡ**b**ḡ** K**ḡ**iv n**ḡ**q**ḡ**Q| **ḡ**ḡ**ḡ**Z**ḡ**x**ḡ** c**ḡ**v**ḡ**V A**ḡ**v**ḡ**j**ḡ**vK**ḡ**c**ḡ**Z K**ḡ**iv n**ḡ**q**ḡ**Q m**ḡ**vi **ḡ**ḡ**ḡ**U**ḡ**v**ḡ**b**ḡ** hš**ḡ** m**ḡ**á**ḡ**k | ZZ**ḡ**x**ḡ**
c**ḡ**v**ḡ**V i**ḡ**q**ḡ**Q H**ḡ**iZ**ḡ**n**ḡ**M**ḡ**Z I A**ḡ**v**ḡ**b**ḡ**k **ḡ**ḡ**ḡ**ov**ḡ**b**ḡ** hš**ḡ**, **ḡ**j**ḡ**vi **ḡ**ḡḡ**ḡ**iY| P**ḡ**ZZ c**ḡ**v**ḡ**V A**ḡ**v**ḡ**j**ḡ**P**ḡ**b**ḡ** K**ḡ**iv n**ḡ**q**ḡ**Q
n**ḡ** I k**ḡ**ḡ³ P**ḡ**ḡ**ḡ**iZ t**ḡ**_ú**ḡ**q**ḡ**vi m**ḡ**á**ḡ**k|

$c\hat{A}g, l\hat{o} \mid m\beta g \text{ c}\nu V \text{ e}^{\prime}en_{\parallel}iK \text{ w}elqK \mid c\hat{A}g \text{ c}\nu V \text{ m}\lambda W \text{ W}\hat{w}ji \text{ g}\nu V \text{ ch}\nu q \text{ c}\nu iP\nu jbv \mid l \text{ ex}^{\prime}Ri$
 $m_{\parallel}VK \text{ c}\nu i gY \text{ w}bi^{\ast}cb \text{ m}\mu\nu\check{s} \mid l\hat{o} \text{ c}\nu V \text{ i}^{\ast}q^{\ast}Q \text{ R}\nu c\nu bR \text{ i}\nu Bm \text{ DBW}\hat{w}ii \text{ g}\nu V \text{ ch}\nu q \text{ c}\nu iP\nu jbv$
 $\mid K\nu hK\hat{w}iZ\nu \text{ ch}\epsilon\eta Y \mid m\beta g \text{ c}\nu V \text{ n}^{-} \text{ P}\nu jZ \text{ b}^{\ast}\nu c m^{\ast}\nu K \text{ t}^{\ast}\acute{u}q\nu i \text{ ch}\epsilon\eta Y \mid c\nu iP\nu jbv$
 $m\mu\nu KZ \mid$

cvV 5.1 *m_xW_WW_j | a_v†b_i P_vi_v †i_vc_Y hš*

$G_{cV} \neq 0$ / $A_{cV} = 0$ —



- $mxWwWj\ KZK.KiYxq\ hW\ S\ K\ V\ R, \dagger j\ v\ e\ j\ Z\ c\ v\ i\ \dagger\ e\ b\ |$
- $mxWwW\dagger j\ i\ \mathbb{W}\mathbb{E}\mathbb{F}\mathbb{B}\ A\mathbb{S}\dagger k\mathbb{i}\ b\mathbb{V}\mathbb{G}\ I\ Z\mathbb{V}\dagger\mathbb{I}\ K\mathbb{V}\mathbb{R}\ \mathbb{W}\mathbb{J}\mathbb{L}\dagger Z\ c\mathbb{V}\mathbb{i}\dagger\mathbb{E}\mathbb{B}\ |$
- $mxWwW\dagger j\ i\ m\mathbb{V}\mathbb{B}\mathbb{R}\ e\mathbb{j}\dagger Z\ c\mathbb{V}\mathbb{i}\dagger\mathbb{E}\mathbb{B}\ |$
- $mxWwW\dagger j\ i\ K\mathbb{V}\mathbb{W}\mathbb{J}\dagger\mathbb{E}\mathbb{K}\mathbb{B}\ c\times\mathbb{Z}\ \mathbb{W}\mathbb{J}\mathbb{L}\dagger Z\ c\mathbb{V}\mathbb{i}\dagger\mathbb{E}\mathbb{B}\ |$
- $g\mathbb{V}\mathbb{B}\mathbb{Y}\ P\mathbb{W}\mathbb{J}\ Z\ G\mathbb{K}\mathbb{U}\ a\mathbb{V}\dagger\mathbb{B}\mathbb{i}\ P\mathbb{V}\mathbb{i}\mathbb{V}\ \mathbb{V}\mathbb{i}\mathbb{V}\mathbb{C}\mathbb{Y}\ h\mathbb{S}\mathbb{i}\ \mathbb{W}\mathbb{E}\mathbb{F}\mathbb{B}\ A\mathbb{S}\dagger k\mathbb{i}\ b\mathbb{V}\mathbb{G}\ I\ h\mathbb{S}\mathbb{U}\mathbb{i}\ K\mathbb{V}\mathbb{H}\mathbb{C}\times\mathbb{Z}\ \mathbb{W}\mathbb{J}\mathbb{L}\dagger Z\ c\mathbb{V}\mathbb{i}\dagger\mathbb{E}\mathbb{B}\ |$

 $m \times W \times W \times j$

G h†šī mṽnṽh" mṽVK
cīigY exR mṽVK MfxZvq
ecb Kiv hṽq| GṽU exR
ecb QvovI gṽU†K
Av†jvṽoZ I`p K†i|

GiiU GKiiU exR ecb Kivi hš| Gi gva"tg avb, ciU, Mg, miilv, ewij, fÆv BZ"vi` exR mwiex fvte RiigZ ecb Kiv hvq| exRi cKvi f††` weifb ai†bi mxiWij ev exR ecb hš e"eüz ntq _v†K| G h†ši mvinv"th" mivK ciigvY exR mivK MfxiZvq ecb Kiv hvq| GiiU exR ecb QvovI gwiU†K Av†jvwoZ I `p K†i| GiiU ecbKZ.exR†K †X†K †`q Ges gwiU†K GKUZD†K†i iv†L| A†bK mgq exR ec†bi mv†_ mv†_ c†qvRbxq mviI c†qvM Kiv nq|Gijc hš†K mvi-exR ecb hš e†j| »PÎ 5.1G Zv †`Lv†bv nj|

GKwU exR ecb hš†K (exR wQUv†bv hš e“ZxZ) wba w jwLZ hwšK KwR, †jv mawúb Ki†Z nq|

- 10 $m\backslash K Mf_{\times}iZ\eta\ e\backslash R\ ec\sharp bi\ Rb''\ L_v\` (furrow)\hat{Z}w\ i\ Kiv|$
20 $\backslash K\ n\sharp i\ e\backslash R\ g\backslash U\sharp Z\ co\sharp e\ Z_v\ \backslash\backslash ba\ i\ Y\ Kiv|$
30 $m\phi\ L_v\` M\backslash Y\sharp h\backslash m''\ \backslash eb\`v\sharp m\ e\backslash R\ \`vc\ b\ Kiv|$
40 $e\backslash R\sharp K\ g\backslash U\ \` \sharp q\ \sharp X\sharp K\ \sharp\`q\ \backslash Ges\ c\sharp q\backslash Rb\ Ab\backslash q\backslash x\ e\backslash R\ i\ P\backslash i\ c\backslash v\sharp ki\ g\backslash U\sharp K\ Au\backslash m\backslash U$
(compact) $Kiv|$

$K_{\ell} L \ell c j_X D b q b^{-} \bar{q}$

$\mathbb{P}\hat{I} \ 5.1 \ m a \mathbb{U} \dot{S} Z \ m \nu i - e_X R \ e c b \ h \dot{S}$



$\mathbb{P}\hat{I} \ 5.2 \ G \ G K \mathbb{U} \ m i j \ e_X R \ e c b \ h \dot{S} i \ \mathbb{U} e \mathbb{U} f b \ A s k \ \dagger \ ` \ L \nu \dot{b} \nu \ n \dot{q} \dot{q} |$

$\mathbb{P}\hat{I} \ 5.2 \ G K \mathbb{U} \ m i j \ e_X R \ e c b \ h \dot{S} i \ \mathbb{U} e \mathbb{U} f b \ A s \dot{k} i \ A e^{-} \nu b$
 $G e \nu i \ Z \nu n \dot{q} j \ R \nu b \nu \ h \nu K \ K_X \ K_X \ A s k \ \mathbb{U} b \dot{q} \ m_X W \mathbb{U} W j \ M \mathbb{U} V Z \ G e s \ G \ A s k \ , \ \dot{q} j \nu i \ K \nu R \ K_X |$

$n c \nu i - G \mathbb{U} \ e_X R \ a \nu i K \ c \nu \hat{I} | \ t h \ e_X R \ e c b \ K i \dot{q} Z \ n \dot{q} e \ Z \nu \ G L \nu \dot{q} b \ R g \nu \ i \nu L \nu \ n q |$
 $B D \mathbb{U} b U \ 5$

ciz tn±i RigtZ K cigvY
exR tadjZ nte Zv wqšY
Kti|

mW wUwis BDibU- Gi mwnth" exR ec±bi nvi wqšY Kiv nq A_vr ciz tn±i RigtZ K
cigvY exR tadjZ nte Zv wqšY Kti| exRi AvKvi-AvKzi Ici wfi Kti wefb
aitbi wUwis BDibU e"eüZ nq thgbt tmj UvBc, tivj UvBc, LvBhy tivjvi UvBc, "i
Q` GvRtUUi UvBc, evqrc hy wUwis BZ" |

mW uDe- G uDei ga" w`q ncvi t\_K exR wUwis BDibUi mwnth" Lv` (furrow)
wcz nq|

exR, tju mwiZ ecb Kivi
Rb" Gu gwUz wbo
Mfxizvq Lv` %Zi Kti|

dtiv lcbvi- exR, tju mwiZ ecb Kivi Rb" Gu gwUz wbo Mfxizvq Lv` %Zi Kti|
wefb aitbi dtiv lcbvi nZ cvi| thgb- AveRbv I AvMvQig gwUz e"eüZ nq
ivbvi, cv_i I wKoh gwUz tn UvBc, AveRbv cY I A+cKZ.k³ gwUz wv UvBc
dtiv lcbvi e"eüZ nq|

Lv` cizZ exRtK gwU w`q
tXtK t`qvi Rb" Gu
e"eüZ nq|

Kfwis BDibU - Lv` cizZ exRtK gwU w`q tXtK t`qvi Rb" Gu e"eüZ nq| wefb
aitbi Kfwis BDibUi ga" itqQ UvthvM" tPbb, UvthvM" `Ü, vcv teW, ótji ev
iveihy Pvc t`qvi Pvkv BZ" |

tcm ubj- exRtK gwU w`q tXtK t`qvi ci exRi ctqvRb Abhyq Gi Pvicvki ev lctii
gwUk p Kivi Rb" Gu e"eüZ nq| Gu wefb iKgi nZ cvi, thgb- tKvbiU ciwai
gvSLv b AeZj ev DËj, tKvbiU mgZj nZ cvi|

mxWwji mBR

exR ecb htši AvKvi
ejZ Avgiv eyS GtZ
KZ, tju dtiv lcbvi
AvQ Ges Gti ciúi
gvS tZ|

exR ecb htši AvKvi ejZ Avgiv eyS GtZ KZ, tju dtiv lcbvi AvQ Ges Gti
ciúi gvS tZ| mavizy Gu ckv Kiv nq Gfvte 12-15 A_ev 18-17, hv w`q
tevsv hvq GtZ 12 A_ev 18u dtiv lcbvi AvQ Giv ciúi 15 A_ev 17 tmUigUvi
tZ AvQ| mZivs mxW wWjU tgvU ckZv n"Q (12×15) = 180 tm.wg. A_ev (18 ×
17) = 306 tm.wg.

exRi cigvY wbiqb (Calibration of a seed drill)

cizU ktm"i Rb" exRi
nvi A_vr ciz tn±i ecb
thvM" exRi cigvY wbo

GKu mxWwjK gvV tbqvi AvM mVK nti exR ecb Kivi Rb" GtK cZ Kti wtZ
nte| A_vr ciz tn±i RigtZ th cigvY exR ecb ctqvRb tm Abhyq mxWwj mgšq
mvab KtZ nte| mxWwjK Gfvte cZ Kti tbqvKB Kvjtekb ej| cizU ktm"i Rb"
exRi nvi A_vr ciz tn±i ecb thvM" exRi cigvY wbo G nti tPq Kg ev tek
nti exR ecb Ktj GKtK thgb exRi AcPq nq AbtK tZgvb ktm"i djbl Ktj
hvq| ZvB Avev KZ. ktm"i NbZ vK ivLvi Rb" mxWwj Kvjtekb, iZcY|

mxWwj w`q ecbKZ exRi cigvY wbyq Kivi Rb" wbjLZ cxZ Abhyi KtZ nte -

- 1 mxWwjUk RvtKi mwnth" lcti lwb hvZ Gi Pkv gy fvt tNvZ
cvi|
- 2 ncvi exR w`q cY Kib|

KuL.I c jx Dbqb ̄x

- 30 $dv_{iv} I \dagger cb \dagger i i$ msL^v ̄^v ̄^q G[†] i ga^eZx ̄[†]Z ,bb K[†]i tgvU ck⁻Z^v (W)
tei Ki[‡]b|
- 40 mW ̄UDe ,[†]jvi ̄b[†]P GK^U K^vco ev tU i^vL[†]|
- 50 mW W[†]j i P^vK^vi e^vm (D) gv^c~~y~~ Ges G [†] K c^Uia (P) tei Ki[‡]b|
- 60 Gevi P^vK^vi GK^U ̄b ̄^ó RvqMvq PK ̄^q ̄P^UY[†]Z Ki[‡]b| GLb G ̄^v†Mi Ae⁻vb
[†] K P^vK^v†K N[†]i^q c[†]ri^vq G Ae⁻vb Avb[†]j GK N[†]y^b c[†]n[†]e|
- 70 Gfv[†]e P^vK^v†K 50 evi ⁻v[†]veK gvV M^UZ[†]Z †N^vivb|
- 80 GLb tU[†]Z RgvKZ.ex[†]Ri c^UigvY tei Ki[‡]b (tgvU ex[†]R[†]K 50 ̄^q fvM Ki[†]Z
n[†]e)
- 90 GLb c^UZ †n[†]±i ex[†]Ri c^UigvY ̄b[†]±i mgxKiY [†] K tei Ki[€]b|

10,000 X

ex[†]Ri c^UigvY, (†K^UR/†n[†]i) = -----

50 π DW

GLv[†]b,

x - 50 N[†]±b tU[†]Z msM[†]xZ ex[†]Ri c^UigvY, †K^UR

D - P^vK^vi e^vm, ̄gU^vi

W - ̄mW ̄W[†]j i ck⁻Z^v, ̄gU^vi

π = 3.14 (a[†]K)



Abj[†]jb^x t ai[‡]b, Avcb[†]K GK^U ̄mW^UWj [†] q^v n[†]jv| Avcb G^U ̄^q Kxfv[†]e K^vR Ki[†]eb
Zv ̄j[†]ce× Ki[‡]b|

av[†]bi P^viv t^vivY h^š

G h^ši m^vnv[†]h[†] m[†]viexfv[†]e av[†]bi P^viv t^vivY Kiv nq| Rvcvb 1898 m[†]b GK^U av[†]bi P^viv
j^vM[†]bvi h^š c_g ^Z[†]i K[†]i^UQj| Zv ̄^q Aek[†] gvV chv[†]q K^vR Kiv m[†]ae nq^Ub| cieZ[†]x[†]Z
̄we[†]fb [†] k Gi bKkv I ̄WRvBb DbZ K[†]i gvV chv[†]q e^ven[†]i Dc[†]h[†]M[†]x Kiv nq| Pxb 1956
m[†]b c_g av[†]bi P^viv t^vivc[†]Yi h^š ^Z[†]i K[†]i hvi gvV ̄gZv ̄Qj 0.3 †n[†]±i/ ̄^b| G h^ši
Rb[†] ̄we[†]kl fv[†]e Drcb Kiv P^vivi c[†]qvRb nq| m[†]vaviYZ P^viv, [†]jv cW (Pod) UvBc, teë
(Belt) UvBc Ges g^vU (Mat) UvB[†]c Drcb Kiv nq| Z[†]e g^vU UvB[†]ci P^viv G h^š te[†]k
e^veüZ n[†]q ̄^v†K| G h^ši m^vnv[†]h[†] GKB mg[†]q GK^U ̄mW^UWj av[†]bi P^viv t^vivcb Kiv hvq|
G h^š gvby P^UjZ I k^U 3 P^UjZ Dfq ai[†]biB n[†]Z c[†]i|

G h^ši m^vnv[†]h[†] GKB mg[†]q
GK^U ̄mW^UWj av[†]bi P^viv
t^vivcb Kiv hvq| G h^š gvby
P^UjZ I k^U 3 P^UjZ Dfq
ai[†]biB n[†]Z c[†]i|

1981 m[†]b evsjv[†] k B[†]i[†] (IRRI) ^Z[†]i av[†]bi P^viv t^vivc[†]bi h^šU[†]K gvV chv[†]q e^ven[†]i i
Dc[†]h[†]M[†]x ̄Kbv Zv cix ̄v ̄bix ̄v Kiv nq| G h^šU[†]i Mo gvV ̄ ̄Zv ̄Qj 70% Ges gvV ̄gZv
̄Qj 0.14 †n[†]±i/ ̄^b| G h^š ̄^q c^UZ †n[†]±i R[†]ig[†]Z P^viv t^vivY Ki[†]Z 122 gvby-N[†]Uv
c[†]qvRb nq, hv k[†]ig[†]Ki m^vnv[†]h[†] t^vivY Ki[†]Z 336 gvby-N[†]Uv ̄ⁱKvi nq| ̄b[†]± k^U 3 P^UjZ
GK^U av[†]bi P^viv t^vivY h^ši ̄P[†] I ̄we[†]fb Ask [†] L[†]v[†]bv nj|

G h^š ̄^q c^UZ †n[†]±i
R[†]ig[†]Z P^viv t^vivY Ki[†]Z
122 gvby-N[†]Uv c[†]qvRb nq,
hv k[†]ig[†]Ki m^vnv[†]h[†] t^vivY
Ki[†]Z 336 gvby-N[†]Uv
̄ⁱKvi nq|

BD^UbU 5

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¶PÎ 5.3 k³ PmjZ GKU av#bi Pviv tivcY hš



gvbyPmjZ av#bi Pviv tivcb hšš*i* Kvhc×Z

MiZ RoZv ¶bqšYKvix
tgKvibRgU hšU#K KvR
ïi# Kivi mgq mvgvb" av°v
†`q hvi d†j Pviv tivcY
Kivi Rb" hšU c⁻Z nq|

G hšš (¶PÎ bs 5.4) `yUv ivbvi (A) _v†K hvi Dci fi K†i hšU P†j| G hšš*i* g†
KvWv†gv (B) hvi Dci Pviv ivLvi †U (C) , ¶dWv G†m¶j (D), †U Bb†Wv · s G†m¶j (E),
MiZ RoZv MnYKvix `Û (F) Ges nvZj (G) emv†bv _v†K| hšU*i* IRb 20-25 †KvR n†q
v†K| Pviv ivLvi †UvU †mvRv Ges Pviv jvMv†bvi m¶úY tgKvibRgU ivbv†i i m† tevë ¶`†q
hš _v†K| evB-mvB†K†ji ¶d-ûBj I †⁻cv†KU †U Bb†Wv · s G†m¶j ¶nmv†e KvR K†i| MiZ
RoZv ¶bqšYKvix tgKvibRgU hšU#K KvR ïi# Kivi mgq mvgvb" av°v †`q hvi d†j Pviv
tivcY Kivi Rb" hšU c⁻Z nq|

¶PÎ 5.4 gvb_y Pw_jZ GK_U av_†bi P_{iv} t_{iv}cY hš

hš_U GK_{Rb} gvb_y w⁻†q Uvb_v nq_| hLb hš_Ui n_vZ_j w_†Pi w⁻†K b_vg_v†b_v nq. ZLb w_cK_{vi}
G_tm_{aj} m_vg_†bi w⁻†K AM_{mi} n_†q t_U t₋†K w_{KQ}yP_{iv} MnY K_†i Ges K_v[`]v g_wU_†Z P_{iv}, t_jv_†K
3-5 t_m.w_g. M_fx_†i e_wm_†q t⁻q_| c_pivq n_vZ_jU_†K hLb P_vj_†Ki w⁻†K Uvb_v nq hš_U
w_ØZ_xqev_†i i Rb[”] P_{iv} MnY K_{iv}i Rb[”] c⁻Z nq_| G c_wμq_wU c_pt c_pt P_j†Z ₋v_†K_|



m_vigg t m_wVK c_wig_vY ex_R m_wVK M_fx_iZ_vq ecb K_{iv}i Rb[”] m_xW_wj e[”]env_i K_{iv} nq_| G_†K
m_wVKf_v†e e[”]env_i K_i†Z n_†j Gi w_ew_{fb} A_s†ki b_vg m_xW_w†j_i m_vBR Ges
m_xW_w†j_i K[”]w_j†ekb m_oú_†K ⁻”Q av_iY_v ₋vK_†Z n_†e_| av_†bi P_{iv} t_{iv}cb h_†š_i
m_vnv_†h[”] GKB m_g†q GK_wak m_wi_†Z av_†bi P_{iv} t_{iv}cb K_{iv} hvq_| G_wU gvb_y P_wj_Z
I k_w³ P_wj_Z D_fqB n_†Z c_v†i_|



cvWĖi gj`qb 5.1

mVK DĖi i cvk UK Pý (√) `b|

1. vbPi tKvbU mxW Wj i mv_ mŏKZ bq ?

- K. GU mviZ exR ecb Kivi hš
- L. mVK MfxiZvq Lv` ^Zi Ki ZvZ exR vcb Ki
- M. gvUi tXjv tft½ Pý Ki
- N. exR ecYi ci gvU `q tXK t`q|

2. mxW gvUis BDvbUi KiR Kx ?

- K. mVK MfxiZvq Lv` ^Zi Ki
- L. exR ecbi cgvY vbqšY Ki
- M. Lv` cZZ exR K tXK t`qv
- N. exRi Pvi cvki gvU K `p Ki

3. vbPi tKvbU mVK bq ?

- K. mVK nv i exR ecbi Rb" mxW Wj i mgšq mvabKB K"vjtekb ej
- L. Avev`KZ. ktm"i NbZ VK ivLvi Rb" K"vjtekb , iZcŸ
- M. mxW Wj i K"vjtekb bv Ki n j exRi AcPq ev ktm"i djb Ktg thZ cv i
- N. mxW Wj K gvV vbq KiR Kivi ci K"vjtekb KiZ nte

4. vbPi tKvbU avbi Piv tivcY hš i mv_ mŏKZ bq ?

- K. Gi mvinth" GKB mgq GKvKaK mviZ Piv tivcY Ki hvq
- L. veklfvte Drcb avbi Piv GB hš `iKi nq
- M. hš i Ask , t jvi gta" iqtQ tU, dWs I BbWw · s Gtmj
- N. Gi mvinth" Piv ecb KiZ kvgK Atcv tek mgq jvM

Kl. I c jx Dbqb ǂ

cV 5.2 mvi ǂQUǂbv hš

G cV tǂtǂl Avcǂb —



- mvi cǂqvǂMi ǂeǂfb cǂxǂZ ǂjLǂZ cviǂebǂ
- mvi ǂQUǂbv hšǂi ǂeǂfb Aǂǂki bǂg ejǂZ cviǂebǂ
- GKǂU mvi ǂQUǂbv hšǂi KǂhcǂxǂZ ǂjLǂZ cviǂebǂ
- ǂeǂfb cKǂi ǂgUǂis BDǂbǂUi bǂg ejǂZ cviǂebǂ

G hšǂi mǂvǂhǂ ǂeǂfb
aiǂbi ǂbvǂvi mvi gǂUǂZ
eǂenvi Kǂi tǂZ cviǂiǂ

G hšǂi mǂvǂhǂ ǂeǂfb aiǂbi ǂbvǂvi mvi gǂUǂZ eǂenvi Kǂi tǂZ cviǂiǂ tǂMveǂ I Zij
iǂmǂqǂbK mvi ǂQUǂbvǂi Rbǂ Uǂǂi PǂǂjZ ǂfb aiǂbi dǂUǂjǂBRǂi Gǂc-ǂKǂi eǂeǂZ nǂZ
cviǂiǂ

gǂUǂZ ǂeǂfb cKǂiZǂ mvi cǂqvǂM Kǂi hǂq, tǂgb - tǂMveǂ, bǂbv Dcǂǂǂbi cǂDWǂi I ǂbvǂvi
iǂmǂqǂbK mvi, Zij I Mǂǂmǂq cKǂiZǂ mviǂ gǂUǂZ mvi cǂqvǂM cǂxǂZ ǂbǂǂc nǂZ cviǂi -

- 1• Rǂg Pǂǂli AǂǂM ev dǂmǂj Rbǂǂǂbi ci gǂUǂZ ǂQUǂbv A_eǂ cǂDǂǂi mǂǂ_ mshǂ
ǂWǂǂeDUǂǂi mǂvǂhǂ cǂZǂU Lǂǂ mvi tǂdǂj Kǂb MǂxiZǂq mviǂK ǂvcǂ Kǂiǂ
- 2• ǂPǂRǂj (Chisel) UǂBc KǂjǂUǂfUǂǂi (Cultivtor) mǂvǂhǂ gǂUǂi Mǂxiǂ ǂvcǂ
Kǂiǂ
- 3• exR ecǂbi mgq GKmǂǂ_ mvi cǂqvǂM Kǂi gǂUǂZ ǂgǂkǂq tǂǂqǂ
- 4• cǂZǂôZ ZY.fǂgǂZ ǂeǂkl hšǂi mǂvǂhǂ mǂǂiǂZ gǂUǂi ǂbǂP mvi ǂvcǂ Kǂiǂ

tǂǂǂefǂM

nǂ PǂǂjZ I kǂ³ PǂǂjZ G ǂǂaiǂbi mvi ǂQUǂbv hš iǂqǂQǂ Zǂe nǂ PǂǂjZ mvi ǂQUǂbv
hšǂi gǂǂǂ tǂKǂǂegǂǂ mvi ǂQUǂbv hšǂi eǂenviB tǂǂkǂǂ ǂPǂ 5.5 G GKǂU mvi ǂQUǂbv hšǂi
ǂeǂfb Ask I KǂhcYǂǂj eYǂv Kǂi nǂjǂǂǂ

KǂhcǂxǂZ

Nǂǂqǂvb PǂKǂZǂU tǂKǂǂegǂǂ
eǂǂǂi KǂiǂY Gi Dci cǂZZ
mvi PǂǂǂǂǂK ǂQUǂK cǂǂǂ

ncǂǂi mvi iǂLv nǂǂǂ mvi ǂǂjǂv hǂZ ncǂǂi Rǂg bǂ hǂq tǂm Rbǂǂ bǂvǂbǂ (Agitator) eǂenvi
Kǂi nǂǂǂ ncǂǂǂU GKǂU ǂǂǂǂǂǂǂǂ Dci emǂǂbǂ ǂǂKǂǂ ǂǂǂǂǂǂǂ ncǂǂǂǂǂ ǂbǂP ǂǂcZ GKǂU
PǂKǂZǂ mǂǂ_ jǂMǂǂbǂ ǂǂKǂǂ nǂZǂǂǂU hLb tǂNǂǂbǂ nǂ ZLb PǂKǂZǂU NǂǂZ ǂǂKǂǂ G mgq
ncǂǂǂǂǂ ǂbǂPi ǂQǂ ǂǂǂq mvi PǂKǂZǂZ Gǂm cǂǂǂ Nǂǂqǂvb PǂKǂZǂUi tǂKǂǂegǂǂ eǂǂǂi KǂiǂY
Gi Dci cǂZZ mvi PǂǂǂǂǂǂK ǂQUǂK cǂǂǂ PǂKǂZǂU mǂǂǂǂYZ 30-40 tǂm.ǂg. eǂǂmhǂ I 5
ǂg.ǂg. cǂǂ nǂq ǂǂKǂǂ Gi Dci ǂZbǂU tǂfb (Vane) 120 ǂWMǂ Aǂǂ emǂǂbǂ ǂǂKǂǂ hǂi DǂPZǂ
cǂq 2 tǂm.ǂg.ǂ mǂǂǂhšǂU GKǂU tǂdǂg emǂǂbǂ ǂǂKǂǂ

¶PÎ 5.5 GKU mvi QUv#bv hš

G hšU#K nvZ#ji cie#Z k`vd#Ui mnv#h" teë cyj A\_ev P.T.O. Gi gva`tg cvIqv
Ujvi ev Uv±i ¶`#q Pvjv#bv th#Z cv#i | tm †¶Î GKwaK BD#bU e`eüZ n#Z cv#i |

¶gU¶is BD#bU

mvi QUv#bv hšši G
BD#bU mvi c#qv#Mi nvi
¶bqšY K#i |

mvi QUv#bv hšši G BD#bU mvi c#qv#Mi nvi ¶bqšY K#i | ¶e¶fb cKvi i@ mvi QUv#bvi
Rb" ¶e¶fb ai#bi ¶gU¶is BD#bU i#q#Q | ¶gU¶is BD#bUi N¶qgvb AskU P#Kv ev ¶c. ¶U. I.
¶`#q P¶jZ nq | ¶e¶fb ai#bi ¶gU¶is BD#bUi g#a" i#q#Q- óvi ûBj UvBc, AMvi
UvBc, teë UvBc, †cU I ¶dKvi UvBc, N¶qgvb eUg UvBc |



mvi gg t mvi QUv#bv hšši mnv#h" `vb`vi mvi g¶U#Z c#qv#M Kiv n#q _v#K | G¶U n⁻ P¶jZ
ev k³ P¶jZ n#Z cv#i | ¶gU¶is BD#bU mvi c#qv#Mi nvi ¶bqšY K#i | ¶gU¶is
BD#bU ¶e¶fb ai#bi n#Z cv#i |



cvWĖi gj'vqb 5.2

mVK DĖi i c k UK (√) Pý b |

1. bPi tKvU mVK bq ?

K. R₁g P₁i Ii AvM gvU₁Z Q₁U₁q mvi c₁q₁M Kiv hvq

L. Kv j₁U₁fU₁i i m₁nv₁h₁ gvU₁i Mf₁x₁i mvi ⁻vcb Kiv hvq

M. exR ec₁bi mgq mvi c₁q₁M K₁i gvU₁Z g₁k₁q t₁q₁ hvq

N. ⁻v₁b₁v₁vi, cvDW₁i ev Zij me ai₁bi mvi GKB ai₁bi h₁š₁i m₁nv₁h₁ c₁q₁M Kiv hvq

2. n⁻ P₁jZ mvi QU₁b₁ h₁š₁ ⁻v₁b₁v₁vi mvi QU₁K c₁o K₁ Ki₁Y ?

K. b₁ov₁b₁i Ki₁Y

L. P₁K₁Z₁i N₁Y₁b m₁o t₁K₁ ⁻eg₁Y e₁j₁i Ki₁Y

M. n₁v₁Z₁ QU₁b₁vi Ki₁Y

N. nc₁v₁i i Ki₁Y

3. mvi QU₁b₁ h₁š₁i e₁fb cK₁vi gU₁is BD₁b₁Ui g₁a₁ bPi tKvU AvIZ₁f,³ bq ?

K. AM₁vi U₁Bc

L. t₁cU₁ I dK₁vi U₁Bc

M. t₁m₁j U₁Bc

N. ÷₁vi ūB₁j U₁Bc

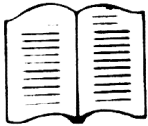
cV 5.3 HıZn`MZ I AvaybK wbowx hšmgn

G cV tKtI AvCwb —



- wefb cKvi HıZn`MZ wbowxi bvg ejtZ cvi#eb|
- wefb cKvi HıZn`MZ wbowxi weeiY wjL#Z cvi#eb|
- RvcvbxR ivBm DBWtiii weeiY wjL#Z cvi#eb|
- kV³PwjZ ivBm DBWtiii weeiY wjL#Z cvi#eb|

HıZn`MZ wbowx hšmgn



G ai#bi wbowx hš,tjv hM hM a#i Avgv`i t`tki KIKKž e`envi Kti AvmtQ| G,tjv GjuKv wfiEK wefb AvKvi-AvKıZi ntq \_vtK Ges wefb bvtg cwiPZ| G,tjv meB n<sup>-</sup>PwjZ| wefb dm#ji t#tZ AvMtQv `gb I gwUi Ic#ii k³ Av`i fv#vi Rb` G ai#bi wbowx hš,tjv KIKiv cavbZ e`envi Kti \_vtK| Gi `tUv Ask- óx#ji ^Zi teW Ges Kv#Vi ^Zi nvZj| Mvtgi Kvgvi m#ú`vq G,tjv ^Zi Kti \_vtK| AvmtGevi wefb ai#bi HıZn`MZ wbowx htši mvt_ cwiPZ nB|

wefb dm#ji t#tZ AvMtQv
`gb I gwUi Ic#ii k³
Av`i fv#vi Rb` G ai#bi
wbowx hš,tjv KIKiv
cavbZ e`envi Kti _vtK|

tQbx KvP ev wbowx-

wPÎ 5.6 tQbx KvP ev wbowx

GKRb tjuK emv Ae⁻vq
GıU w`tq KvR Kti Ges
^wbK cvq 0.02 - 0.03
tn#i Rıg wbowtZ cv#i|

te#Wi evB#ii cvš aiv#jv| mvaviYZ AvDk, cvU, kvK-meRi t#tZ AvMtQv `g#bi Rb` e`eüZ nq| GKRb tjuK emv Ae<sup>-</sup>vq GıU w`tq KvR Kti Ges ^wbK cvq 0.02 - 0.03 tn#i Rıg wbowtZ cv#i| te#Wi ^N` cvq 11 tm.ıg. Ges nvZjmn tgvU ^N` cvq 35 tm.ıg. | IRb 200-250 Mıg| cvq 2 ermi GıUi KvHKvj eRvq _vtK Ges cıZ ermi teW#K avi w`tZ nq| A#bK mgq te#Wi tfZ#ii cvš Kvt<sup>-</sup>i gZ `vZ KvUv _vtK| k³ AvMtQv tKtU t#jvi Rb` G cvš e`eüZ nq|

wbo KvP ev wbowx

wPÎ 5.7 wbo KvP ev wbowx

K₁L.1 c jx Dbqb $\bar{q}$

GKRb $\dagger jvK$ emv Ae $\bar{v}q$
K_vR K $\dagger i$ $\hat{\sim}$ $\mathbb{b}K$ cvq 0.01-
0.015 $\dagger n\pm i$ R_{ig} $\mathbb{b}ov\ddagger Z$
cv $\dagger i$ |

G_Ui $\dagger eW$ $\mathbb{K}QY$ mi $\ddagger$ | m $\mathbb{v}aviYZ$ $\mathbb{g}k$ dmj (A_vDk I A_vgb) $\mathbb{b}ov\ddagger bvi$ K_v $\dagger R$ KIKiv e $\bar{e}nvi$
K $\dagger i$ | $\dagger e\ddagger Wi$ $\hat{\sim}$ N $\bar{c}$ cvq 13 $\dagger m.$ ig. Ges n_vZjmn $\dagger gU$ $\hat{\sim}$ N $\bar{c}$ cvq 30-35 $\dagger m.$ ig. | IRb 250-
280 Mvg | GKRb $\dagger jvK$ emv Ae $\bar{v}q$ K_vR K $\dagger i$ $\hat{\sim}$ $\mathbb{b}K$ cvq 0.01-0.015 $\dagger n\pm i$ R_{ig} $\mathbb{b}ov\ddagger Z$
cv $\dagger i$ | M $\ddagger o$ cvq 1.5 ermi K_vh $\mathbb{I}g$ $\bar{v}\ddagger K$ |

c_vk_{ib} ev $\dagger Qbx$

$\mathbb{P}\hat{I}$ 5.8 c_vk_{ib} ev $\dagger Qbx$

GKRb KIK $\hat{\sim}$ $\mathbb{b}K$ cvq
0.02 $\dagger n\pm i$ R_{ig} $\mathbb{b}ov\ddagger Z$
cv $\dagger i$ |

G ai $\ddagger bi$ $\mathbb{b}ovbx$ c_veb_v, K $\acute{o}q$ _v, U_vSM_vBj, R_vgvjcy cf $\mathbb{Z}$. $\dagger Rjvq$ $\dagger eW$ e $\bar{e}üZ$ nq | Gi
n_vZj $\mathbb{U}$ $\mathbb{e}\ddagger kl$ f_v $\dagger e$ ev $\mathbb{K}v\ddagger bvi$ | A_vDk I c_vU $\dagger \mathbb{I}Z$ $\mathbb{b}ov\ddagger bvi$ R_b $\bar{c}$ c_vb $\bar{Z}$ e $\bar{e}üZ$ nq | GKRb
KIK $\hat{\sim}$ $\mathbb{b}K$ cvq 0.02 $\dagger n\pm i$ R_{ig} $\mathbb{b}ov\ddagger Z$ cv $\dagger i$ | G_UU $\mathbb{I}^{\dagger}qI$ emv Ae $\bar{v}q$ K_vR Kiv nq | Gi
 $\dagger eWU$ $\div x\ddagger ji$ $\hat{\sim}$ Z $\mathbb{I}$ i Ges Aae $\mathbb{E}vKvi$ | $\dagger e\ddagger Wi$ $\hat{\sim}$ N $\bar{c}$ cvq 7.5 $\dagger m.$ ig Ges m $\acute{a}ú\mathbb{Y}$ $\mathbb{b}ovbx$ i $\hat{\sim}$ N $\bar{c}$
cvq 50-55 $\dagger m.$ ig. | IRb cvq 250-450 Mvg |

L_yic

$\mathbb{P}\hat{I}$ 5.9 L_yic

emv Ae $\bar{v}q$ G_UU $\mathbb{I}^{\dagger}q$ K_vR
K $\dagger i$ GKRb KIK $\hat{\sim}$ $\mathbb{b}K$
0.01-0.015 $\dagger n\pm i$ R_{ig}
 $\mathbb{b}ov\ddagger Z$ cv $\dagger i$ |

Gi $\dagger eWU$ $\mathbb{I}^{\dagger}fRvK\mathbb{Z}i$ | A_vDk I c_vU $\dagger \mathbb{I}Z$ $\mathbb{b}ov\ddagger bvi$ R_b $\bar{c}$ e $\bar{e}üZ$ nq | emv Ae $\bar{v}q$ G_UU $\mathbb{I}^{\dagger}q$
K_vR K $\dagger i$ GKRb KIK $\hat{\sim}$ $\mathbb{b}K$ 0.01-0.015 $\dagger n\pm i$ R_{ig} $\mathbb{b}ov\ddagger Z$ cv $\dagger i$ | $\div x\ddagger ji$ $\hat{\sim}$ Z $\mathbb{I}$ i $\dagger eWU$ cvq
18 $\dagger m.$ ig. j $\acute{a}v$ Ges Gi g_v $\bar{v}$ cvq 6-7 $\dagger m.$ ig. c $\bar{v}$ | cvq 2-3 ermi $\mathbb{U}\ddagger K$ $\bar{v}\ddagger K$ |

A_vPov-

$\mathbb{P}\hat{I}$ 5.10 A_vPov

emv Ae⁻v#b ev Dc⁹ n#g
GKRb KIK ^`bk cvq
0.02-0.03 tn±i RigZ
AvPov w`Z cv#i |

mvaviYZ óx#ji ^Zwi 4-5 wU evk⁻úvBK nv#Zi Av^{1/2}ji gZ mvRv#bv _v#K | nvZ#ji mvinv#h
Pvj#Ki w`K tU#b tU#b KvR Kiv nq | AvDk, cvU I kvK-meiRi t<sup>9</sup>†Z AvMvQv `gb I
gvUUi Ic#ii Av⁻i fv^{1/2}vi Rb" e"eüZ nq | emv Ae⁻v#b ev Dc⁹ n#g GKRb KIK ^`bk
cvq 0.02-0.03 tn±i RigZ AvPov w`Z cv#i | úvBK_s†jv cvq 25 tm.ig. j^{av} Ges
nvZjwU c†qvRb Abj⁹qv j^{av} n#g _v#K |

tg⁹ `tQbx

wPÎ 5.11 tg⁹ `tQbx

teWwU cvq 20 tm.ig. ck⁻ |
m^{av}ú⁹ wbovxi ^`N" cvq
70-80 tm.ig. |

G ai#bi wbovxi DcRvZxq GjvKvq carbZ e"eüZ nq | Avbvim, Kvmvfv BZ⁹ w` t⁹†Z
wbov#bvi Kv#R e"eüZ nq | wó#ji cv#Zi ^Zwi teWwU tek eo, Aae⁹†Kvi Ges GwU j^{av}
`†Üi miv_ hy | emv Ae⁻v#b KvR Kivi mgq Avbvi#mi cvZvi Kw⁹ t_#K i⁹†v clevi Rb"
`ÜwU j<sup>av</sup> ivLv nq | teWwU cvq 20 tm.ig. ck<sup>-</sup> | m<sup>av</sup>ú<sup>9</sup> wbovxi ^`N" cvq 70-80 tm.ig. |
IRb cvq 1 tKwR |

AvaybK wbovxi hšmgn

G_s†jv gvby PwjZ I k³ PwjZ Dfq ai#biB n#Z cv#i | Z†e evsjv`k mvaviYZ gvby
PwjZ AvaybK wbovxi⁹mgn e"eüZ n#g _v#K | G_s†jvi g†S n⁻ PwjZ RvcvbxR ivBm DBWvi
I k³ PwjZ DBWviB carb |

wPÎ 5.12 RvcvbxR ivBm DBWvi

K₁L.1 c jx Dbqb $\overline{\text{q}}$

G RvZxq DBWwi Kv`vhy
g_UU_Z m_Ui_Z j_vM_vb_v avb
ev Ab^{''} dm_ji R_{ig}Z
AvMvQv `g_b e^{''}eüZ nq|

⌈P₁[^] GK⌈U RvcvbxR ivBm DBWwi t`Lv<sub>b</sub>v ntq<sub>Q</sub>| G ai<sub>b</sub>i DBW<sub>i</sub> GK⌈U tU, GK ev `P
m_Ui `v_U (Spike) hy P_vK_v Ges Kv_vVi [^]Z_Ui GK⌈U t_{dg} _vK| G_UU_i IRb 3-5 t_KR n_q
_vK| t_UU t_jv_Uvi P^{''}v_Pv evi I cvZ _vq [^]Z_Ui hv hš_UU_i f_{vi} enb K_ii| G_UU hš_UU_iK Kv_vq
P_j_Z m_Unv^{''} K_ii| G RvZxq DBWwi Kv`vhy g_UU_Z m_Ui_Z j_vM_vb_v avb ev Ab^{''} dm_ji
R_{ig}Z AvMvQv `g_b e^{''}eüZ nq| G_UU GKRb t_jvK _vq P_vj_bv Kiv nq, Z_{te} A_bK mgq
Av_iKRb mvg_b t_U_K U_vb| G_ZZ Z_vovZ_Uo Ges f_vj f_v_{te} K_vR nq|

hš_UU hLb mvg_bi _vK t_V_j t^{''}q_v nq ZLb [¯]úvBK_U _jv [^]t_Ui g_a^{''} N_y_Z _vK Ges
AvMvQ_Ui g_j Dc_{to} t_d_j I g_UU_Z _Ug_Uk_q t^{''}q| d_j AvMvQ_v g_UU_Z c_{te} Re m_Ui [^]Z_Ui nq|
[¯]úvB_UKi [^]U_U _jvi AvK_Ui AvK_UZ _Uefb ai_bi n_q _vK| G_UU P_vj_v_Z L_gB k_U³ i c_qvRb
nq Ges P_vjK A_i mg_q Kvš n_q c_{to}| _UKš [^]t_Ui m_v_U _Ueq_Uis ev e_k e^{''}envi K_ii k_U³ i
c_Uig_vY Kgv_bv m_{ae}| G _Ub_q evs_j_v[^]k K_UL. _Uek_Ue^{''} _vj_qi K_ULk_U³ I hš _Uef_v_{te}M M_{te}l_bv
P_j_Q| G_UU_i g_v _Ug_Zv cvq 1 GK_i /_v b|

K_U³ P_UjZ DBWwi

m_Uiex_v_{te} j_vM_vb_v dm_ji
[^]m_Ui_i g_v_S AvMvQ_v `g_bi
Rb^{''} m_vav_iYZ e^{''}eüZ nq|

G_UU m_vav_iYZ U_v_i I cvlq_Ui _UU_jvi _vq U_vb_v nq| G_U _jv_v tek f_vi_x Ges A_bK ck[¯]|
G_U _jv_v_Z GK ev GK_UaK j_{av} [^]t_U A_bK_U _jv [¯]úvBK U_z teW ev _UW[¯] K_vQ_vK_UQ emv_bv
_vK| G_UU_i ck[¯]Z_v m_vav_iYZ 3-6 _Ug_Uvi n_q _vK| G_i IRb U_v_i m_{ae}_U^{''} enb K_ii| P_Uiv
hLb t_QvU _vK ZLb G_UU e^{''}envi Kiv nq| m_Uiex_v_{te} j_vM_vb_v dm_ji [^]m_Ui_i g_v_S AvMvQ_v
[^]g_bi Rb^{''} m_vav_iYZ e^{''}eüZ nq| G_UU AvMvQ_v_K g_UU_Z _Ug_Uk_q t^{''}q A_{ev} g_jmn AvMvQ_v_K
Dc_{to} t_d_j g_UU_Z iB_q t^{''}q|

⌈P₁[^] 5.13 k_U³ P_UjZ DBWwi



cvWĖi gj`qb 5.3

mVK DĖi i cvk UK (√) Pý `b|

1. vbPi †KvU HZn`MZ vovx hš bq ?

K. cvk b , AvPo

L. †Qbx Kv

M. Ljic

N. RvcvR ivBm DBWi

2. mVK DĖi †KvU ?

K. RvcvR ivBm DBWi iKbv gvUžZ Dc#hvMx

L. GvU Kv`vhj gvUžZ evβfvte jvMv#bv dm#ji Dc#hvMx

M. GvU Kv`vhj gvUžZ mviex av#bi †žZ Dc#hvMx

N. GvU Uv±i ev cvIqvi vUjvi PvjZ

3. k³ PvjZ DBW#i i †žĖ vbPi †KvU c#hvR` bq ?

K. GvU Uv±i ev cvIqvi vUjvi PvjZ

L. mviex dm#ji †žZ AvMvQv`g#bi Rb` GvU e`eüZ nq

M. GK ev GKvaK`žŮ A#bK, †jv teW ev W` KvQvKvQ emv#bv _v#K

N. Gi ck⁻Zv 0.2 - 0.5 gvUv n#q _v#K|

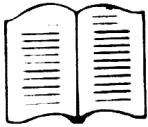
cV 5.4 n⁻ I k³ P_WjZ f⁻cqv_i

G cV t_k I Av_c b —



- n⁻P_WjZ f⁻úqv_i i w_efb Ask, t_jvi bvg ej_z cvi_{teb} |
- w_efb cK_{vi} n⁻P_WjZ f⁻úqv_i i bvg ej_z cvi_{teb} |
- j f_{vi} P_WjZ b⁻vcm⁻vK f⁻úqv_i i K_{vhc}Y_Wj eY_{bv} Ki_z cvi_{teb} |
- k³P_WjZ f⁻úqv_i i cK_{vit}f⁻ ej_z cvi_{teb} |
- t_QU Bi_Äb P_WjZ b⁻vcm⁻vK f⁻úqv_i i ce_{vn} P¹ A_vK_z cvi_{teb} |
- t_QU Bi_Äb P_WjZ b⁻vcm⁻vK f⁻úqv_i i K_{vhc}Y_Wj eY_{bv} Ki_z cvi_{teb} |

f⁻cqv_i



f⁻úqv_i Ggb GK_U hš h_v Zij c⁻v_z K t_f $\frac{1}{2}$ q_z q_z KY_{vq} c_WiYZ Ki_z cvi_i | R_{ig}z_z dmj_zK q_WZK_{vi}K t_cvK_v g_vK_{to}i Av_μgY t_z K i q_v Kivi Rb⁻ Zij K_Ub_{vk}K q_Uv_z f⁻úqv_i e⁻e_üZ nq |

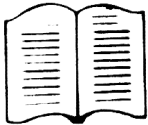
R_{ig}z_z dmj_zK q_WZK_{vi}K
t_cvK_v g_vK_{to}i Av_μgY
t_z K i q_v Kivi Rb⁻ Zij
K_Ub_{vk}K q_Uv_z f⁻úqv_i
e⁻e_üZ nq |

f⁻úqv_i w_efb ai_zbi n_zZ cvi_i | Z_{te} k³i e⁻envi Ab_qq_x $\bar{q}$ cK_{vi} -

K) n⁻P_WjZ f⁻úqv_i

L) k³P_WjZ f⁻úqv_i

n⁻P_WjZ f⁻cqv_i



G R_vZ_{xq} f⁻úqv_i g_vb_y KZ_K P_WjZ nq | n⁻P_WjZ f⁻úqv_i m_vav_iYZ w_bq_Wj_WLZ Ask, t_jv
(Elements) w_e $\bar{q}$ g_vb $\bar{q}$ v_z K |

K) JI_zai U⁻vsK (Spray tank)

L) P_{vc} $\hat{Z}$ W_ii Drm I Z_v i_vL_{vi} e⁻e⁻_v (Pressure chamber)

M) bR_j (Nozzle)

N) c_tq_vR_bq w_bqšYK_{vi}x e⁻e⁻_v (Control valves & fittings)

n⁻P_WjZ f⁻úqv_i w_bq_Wj_WLZ cK_{vi} i n_zZ cvi_i -

K) w_m iÄ U_vBc

L) ÷vq_{vi}vi c_vá U_vBc (Stirrer Pump type)

M) j f_{vi} P_WjZ b⁻vcm⁻vK

N) w_có_b U_vBc b⁻vcm⁻vK

G,†jvi g#a" Kll.Kv†R ‖j fvi PwJZ b"vcm"vK f"úqv†ii e"envi teik | ‖b†a Gi KvhcYwJ
 ‖PÎ mn (‖PÎ 5.14) eYbv Kiv nj |

‖PÎ 5.14 ‖j fvi PwJZ b"vcm"vK f"úqv†i

G f"úqv†i GKU JI†ai U"vsK, n" PwJZ cváú, GKU Pvc Avavi (Pressure chamber), GKU †jY I †Lvjjv-eÜ Kivi e"e"v ev ‖UMvi fvj Ges GK ev GKwaK bRj _v†K |

G f"cq†i GKU JI†ai
 U"vsK, n" PwJZ cváú,
 GKU Pvc Avavi (Pressure
 chamber), GKU †jY I
 †Lvjjv-eÜ Kivi e"e"v ev
 ‖UMvi fvj Ges GK ev
 GKwaK bRj _v†K |

Jl†ai U"vsKU W†gi ^Zii n†q _v†K | A†bK mgq gvBì óxj (Gg, Gm) ev tóBb†jm
 ‖ó†jii ^Zii Kiv hvq | eZgv†b LiP Kgv†bvi Rb" c"ó†Ki ^Zii Kiv n†"Q | U"vs†Ki AvqZb
 10-15 ‖jUvi n†Z cv†i | Kda †Svjv†bvi Rb" U"vs†Ki M†q c"ó†Ki ev Pvgovi ^Zii ‖dZv
 (Strap) jvM†bv _v†K | Jla fivi Rb" U"vs†Ki Dc"i fv†M 90 - 100 ‖g. ‖g. e"v†mi gk ivLv
 nq | Jla f†i XvKwb fvj fv†e AvU†K ‖`†Z nq hv†Z U"vsKU evq†ivax nq | Jla fivi mgq
 50 ‖g. ‖g. g"vk QvKwb ‖`†q QvK†Z n†e hv†Z K†i f"ú Kivi mgq bRj fvj fv†e KvR Ki†Z
 cv†i |

G f"úqv†i Wqv†vg ev ‖cób cváú e"envi Kiv nq | ‖cób cváú ‖eikó f"úqv†i teik Pvc m†ó
 Ki†Z cv†i | G RvZxq f"úqv†ii ‖j fviUvi Ae"vb GKcv†k nq | ‖j fvi†K hLb ‖b†Pi ‖`†K
 Pvc f"qv nq ZLb f"ú U"vs†Ki Dc"i fv†M Pvc evo†Z _v†K | K†qKevi ‖j fvi†K Ic†i ‖b†P
 IVb†gv Kiv†bvi d†j 7-8 evi (Bar) Pvc m†ó nq | hLb j"v†Y Pvc f"qv nq, ZLb
 f"cq†ii †fZ†ii P†c Zij c"v _ bRj ‖`†q ¶ž ¶ž KYvi AvKv†i tei nq |

Kl³ PwJZ f"úqv†i

mvaviYZ teik GjvK R†o f"ú Kivi Rb" kl³ PwJZ f"úqv†i e"envi Kiv nq | ‖efb ai†bi
 kl³ PwJZ f"úqv†i AvRKvj †Lv hvq | en†bi ‖`K ‖`†q G,†jv ‖b†i | c -

K) gvby KZK enb†hvM" (†QvU †c†Uvj B"Äbhy)

L) Uv†i ev cv†qv†i ‖Ujvi gvD†UW

K₁L.1 c j_x Dbqb $\bar{q}$

M) t_mj d c_†c i $\bar{f}$ úqv i

N) $\mathbb{W}$ egvb P_Wj Z $\bar{f}$ úqv i

Avev i bR j t_f† $\bar{f}$ k_W³ P_Wj Z $\bar{f}$ úqv_†i i cK_vi_†f $\bar{f}$ $\mathbb{W}$ b_ai|c n_†Z c_v†i -

K) Gqv i t_kqv i bR j

L) $\mathbb{W}$ bD_†g_WUK bR j

M) d_WMs bR j

N) n_vBW_Wj K bR j

O) B_†j K_†U_v ó $\bar{v}$ _WUK ev B_†j K_†U_v Wqbw_WgK bR j

c_†qvM_†f_† $\bar{f}$ t_k_WYef_vM $\mathbb{W}$ b_ai|c -

K) g_vV k_†m $\bar{i}$ Dc_†h_vM_x

L) D $\bar{v}$ b e $\bar{v}$ env i Dc_†h_vM_x

$\mathbb{W}$ b_†† t_QvU B_WÄb m_Wj Z GK_WU b $\bar{v}$ cm $\bar{v}$ K $\bar{f}$ úqv_†i i K_vhcY_Wj ce_vn $\mathbb{W}$ P_†Î i g_va $\bar{v}$ †g eY_b K_vn_j |

$\mathbb{W}$ P_†Î 5.15 t_QvU B_WÄb P_Wj Z GK_WU b $\bar{v}$ cm $\bar{v}$ K $\bar{f}$ úqv_†i i ce_vn $\mathbb{W}$ P_†Î |

A- B_WÄb

E- bR j

B- t_i_WWqv j te- vqv i

F- evZ_v†mi ce_vn

C- JI_†ai U $\bar{v}$ sK

G- JI_†ai ce_vn

D- Ab/Ad m_{BP}

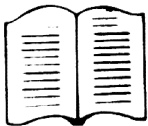
H- $\bar{f}$ c(JI_a + evZ_vm)

$\bar{f}$ ú evZ_v†mi M_WZ m_vav_iYZ
30 - 40 $\mathbb{W}$ gU_vi/†m_†KÛ n_†q
v†K Ges evZ_v†mi c_Wig_vY
600-750 Nb_WgU_vi/N_vU_v |

t_i_WWqv j te_vqv_†i K (B) GK_WU $\mathbb{W}$ ØN_vZ t_c†U_vj B_WÄb (A) $\mathbb{W}$ †q c_WiP_vj_b K_vn_j nq | te- vqv_†i i
N_††bi c_Wig_vY B_WÄb_†bi μ $\bar{v}$ sK_†v_d†U_i N_††bi mg_vb | K_viY D_f†qB m_vm_Wi msh_† | $\bar{f}$ c
evZ_v†mi M_WZ m_vav_iYZ 30 - 40 $\mathbb{W}$ gU_vi/†m_†KÛ n_†q _v_†K Ges evZ_v†mi c_Wig_vY 600-750
Nb_WgU_vi/N_vU_v | G R_vZ_xq $\bar{f}$ úqv_†i $\mathbb{W}$ efb ai_†bi bR j (E) e $\bar{v}$ eüZ c_v†i | bR_†j i A_vDUc_y
evoi_†b_v ev K_v†b_v t_h†Z c_v†i |

Jl'ai U'vs#Ki (C) ¶lgZv 10-15 ¶jUvi | m¶úY f¯cqvtii IRb 15-25 †K¶R n#Z cv#i |
 †h#nZzGB f¯úqvi gvby KZK enb Kiv nq ZvB nvéi nIqv evÄbxq | Jl'ai U'vsK GKevi
 cY Ki#j G RvZxq f¯úqvi 30-40 ¶g¶bU e"envi Kiv hvq | ¶b#z ¶PÎ 5.16 G †QvU †c#Uvj
 B¶Äb P¶jZ G RvZxq GK¶U f¯úqvi c`¶kZ n#jv |

¶PÎ 5.16 †c#Uvj B¶Äb P¶jZ b"vcm"vK f¯úqvi



mivgg t R¶g#Z Zij KxUbnkK ¶QUv#bvi Kv#R f¯úqvi e"eüz nq | f¯úqvi n¶P¶jZ ev
 k¶³ P¶jZ n#Z cv#i | ¶e¶fb ai#bi n¶P¶jZ f¯úqvi i#q#Q | Z#e K¶L. Kv#R
 me#P#q te¶k e"eüz nq ¶jfv¶i P¶jZ b"vcm"vK f¯úqvi | k¶³ P¶jZ f¯úqvi I
 ¶e¶fb ai#bi n#q _v#K |



K₁L.1 c jx Dbqb ⁻q̇

cv#VwEi gj'vqb 5.4

mVK DĖ#ii cv#k UK (√) Pý w`b|

1. w₁b#Pi †KvbU n⁻PwjZ f⁻úqv#ii Ask bq ?

K. bRj

L. te-vqvi

M. f⁻ú U⁻vsK

N. †cmvi †Pavi

2. K₁L.Kv#R †Kvb ai#bi f⁻úqv te#k e'eüZ nq ?

K. ÷vqvivi cv#ú UvBc

L. w₁cób cvBc UvBc

M. w₁miÄ UvBc

N. w₁j fvi PwjZ b⁻vcm⁻vK

3. f⁻úqv#ii †Kvb Ask Zi j KxUbnkK#K ¶ž ¶ž KYvq cwiYZ K#i ?

K. cv#ú

L. f⁻úmvi †Pavi

M. bRj

N. j⁻vY

4. w₁b#Pi †KvbU bRj †f#` k<sup>3</sup> PwjZ f<sup>-</sup>úqv#ii cKvi#f` bq ?

K. nvBW₁jK bRj

L. w₁Mqvi UvBc bRj

M. w₁bD#gUK bRj

N. d₁Ms bRj

5. †QvU B₁ÄbPwjZ GK₁U b⁻vcm⁻vK f⁻úqv#ii te-vqvi KZK. ce₁nZ evZv#mi M₁Z m₁aviYZ KZ ?

K. 5 - 10 w₁gUvi/#m#KŮ

L. 30 - 40 w₁gUvi/#m#KŮ

M. 10 - 15 w₁gUvi/#m#KŮ

N. 1 - 5 w₁gUvi/#m#KŮ

e'enwIK

cV 5.5 mxW W#ji gV ch#q c#Pjbn I ex#Ri mVK c#igb wbi|cb (Catibration of seed drill)



G cV tk#I Avcb —

- GKU mxWw#ji wefb Ask, #jv mbv³ Ki#Z cvi#eb|
- mxWw#jiUi wefb c#igvc I m#BR wbyq Ki#Z cvi#eb|
- mxWw#jiUi gV #lgZv wbyq Ki#Z cvi#eb|
- mxWw#ji K`w#j#ekb Ki#Z cvi#eb|

K) GKU mxWw#ji wefb Ask, #jv mbv³ Ki#b|

L) mwii msL`v, mwii t\_#K mwii `#Z I mwii MfxiZv wbyq Ki#b|

M) exR tevbi h#ši m#BR wbyq Ki#b|

N) mxWw#jiUi K`w#j#ekb Ki#b|

O) mxWw#jiUi gV #lgZv t#i/N>Uvq wbyq Ki#b|

cV 5.6 RvcbxR ivBm DBW#ii gV ch#q c#Pjbn I Kv#KvixZv ch#e#Y



G cV tk#I Avcb —

- GKU RvcbxR ivBm DBW#ii ~úvB#Ki msL`v, AvK#Z ch#e#Y Ki#Z cvi#eb|
- GiU w`#q AvMvQv `gb Kivi cK#Z ch#e#Y Ki#Z cvi#eb|
- Gi gV #lgZv (t#i/N>Uv) wbyq Ki#Z cvi#eb|

K) GKU RvcbxR ivBm DBW#ii ch#e#Y K#i Gi ~úvBK msL`v, mwii msL`v, I ~úvB#Ki AvK#Z ch#e#Y Ki#b|

L) GiU Pw#j#q AvMvQv `gb Kivi cK#Z ch#e#Y Ki#b|

M) ciZ N>Uvq G w`#q KZUKZ#Rgi AvMvQv `gb Kiv hvq Zv tei Ki#b|

K_UL.I c j_x Dbqb ⁻q̇

cV 5.7 n⁻ P_WjZ b⁻vc⁻vK f⁻úqv_i ch_e¶Y I c_iP_vj_{bv}



G cW tk_‡/ Avc_‖b —

- GK_U n⁻P_WjZ b⁻vc⁻vK f⁻úqv_i _‖we_‖fb Ask mb_v³ Ki_‡Z cvi_‡eb|
- f⁻úqv_i _‖WmP_vR _‖bYq Ki_‡Z cvi_‡eb|
- f⁻ú_i ck⁻Z_v _‖bYq Ki_‡Z cvi_‡eb|

K) GK_U n⁻P_WjZ b⁻vc m⁻vK f⁻úqv_i ch_e¶Y K_‡i Gi _‖we_‖fb Ask mb_v³ Ki_‡b|

L) f⁻úqv_i _‖m_‖j_‖Ú_v_‡_i m_ó P_vc GK_U t_{cm}_vi t_M_‡R_i m_vn_v_‡h⁻ _‖bYq Ki_‡b|

M) _‖m_‖j_‖Ú_v_‡_i Zij a_viY ¶lgZ_v, bRj KZ_K _‖WmP_vRKZ.Zi_‡_ji c_‖ig_vY(_‖jU_vi/_‖g_‖bU) _‖bYq Ki_‡b| [Hints : GK_U cv_‡Ŷ bRj t_i_‡L _‖Zb _‖g_‖bU mgq a_‡i Zij c⁻_v msMn K_‡i Z_v t₋_‡K c_vZ _‖g_‖b_‡U_i Mo _‖WmP_vR t_ei Ki_‡b|]

N) ⁻v_‖weK D⁻PZ_vq bRj t_i_‡L t_g_‡S_‡Z f⁻ú K_‡i f⁻ú-Gi ck⁻Z_v t_ei Ki_‡b|



Ppovš gŋ`vqb

iPbvŋjK ck

1. mij ųPÎmn GKųU mxWųWžji ųeųfb Asžki KvR eYbv Kižb|
2. GKųU mxW ųWžji K`ųjžekžbi ųižZ Kx ? mxWųWžji K`ųjžekžbi c×ųZ eYbv Kižb |
3. RųgžZ mvi cžqvžMi c×ųZ ųjv Kx Kx nžZ cvži ? GKųU n`PųjZ mvi ųQUvžbv hžŠi Kvhc×ųZ mnRfvže eYbv Kižb |
4. UxKv ųjLžt RvcvbxR ivBm DBWvi |
5. n`PųjZ f`úqvžii cKvižf` ųjLž| ųjfv i PųjZ GKųU b`vcm`vK f`úqvžii Kvhc×ųZ eYbv Kižb |
6. cevniPÎmn GKųU žQvU BiĀb PųjZ b`vcm`vK f`úqvžii Kvhc×ųZ eYbv Kižb|



mųVK DĚi

cųWĚi gŋ`vqb 5.1 t 1) M, 2) L, 3) N, 4) N|

cųWĚi g j`vqb 5.2 t 1) N, 2) L, 3) M, |

cųWĚi g j`vqb 5.3 t 1) N, 2) M, 3) N, |

cųWĚi g j`vqb 5.4 t 1) L, 2) N, 3) M, 4) L, 5) L|

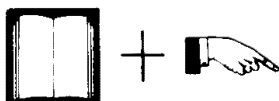
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G BD**h**U cP**j**Z I Av**h**K t**m**P hš**c**W**Zi** weeiY I K**h**cY**w**j**i** D**c**i A**v**j**v**K**c**vZ K**i**v
n**t**q**t**Q I G BD**h**U t**g**vU P**r**iU c**v** i**t**q**t**Q I c_g c**v**†**v** I **w**mD**w**Z**i** weeiY I K**h**cY**w**j
eY**v** K**i**v n**t**q**t**Q I **W**Z**x**q c**v**†**v** t**U**†**W**j c**v**á, t**i**vq**i** c**v**á I **W**q**v**d**g** c**v**†**á**i weeiY I
K**h**cY**w**j eY**v** K**i**v n**t**q**t**Q I **Z**Z**x**q c**v**†**v** t**m**U**d**D**M**j c**v**á I t**i**m**†**c**v**†**K**i**U**s c**v**†**á**i weeiY
I K**h**cY**w**j**i** D**c**i A**v**j**v**K**c**vZ K**i**v n**t**q**t**Q I P**Z**z c**v**†**v** t**i**vU**x** c**v**á, f**v**i**U**K**v**j U**v**i**v**B**b**
c**v**á Ges m**v**eg**v**i**m**e**j** U**v**i**v**B**b** c**v**†**á**i weeiY I K**h**cY**w**j eY**v** K**i**v n**t**q**t**Q I

cvV 6.1 † `vb I w mDw Zi weeiY I KvhcYvw j

G c_vV †k‡I A_vc_Wb —



- $\uparrow \text{'vb } I \text{ } \text{wmDwZ Kx Zv eyS} \uparrow q \text{ ej} \uparrow \text{Z cvi} \uparrow \text{eb|}$
- $\uparrow \text{'vb } I \text{ } \text{wmDwZi KvhcYv} \uparrow j \text{ eYbv Ki} \uparrow \text{Z cvi} \uparrow \text{eb|}$
- $\uparrow \text{'vb } I \text{ } \text{wmDwZi cvwb } \uparrow \text{Zvjvi } \uparrow \text{lgZv Ges G,} \uparrow \text{jv } \text{w} \uparrow \text{q KZ D} \uparrow \text{PZvq cvwb } \uparrow \text{Zvjv}$
 $\text{hyte Zv ej} \uparrow \text{Z cvi} \uparrow \text{eb|}$



Avgiv Rwb evsjv`tk D"P djbkxj km" Drcv`tb tmPi we+kI , iZcY fvgKv i#gQl
 evsjv`tk tmPi Rb" cPijZ I AvaybK tmP hšcwZ e"eÜZ n"Ql cPijZ n" Pwiz tmP
 hšcwZ mvariYZ ¶ž I cwišK Kl#Kiv e"envi KiQl fcp̄ cwb DšEvj#bi Rb" e"eÜZ
 eûj cPijZ n" Pwiz tmP hšcwZi gta" gjZ t'vb I mwDizB cavb| G cvtV Avgiv t'vb
 I mwDizI weeiY I Khcywvj AvjvPbv Ki#ev| Zte t'vb I mwDizI e"envi µgk Ktg
 Avm#Ql

†`vʔbi AvKɿZ Ges cwb
DʔÉvjʔbi D`PZvi Dci
wbfi Kʔi †`vʔbi cwb
†Zvjvi ʔgZv | G ʔgZv
mvaviYZ 3-4 ʔjUvi/tmʔKŨ
Ges †`vb mvaviYZ 1 ʔgUvi
D`PZiq cwb ZʔʔZ cʔi |

† v†bi weeiY I KvhcYwvj

cwɪb tʰzvʝvi cɪpɤbzg cɤwZ.ʃʝvi gʰaː ɠuU GKwU | Lʝj, wɛj, bˈx-bʝʝv I cɤʝ tʰʃK cwɪb
Zzj cɪkeZx wɪpʰzRɠʰZ tɪp tʰevɪ Rbˈ tʰvb eːeüZ nq | ʃˈvɪbi AvKüZ Ges cwɪb
Dːëvʝtɪ DˈPZvi Dci wɪfi Kɪi tʰvɪbi cwɪb tʰzvʝvi ɪɫgZv | G ɪɫgZv mvaviYZ 3-4
wɪUvi/tɪKÜ Ges ʃˈvb mvaviYZ 1 wɪUvi DˈPZvɫ cwɪb ZzʰZ cɪʃi |

mvaYiYZ ZvjMvQ n#Z t`vb ^Zwi Kiv nq | Z#e KvV l aiZe cv#Zi ^Zwi t`vbI cvIqv
 hvq| G#U GK#U tQvU t#S#KvK#Zi cv#i hvi GKcvS tLv#v Ges Aci cvS eÜ _v#K (p#
 6.1)| G#U P#jvevi Rb` e#ki ^Zwi GK#U t#dg `iKvi| t#S#KvK#Zi cv#iUi eÜ cvS#U
 i#k ev tPB#bi m#v#h` GK#U j#v euk ev Kv#Vi L#ki m#t_ e#v _v#K hv #j fvi #n#m#e KvR
 K#i| G #j fvi#U GK#U Dj-# L#ki m#t_ e#v _v#K| #j f#i i Aci cv#š h# _v#K c#Zmvg`
 m#Kvix GK#U IRb hv eo cv_ i ev iKbv g#vUi P#Kv n#Z cv#i| t`v#bi tLv#v cvS#U t#P
 bv#vi g#L tVm t`qv \_v#K| P#j#Ki `#nK IRb l ej c#qv#Mi g#v#g t`v#bi eÜ cv š#K
 c#v#b#Z W#v#v nq| #j f#i i Aci cv#š i c#Zmvg`Kvix IR#bi Kv#Y c#v#b mn cv#U
 D#E#vjb mnR nq Ges tLv#v cvS `#q D#E#v jZ c#v#b t#Pbv j#q c#v#nZ nq|



¶PÎ-6.1 †`vb

Abj_x jbx t †`vb Ges ¶mD₁Z ev D₁oi g₁a˘ cv_K˘ ¶jL₁|

¶mD₁Z ev D₁oi (Swing Basket) ¶eeiY I K₁hcY₁j

ev₁˘ ¶U₁ AvK₁vi Ges c₁wb
D₁Êv₁j₁bi D₁˘PZ₁vi D₁ci
¶bfi K₁†i G₁U₁ ¶gZ₁v 2.5-
3.5 ¶jU₁vi/†m₁†K₁Û n₁†Z
cv₁†i| G₁U₁ 1-1.5 ¶gU₁vi
D₁˘PZ₁vq c₁wb D₁Êv₁jb K₁†Z
cv₁†i|

f₁;c₁ô˘ c₁wb D₁Êv₁j₁bi Rb˘ G₁U₁ I GK₁U c₁vP₁xb Ges e₁ûj e˘eüZ c₁×¶Z| †mP †`q₁vi K₁v†R
m₁vaviYZ G n˘P₁¶jZ †`k₁xq c₁P₁jZ c₁×¶Z e˘eüZ nq| ev₁˘ ¶U₁ AvK₁vi Ges c₁wb D₁Êv₁j₁bi
D₁˘PZ₁vi D₁ci ¶bfi K₁†i G₁U₁ ¶gZ₁v 2.5-3.5 ¶jU₁vi/†m₁†K₁Û n₁†Z cv₁†i| G₁U₁ 1-1.5 ¶gU₁vi
D₁˘PZ₁vq c₁wb D₁Êv₁jb K₁†Z cv₁†i|

¶PG-6.2 G GK₁U m₁qs ev₁˘U †`Lv†bv n₁q†Q| ev₁˘U₁U e₁ûki P₁vUvB†qi ^Z₁i GK₁U
¶Î†K₁vYvK₁vi cv†| G₁U₁ avZe cv†Zi ^Z₁i I n₁†Z cv†i| ev₁˘ ¶U₁ ¶Zb cv†š P₁viU i₁k mshy₁
_v†K| `Rb P<sub>1</sub>vjK g<sub>1</sub>ylg<sub>1</sub>ylfv†e c<sub>1</sub>kz ev Lv†ji c<sub>1</sub>wb D<sub>1</sub>Êv<sub>1</sub>jb ˘vbi `ycv†k `wo†q i₁ki
m₁v†h˘ ev₁˘U†K c₁wb†Z ¶b†¶c K₁†i Ges ev₁˘U₁U c₁wb ¶`†q c<sub>1</sub>† K<sub>1</sub>†i| c<sub>1</sub>†i †`vjv†bvi
gia†g c₁wb c₁† ev₁˘U †_†K c₁wb †mPbvjq ¶b†¶c K₁†i|

¶PÎ 6.2 ¶mDvZ ev DvO



mvigg t †`vb I ¶mDvZ n†"Q f;ĉ cwb D†Ëvj†bi eûj cPvjZ cvPxb c×vZ| evsjv`†ki
¶lž I c¶ŠK Kl†Kiv f;ĉ cwb †Zvjvi Rb" g†Z †`vb I ¶mDvZ e"envi K†i
_v†K| †v†bi cwb †Zvjvi ¶lgZv mvaviYZ 3-4 ¶jUvi/†m. Avi ¶mDvZi cwb
†Zvjvi ¶lgZv mvaviYZ 2.5-3.5 ¶jUvi/†m. |



cvWĖi gjvqb 6.1

mVK DĖii cvk UK (√) Pý b

1. GKU tK i m bi U bi Dc i i Ask tK U t d j m D Z ^ Z i K i cvb DĖj b Ki t Z
Kgc t KqRb t j v K i K v i

(K) Kgc t GKRb t j v K i K v i

(L) Kgc t Rb t j v K i K v i

(M) Kgc t ZbRb t j v K i K v i

(N) Kgc t P v i Rb t j v K i K v i

2. t v bi Aci cvš IRb teta t qv nq tKb ?

(K) cvb DĖj b mnR mva Kiv nq

(L) t v b cvb t Z W t b v mnR mva Kiv nq

(M) cvb DĖj b I t v b cvb t Z W t b v mnR mva Kiv nq

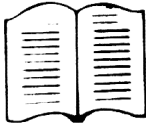
(N) t v b t K m g v e v q i v L v nq

cvV 6.2 †U†Wj, †ivqvi I Wqvdvg cv†úí weeiY I KvhcYwj

G cvV †k†I AvciB —



- †U†Wj cvú, †ivqvi cvú I Wqvdvg cvú Kx Zv ej†Z cvi†eb|
- Dc†iv³ cvú ,†jvi KvhcYwj eYbv Ki†Z cvi†eb|
- †U†Wj cvú, †ivqvi cvú I Wqvdvg cvú ††q cvb †Zvjvi ††gZv Ges KZ D†PZvq cvb †Zvjv hv†e Zv ej†Z cvi†eb|



evsjv`k ††Z †m†Pi Kv†R f†f cvb D†E†j†bi Rb† tek K†qK ai†bi n†Pm†jZ †mP hšc†Z e†eüZ n†Q| G,†jvi g†a† †U†Wj cvú, †ivqvi cvú I Wqvdvg cvú ††k† f††e D†jL†h†M†| Z†e evsjv`k†i D†E†i A††j †U†Wj cvú e†cK††e e†eüZ n†Q| G cv†V Av†iv †U†Wj cvú, †ivqvi cvú I Wqvdvg cv†úí KvhcYwji Dci Av†jvPbv Ki††ev|

†U†Wj cvú (Treadle pump) Gi weeiY I KvhcYwj

†U†Wj cv†úí ca†b K†qK†U Ask n†Q - GK†U avZe cvú†nW (Pump head), ††v e†ki cv†b (Treadle), e†ki †Z†i GK†U Kv††g†v, ††c††m/e†ki c†Bc Ges ††B†vi (Strainer)|

†U†Wj cvú n†Q c†-Pm†jZ cvú hv K†, bjK† ev f†f† th †K†b cv†bi Dm ††K cvb D†E†j†b Ki†Z cv†i| 7-8 ††g†vi D†PZvq Gi cvb D†E†j†b ††gZv 1-1.5 ††j†vi/†m†K†U| †U†Wj cv†úí ca†b K†qK†U Ask n†Q - GK†U avZe cvú†nW (Pump head), ††v e†ki cv†b (Treadle), e†ki †Z†i GK†U Kv††g†v, ††c††m/e†ki c†Bc Ges ††B†vi (Strainer)| cvú†n†Wi ††v Ask i†q†Q - avZe cv†Zi †Z†i ††j†vi (D†f†q†UB m†k I m†g†š†iv† Ges hv ††b†Pi ††K m†K†b cv††ci m††_ Sv†j†B K†i j†v††b†v ††K) Ges i†k I c††j m†K††i ††v ††c††b ev cv†R†vi| m†Pi†Pi e†eüZ g†Wj,†j†v†Z 4.7 ††m.††g. e†††mi ††m†j††vi e†eüZ n†q ††v†K| ††m†j††vi ††v ††b†Pi ††K GK†U m†h††K†vix ev†. i g†v††g h†† ††v†K| ††P†-6.3G ††L††b†v n†q†Q ††K††e cvú††U Kv†R K†i| Ea††g†† N††Z cv†R††i†i f††j† e†† n†q hv†q| ZLb m†K†b c†Bc ††q cvb ††m†j††vi†i c††k K†i| c††Z††U ††m†j††vi†i ††b†P GK†U K†i ††b†q††Y f††j††f (Check valve) i†q†Q hv† iv††††i †Z†i cv†Z ev P†K††Z| cvb hLb Ea††††K c††v††Z n†q ZLb ††PK f††j††f L††j ††M††q cv†††K ††m†j††vi†i c††k Ki†Z ††q| ††c††b KZ††G G cvb ††m†j††vi†i cv†q I††††i cv††† e††v††Z n†q| GKB m††_, c†††i N††Z c††kKZ.cvb ††m†j††vi†i ††K †††i n†q hv†q|

††P†-6.3 †U†Wj cvú

††b††g†† N††Z†i m††q c††R†vi f††j††f L††j hv†q Ges ††m†j††vi†i†i ††PK f††j††f e†† ††v††K| cvb

c_vbR_{vi} f_vj_†f_i †fZi [†]q Ic_†i P_†j A_v†m Ges [†]có_bU [†]m_jŮ_v†i_i †fZi c_vb_i ga[†] [†]q
Ic_i †_†K [†]b_†P P_†j A_v†m| eÜ †PK f_vj_fU m_vK_kb c_vBc †_†K A_vMZ c_vb_†K Aci
[†]m_jŮ_v†i c_†e_†k eva[†] K_†i K_viY D³ [†]m_jŮ_v†i [†]có_b ZLb Ea_vg_† N_v†Z _†v_†K|

[†]PÎ-6.4G c_v†_†ú_i Dc_†iK_vV_†g_v †[†]L_v†b_v n_†q_†Q| [†]Ů_v †U_†W_†j_i m_v†_† h_† i_†q_†Q [†]Ů_v c_vÄ_{vi}
iW (Rod) Ges GK_†U i_†k| G i_†k_†U K_v†V_i ^Z_†i GK_†U c_†y ev P_vK_†Z_i Dc_i [†]q P_jvP_j
K_i†Z c_v†i| A_†bK K_IK G [†]WR_vB_b c_†ieZ_b K_†i c_†y Q_vo_vB †U_†W_j c_v†_†ú_i P_vj_vq| G
c_†×_†Z_†K †X_†K c_†×_†Z e_†j|

[†]Ů_v †U_†W_†j_i GK_†Ug_v† d_vj_†μ_vg [†]cb (eo [†]cb) i_†q_†Q| †U_†W_j [†]Ů_v tek j_† (m_vav_iYZ 2
[†]g_Uvi) i_vL_v n_q h_v†Z P_vjK †cQ_†b m_†i [†]M_†q Kg ej c_†q_v†M K_vR K_i†Z c_v†i A_†ev [†]ØZ_†q
A_v†iK_Rb P_vjK †cQ_†b [†]w_v†Z c_v†i| c_v†_†ú_i P_vj_v†b_{vi} mg_q P_vj_†K_i f_vi_mv_g i_†Ů_v Ges †V_m
†[†]q_vi R_b e_††ki ^Z_†i K_vV_†g_v _†v_†K|

[†]PÎ-6.4 †U_†W_j c_v†_†ú_i Dc_†i K_vV_†g_v

†ivq_i c_v†_†ú_i (Rower Pump) G_i [†]eeiY I K_†hcY_†j

D_†Ě_vj_†b_i D[†]PZ_{vi} Dc_i
[†]b_fi K_†i G_i †gZ_v M_†o 1
[†]jU_{vi}/ †m_†K_†Ů chš n_†Z
c_v†i|

G_†U GK_†U n[†]P_vjZ c_v†_†ú_i | G_i c_†iP_vj_bv c_†×_†Z A_†bK_Uv †bšK_{vi} [†]w U_vb_{vi} gZ| Z_vB
G_†K †ivq_{vi} c_v†_†ú_i e_†j| D_†Ě_vj_†b_i D[†]PZ_{vi} Dc_i [†]b_fi K_†i G_i †gZ_v M_†o 1 [†]jU_{vi}/ †m_†K_†Ů
chš n_†Z c_v†i| G_†U c_vq 6.5-7 [†]g_Uvi [†]bP †_†K c_vb D_†Ě_vj_b K_i†Z c_v†i [†]m_jŮ_v†i, [†]có_b,
n_vZ_j, dšf_vj_f, m_vR c_vÎ (Surge chamber), [†]c_†f_†m c_vB_†c_i ^Z_†i GK_†U Y- [†]c_†m Ges
m_vK_kb c_vBc G Ask_†j_{vi} mgš_†q †ivq_i c_v†_†ú_i M_vVZ |

[†]PÎ-6.5G GK_†U †ivq_{vi} c_v†_†ú_i †mK_kb †[†]L_v†b_v n_†q_†Q| c_v†_†ú_i [†]m_jŮ_v†i GK_†U 5 †m. [†]g.
e[†]v_†m_i [†]c_†f_†m c_vBc h_{vi} [†]b_†P_i [†]†K GK_†U dšf_vj_f L_v†c em_v†b_v _†v_†K Ges [†]có_bU GK_†U
msh_† i_†W_i m_vv_††h[†] [†]m_jŮ_v†i_i †fZi I_vb_vg_v K_†i| m_vR c_vÎ I [†]m_jŮ_v†i GK_†U Y- [†]c_†m_i
m_vv_††h[†] 3.8 †m. [†]g. e[†]v_†m_i m_vK_kb c_vB_†c_i m_v†_† j_vM_††b_v _†v_†K| m_vK_kb c_vB_†c c_vb_i te_†M_i
mgZ_v i_†Ů_v K_i†i R_b m_vR c_vÎ e[†]e_†üZ n_q| G_†Z D_fq N_v†Z m_vK_kb c_vB_†c c_vb_i ce_vn m_†g_†
n_q Ges P_vjK m_n†R I eva_vn_†x_b f_v†e [†]có_b U_vb_†Z c_v†i| c_v†_†ú_i dšf_vj_†f_i Ae_†v_b m_vR

$c_{\hat{t}}\hat{t}i$ g_{Li} $Ae^{-}vb$ $n_{\hat{Z}}$ $_{\hat{b}}P$ $_{-v}K$ $e_{\hat{j}}$ $D_{\hat{E}}j_{\hat{b}}i$ mgq $c_{\hat{w}b}$ $mg_{\hat{e}}M$ $j\hat{U}_{\hat{v}}i$ $_{\hat{f}}Zi$
 $c_{\hat{e}k}$ $K_{\hat{t}}i$ | $c_{\hat{v}}\hat{u}i$ $j\hat{U}_{\hat{v}}iU$ $A_{\hat{b}f}g_{\hat{t}}Ki$ $m_{\hat{v}}_{-30^{\circ}}$ $tK_{\hat{v}}Y$ $Ae^{-}vb$ $K_{\hat{t}}i$ |

WPI-6.5 †ivqvi cvaú

nvZ+jj gva'tg w'cób+K lC+ii w`+K Uwb w`+j dzfvjf L+jj wM+q wmwjûv+i cwlb c'ek
K+i | Gmgq w'cób+i fvjfvU eÜ -v+K | d+j w'cób+i Dcwiw-Z cwlb (ceeZx Nv+Zi mgq
c'ekKZ) wmwjûv+i lC+ii tLv+jv g+ w`+q tei n+q h+q |

11bagl NvʔZi mgq niZjʔK 11bʔPi 11`ʔK ʔVjv 11`ʔj dʔfʔj f eÜ nʔq hvq 11KŠ 11c0ʔbi
 fʔj fʔU Lʔj hvq | dʔj 11m jÜvʔii ga 11Z c 11b 11c0ʔbi 1cʔi Pʔj Avʔm hv cieZx Eaʔgylx
 NvʔZi mgq 11m jÜvi ʔ_ʔK ʔei nʔq Avʔm |

Wwqvdvg **cvau** (Diaphragm Pump) **Gi weeiY I KvhcYvwj**

ews jvʔ ʔk e"eüZ G cʔaú
mʷKkb ʷjdU 2.74 ʷgUv
Ges cʷb cʷaú Kivi ʔlgZ
cʷZ NʷUvq 17.04 ʷjUv |

n⁻ PwJZ WqvdvG cvaú mvKkb c†Kvô I Wqvdv†gi mgš†q MvVZ| cv†aúi wfb Ask
 wPÎ-6.6G †⁻ L†vbn n†q†Q| cv†aúi KvhcYwJ Lg mnR| nvZjU I c†ii w†K Uvb†j cv†aúi
 WqvdvG cmwiz nq Ges cwb cv†aúi b†j c†ek K†i cvaú c†Kvô hvq| Avevi nvZjU
 w†b†Pi w†K Uvb†j cv†aúi WqvdvG msKZ nq Ges cwb†K cvaú c†Kvô ††K †ei K†i
 ††q| wMgb I c†ek c†₋ d†vcvi fvjf w††q cwb cev†ni w†K w†bqšb Kiv nq| nvZ†ji GK
 cv†š IRb ††L Aci cvš ††K GKRb ††vK G cvaú P†jv†Z cv†i| e†sjv††k e†eüZ G
 cv†aúi mvKkb w†jdu 2.74 w†qUvi Ges cwb cvaú Kivi ††qZv c†Z N†Uvq 17.04 w†jUvi|



cVWĖi gj`iqb 6.2

mVK DĖĭi cĭk UK (√) Pý `b|

1. †KvU mVK ?

- (K) †UWj cVáú Eagl NvZ cVĖi fvj f eÜ _vK Ges †bqšY fvj f Ljy hvq;
d†j mVKkb cVbc `†q †mijŮ†i cVb c†ek K†i |
- (L) †UWj cVáú Eagl NvZ †bqšY fvj f eÜ _vK Ges cVĖi fvj f Ljy hvq;
d†j mVKkb cVbc `†q †mijŮ†i cVb c†ek K†i |
- (M) †UWj cVáú †bgl NvZ cVĖi fvj f eÜ _vK Ges †bqšY fvj f Ljy hvq;
d†j mVKkb cVbc `†q †mijŮ†i cVb c†ek K†i |
- (N) †UWj cVáú †bgl NvZ †bqšY fvj f eÜ _vK Ges cVĖi fvj f Ljy hvq;
d†j mVKkb cVbc `†q †mijŮ†i cVb c†ek K†i |

2. †KvU mVK ?

†ivqvi cVáú mVKkb cVbc cVbi ††Mi mgZv i †v Kivi Rb` -

- (K) †mijŮ†i U Aby†g†Ki m†_ 30° †Kv†Y Ae⁻vb K†i |
- (L) mVR cVĭ e⁻eüZ nq |
- (M) †Rv†i †Rv†i `† Uvbi gZ Uvb†Z nq |
- (N) d†fvj†fi Ae⁻vb mVR cV†ĭi Ae⁻vb n†Z I c†i _vK |

3. †KvU mVK ?

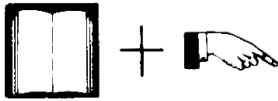
- (K) Wqvdiġ cVáú Wqvdiġ hLb msKĖZ nq ZLb cVb cVáú c†Kv†ô c†ek K†i
- (L) Wqvdiġ cVáú Wqvdiġ hLb cmv†iZ nq ZLb cVb cVáú c†Kv†ô c†ek K†i
- (M) Wqvdiġ cVáú Wqvdiġ hLb cmv†iZ nq ZLb cVb cVáú c†Kv†ô †_†K †ei
n†q hvq |
- (N) Wqvdiġ cVáú Wqvdiġ hLb msKĖZ nq ZLb †bMgb c†_ d⁻vci fvj f eÜ
_vK |

4. †KvU mVK ?

- (K) †UWj cVáú `†q 6.5 -7.0 †gUvi †bP †_†K cVb D†Ėjb Kiv hvq
- (L) †`vb `†q m†aviYZ 6.5 -7.0 †gUvi †bP †_†K cVb D†Ėjb Kiv hvq
- (M) †ivqvi cVáú `†q m†aviYZ 10 -15 †gUvi †bP †_†K cVb D†Ėjb Kiv hvq
- (N) Wqvdiġ cVáú `†q m†aviYZ 5 - 6.5 †gUvi †bP †_†K cVb D†Ėjb Kiv hvq

cv 6.3 *tmUddMvj I tim#cv#KUs cv#úí weeiY I KhcYwj*

G cv *tkI* Avci_b —



- *tmUddMvj* cv#ú *I tim#cv#KUs* cv#ú K_x Z_v ey₈q ej_zZ cvi#eb|
- *tmUddMvj* cv#úí *KhcYwj* eYbv Ki_zZ cvi#eb Ges Gi mnv#h⁻ fMf⁻ bjK_c t₋K cv_b tZvjvi ¶lgZ_v Ges KZ D^oPZvq cv_b tZvjv hv_{te} Z_v ej_zZ cvi#eb|
- *tim#cv#KUs* cv#úí *KhcYwj* eYbv Ki_zZ cvi#eb Ges Gi mnv#h⁻ fMf⁻ bjK_c t₋K KZ D^oPZvq cv_b tZvjv hv_{te} Z_v ej_zZ cvi#eb|

Avqv⁻i t⁻tk Riq_z *tmP* c⁻v#bi Rb⁻ wefb cKvi k³PwjZ cv#ú e⁻eüZ n^oQ| G⁻i g^a Lvj-iej, b⁻x-bvjv *I c₈z* t₋K cv_b tZvjvi Rb⁻ *tmUddMvj* cv#ú e⁻envi Kiv n^oQ| GUv cvlqvi cv#ú bv_g cwiPZ| Avqv⁻i t⁻tk AMfxi bjK_c th cv#ú e⁻envi Kiv n^oQ *tmUI* *tmUddMvj* cv#ú | AMfxi bjK_c *tim#cv#KUs* cv#ú *I* e⁻envi Kiv hvq| bjK_zci cv_{bi} t_fZi cvbRvi *I* fvjf e⁻envi K_i *tim#cv#KUs* cv#úK Mfxi bjK_c *I* e⁻envi Kiv th_zZ cv_i *I* *tim#cv#KUs* cv#ú n⁻PwjZ ¶Ksev k³PwjZ n_zZ cv_i *I*

tk_o v_uZM ev *tmUddMvj* cv#ú *Gi weeiY I KhcYwj*

tk_o v_uZM ev *tmUddMvj* cv#ú (Centrifugal Pump) n^oQ GK_U N^oqgvb hš hv ⁻ქ_v As_zki mgš_zq MvZ (¶PÎ-6.7)| G ⁻ქ_v Ask n^oQ- N^oqgvb Ask A_{vr} B_zújvi (Impeller) *I* ¶i Ask A_{vr} cv#ú tK_{ms} (Pump casing)| P_vK_uZi b_vq GK ev GK_uaK B_zújvi cv#ú k⁻vd_zUi (Shaft) ms_zM msh_z ₋v_zK| ¶eqvish_z k⁻vdU Bb_uRb (Engine) ev ê⁻ÿZK gUi (Electric motor) ¶_zq tN_vv_z B_zújvi Zvi m_z ₋m_z N_zz ₋v_zK| ¶WdDRvi UvBc (Difuser type) *tmUddMvj* cv_zú ¶WdDRvi ev MvBW t_fb (Guide vane) j_vMv_zbv ₋v_zK hvi ga⁻eZ_x ⁻v_zb B_zújvi tN_vz *I*

tmUddMvj cv#ú B_zújvi ex c_zKv_zô tN_vz cv_bzK tK_z ⁻i ¶_zK cev_unZ K_z Ges c_zi cv_bzK *tmUddMvj* ej c_zqv_zM tK_{ms} t₋K ¶WmPvR (Discharge) cv_zc ¶b_z¶c K_z *I*

KhcYwj t P_vjyKivi Rb⁻ cv#ú cv_b ¶_zq c_zY Kiv nq Ges B_zújvi tN_vv_zbv nq| cv_b B_zújv_zii m_z ₋tN_vz_z ₋v_zK Ges D^oP M_zz_zeM cv_z nq| *tmUddMvj* ej cv_bzK evB_zii ¶_zK ¶b_z¶c K_z *I* d_zj cv_{bi} c_zek c_z kb⁻Z_v m_zq nq Ges evB_zii evq_zc cv_b D_zm t₋K cv_zc c_zek K_z *I* tK_{ms}-G c_zeo cv_{bi} D^oP M_zz_zeM D^oP P_zc c_ziiYZ nq Ges ¶WmPvR cvB_zci ga⁻¶_zq cv_b t_mP bv_zqv ¶M_zq t_zQvq| D_zjL⁻ cv#ú P_vjyKivi c_ze m_zKkb cvBc *I* tK_{ms} cv_b ¶_zq c_zY K_z ¶b_zZ nq Ges G K_vR_zK ejv nq ÔcvB_zgsÔ (Priming)| G ai_zbi cv#ú 7.5 ¶gUvi t₋K Kg MfxiZvq cv_b D_zËvj_zb e⁻eüZ nq|

G ai_zbi cv#ú 7.5 ¶gUvi t₋K Kg MfxiZvq cv_b D_zËvj_zb e⁻eüZ nq|

PI-6.7 tmmUiddDMvj cvú



Abjbx t tmmUiddDMvj I tiimcvKUs cvú g`a` cv_K` jicex Kiab|

tiimcvKUs cvú **Gi eeiY I KhcYj**

tiimcvKUs cvú (Reciprocating Pump) tK c÷b cvúI (Piston Pump) ejv nq| GLv`b c÷bi mrv`h` mUjÚvii t`Zi t_K cvb AcmviiZ nq Ges cvbi cevn fvjf mrv`h` bqšb Kiv nq| Ea`gNvZ c`ek fvjf L`j hvq Ges WmPvR fvjf eÜ\_v`K| d`j m` kb`Zvi Rb` mKkb cvBc v`q mUjÚvii cvb c`ek K`i Ges cvAv`ii Dc`ifvM c`ei v`gNvZ c`eó cvb tWjfvix cvBc v`q tei n`q hvq| Avevi v`gNvZ WmPvR fvjf L`j hvq Ges c`ek fvjf eÜ\_v`K| d`j cvAv`ii v`bP c`ei Ea`gNvZ c`eó cvb WmPvR fvj`fi Dc`ifvM c`ek K`i| c÷b mUjÚvii t`Zi I v`bgy Kivi d`j cvbi cevn m`ó nq| c÷b cvúI gZv mUjÚvii mvBR, c÷b NvZi (Stroke) ^`N` I c÷bi MvZ`e`Mi Dci v`bi K`i| G RvZxq cvú v`q 6-7 gUvi D`PZvq cvb D`Evjb Kiv hvq|

G RvZxq cvú v`q 6-7 gUvi D`PZvq cvb D`Evjb Kiv hvq|

h` I 10.33 gUvi D`PZvq cvb I v`i K\_v, ev`e Nlb I Ab`vb` AcP`qi Kv`Y 6.5-7.0 gUvi chš cvb I`V|

AMfxi bjk`c e`eüZ tiimcvKUs cvú b`j cvb evB`ii evZv`mi P`c c`ek K`i|

cvʔáui ʔcób nvZʔji msʔM jvMvʔbv ֿvʔK Ges nvZj ʔcób Ivbvgyv Kviʔq cvʔáui bj nʔZ
evZvm tei Kʔi ֿq nq (ʔPĬ-6.8) | dʔj bʔji ֿfZi kbʔZv mʔó nq Ges cvʔb bj ֿʔq
Icʔi IʔV | cʔi G cvʔb cvʔáui gy ֿʔq teiʔq Avʔm | h ֿ I 10.33 ʔgUvi DʔPZvq cvʔb
Ivvi Kֿv, evֿ ֿe Nlb I Abֿvbֿ AcPʔqi KviʔY 6.5-7.0 ʔgUvi chš cvʔb IʔV |

nֿ PwjjZ ֿiimʔcvʔKʔUs
cvʔáui ֿʔq 45 ʔg chš cvʔb
Ivʔbv hʔq | Zʔe kֿ³
PwjjZ Mfxi bjKʔc ֿgvUi
ʔKsev BֿĀb eֿenvi Kiv
nq |

bjKʔci bʔji cvʔbi ֿfZi cvʔvi I fvjf eֿenvi Kʔi evֿ eֿenvi DcʔhvMx th ֿKvb
DʔPZvq cvʔb Ivʔbv mʔe | Mfxi bjKʔc ֿiimʔcvʔKʔUs cvʔáui nֿ PwjjZ ev kֿ³ PwjjZ nʔZ
cvʔi | nֿ PwjjZ ֿiimʔcvʔKʔUs cvʔáui ֿʔq 45 ʔg Dci chš cvʔb Ivʔbv hʔq | Zʔe kֿ³
PwjjZ Mfxi bjKʔc ֿgvUi ʔKsev BֿĀb eֿenvi Kiv nq |

G cvʔV ֿmʔUֿddMvj cvʔáui I ֿiimʔcvʔKʔUs cvʔáui ʔeeiY I KvhcYvjj mʔúʔK Avgvʔֿi
Rvʔbv nj | ֿmB mʔֿ Avgiv Rvbjvg th evsjvʔֿk RıgʔZ ֿmP ֿqvi ֿʔĬĬ Lvj-ʔej, bֿx-
bvjv I cֿkʔ ֿֿʔK cvʔb ֿZvjvi Rbֿ kֿ³PwjjZ ֿmʔUֿddMvj cvʔáui eֿvcKfֿvʔe eֿenvi Kiv
nʔֿQ | Avgiv Avʔiv Rvbjvg th bjKʔci cvʔbi ֿfZi cvʔvi I fvjf eֿenvi Kʔi
ֿiimʔcvʔKʔUs cvʔúʔK Mfxi bjKʔc I eֿenvi Kiv thʔZ cvʔi | ֿiimʔcvʔKʔUs cvʔáui nֿ PwjjZ
ʔKsev kֿ³PwjjZ nʔZ cvʔi | cieZx cvʔV Avgiv ֿivUvix cvʔáui, fviֿUKvj UvievBb cvʔáui I
mvegvimej cvʔáui ʔeeiY I KvhcYvjj mʔúʔK AvʔjvPbv Kiʔev |

ʔPĬ-6.8 ֿiimʔcvʔKʔUs cvʔáui



mıgg t Avgiv Rvbjvg th evsjvʔֿk RıgʔZ ֿmP ֿqvi ֿʔĬĬ Lvj-ʔej, bֿx-bvjv I cֿkʔ
ֿֿʔK cvʔb ֿZvjvi Rbֿ kֿ³PwjjZ ֿmʔUֿddMvj cvʔáui eֿvcKfֿvʔe eֿenvi Kiv
nʔֿQ | ֿiimʔcvʔKʔUs cvʔáui AMfxi bjKʔc eֿenvi Kiv nʔq ֿvʔK | Aekֿ bjKʔci
cvʔbi ֿfZi cvʔvi I fvjf eֿenvi Kʔi ֿiimʔcvʔKʔUs cvʔúʔK Mfxi bjKʔc I
eֿenvi Kiv thʔZ cvʔi | ֿiimʔcvʔKʔUs cvʔáui nֿ PwjjZ ʔKsev kֿ³PwjjZ nʔZ cvʔi |



cvžVĖi gj`vqb 6.3

mVK DĖžii cvžk UK(✓) Pý ž`b|

1. žmžUdDMvj cvžóú cavb Ask`žž Kx ?

(K) Bžóújvi I cvžó žKžms|

(L) Bžóújvi I cvĖvi|

(M) Bžóújvi I bj|

(N) cvĖvi I bj|

2. žKvžU mVK ?

(K) Mfxi bjkžc žmžUdDMvj cvžó n⁻PvjZ nžZ cvži|

(L) Mfxi bjkžc žimžcvžKžUs cvžó n⁻PvjZ nžZ cvži|

(M) Mfxi bjkžc žmžUdDMvj cvžó BbžRb PvjZ nžZ cvži bv|

(N) Mfxi bjkžc žmžUdDMvj cvžó BžjžK gUi PvjZ nžZ cvži bv|

3. žKvžU mVK ?

(K) žmžUdDMvj cvžó ž`žq 6.5-7.0 žgUvi D"PZvq cvžb DVžžbv hvq|

(L) žmžUdDMvj cvžó ž`žq žh žKvž D"PZvq cvžb DVžžbv hvq|

(M) žmžUdDMvj cvžó ž`žq 45 žgUvi D"PZvq cvžb DVžžbv hvq|

(N) žmžUdDMvj cvžó ž`žq 3-4 žgUvži žtek D"PZvq cvžb DVžžbv mžž bq|

4. žKvžU mVK ?

(K) žcób I Vvžgv Kžižq žimžcvžKžUs cvžó ž`žq cvžb I Vvžbv nq|

(L) Bžóújvi I Vvžgv Kžižq žimžcvžKžUs cvžó ž`žq cvžb I Vvžbv nq|

(M) Bžóújvi I Vvžgv Kžižq žmžUdDMvj cvžó ž`žq cvžb I Vvžbv nq|

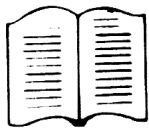
(N) žcób Nžižq žimžcvžKžUs cvžó cvžb I Vvžbv nq|

cv 6.4 tivUvix cváú, fviUKvj UvieBb cváú I mvegvimej cváži weeiY I KvhcYwj

G cvV tkI AvciB —



- tivUvix cváú K Zv eySžq ejžZ cvižeb I KvhcYwj eYbv KižZ cvižeb|
- fviUKvj UvieBb cváži KvhcYwj eYbv KižZ cvižeb|
- mvegvimej cváú K Zv eySžq ejžZ cvižeb|
- fMf˘ bjKžc KLb fviUKvj UvieBb cváú I KLb mvegvimej cváú e˘envi Kiv DıPZ Zv ejžZ cvižeb|



Avgvž`i t`žk tmžPi KvžR AžbK ı`b t_žK Mfxi bjKžc e˘eüz nžQ| Mfxi bjKžc fviUKvj UvieBb cváži mnvnžh˘ cvıb žZvjv nq| Zž mvegvimej cváú I e˘envi Kiv thžZ cvižeb| tivUvix cváú K₁L.RıgžZ gvžS gvžS tmžPi Rb˘ e˘eüz cváži ılgZv eyxKviK ınnžmže e˘envi Kiv nžq _vžK| G cvV Avgiv tivUvix cváú, fviUKvj UvieBb cváú I mvegvimej cváži weeiY I KvhcYwj máúžK AvžjvPbv Kižev|

tivUvix eı NYb cváú (Rotary Pump) Gi weeiY I KvhcYwj

tivUvix cváú (Rotary Pump) mvariYZ jyežKıUs Ažqj cžqıM KižZ e˘eüz nq | GıUžK gvžS gvžS K₁L.RıgžZ cvıb tmžPi Rb˘ e˘eüz cváži ılgZv eyxKviK (Booster) ınnžmže e˘envi Kiv nžq _vžK| mvariYZ th mg˘ – tivUvix cváú t`Lv hvq tm\_žjv K˘vg (Cam) A\_ev ıMqvi ( Gear) ı`žq ıWRvBb Kiv nq|

G cváú GKıU cžek c_, ıbMgb c_ Ges ıMqvi A_ev K˘vg mn GKıU cžKıđi mgšžq MıVZ|

G cváú GKıU cžek c_, ıbMgb c_ Ges ıMqvi A_ev K˘vg mn GKıU cžKıđi mgšžq MıVZ| GKıU ıMqvi UvBc tivUvix cváú ıPÎ-6.9G t`Lvžbv nžqžQ| GKıU ıMqvižK ejv nq PıjK ıMqvi hv eıBžii k<sup>3</sup> ı`žq PıjZ nq Ges Ab˘ ıMqvižK ejv nq PıjZ ıMqvi hv PıjK ıMqvi ı`žq cııPıjZ nq| ıMqvi žıv cžKıđi žZi mygfıte mšhvRb Kiv nq| hLb ıMqvi žıv tNvži ZLb ıMqviıi žZi ga˘eZx˘vžb cvıbžK AvUıKžq eııMgb cž\_ cvıVžq t`q| džj kb˘Zvi mıó nq Ges cžek cž_ cvıb cžek Kžı| Gfvžte myg cvıbi ceıv mıó Kiv nq| G cváži KvıhılgZv Pıžci Dci ıbfikıj bq|

ıPÎ-6.9 tivUvix cváú

fviUKvj UvieBb cvaú Gi weeiY I KvhcYwj

G cvaú cwi bi wbP vcb
KiZ nq ej GKU Lvov
jav k'vdUi mrvh"
cvaúK fgi mgZj
Ae Z BbRb ev e`yZK
gUii mv_ mshy Kiv nq|

Mfxi bjkKc e'eüZ UvieBb cvaú (Turbine Pump) GKwaK tmiUldDMvj BgcjvitK
mviR ms'hvM K'i ^Zi Kiv nq (PÎ-6.10) | cwiU Btújvi GKU evDjji gta Ae vb
K'i Ges D³ ms'hvRbK cvaú a/c (Stage) ejv nq | G cvaú cwi bi wbP vcb KiZ
nq ej GKU Lvov jav k'vdUi mrvh" cvaúK fgi mgZj Ae Z BbRb ev e`yZK
gUii mv_ mshy Kiv nq | Btújvi cwi bi wbP wbgjZ vKvi Kvitb G cvaú tKvb
mvKkb tnW (Suction head) tbB | cvaú eivei cwi bi tjtj t_K WmPvR cBc w`tq
fytZ cwi b cwiZ'vMi vb chš D'PZvK ejv nq WmPvR tnW (Discharge head) | WmPvR
tnW I cwi bi Pvc Btújvii e'vm, msL'v I N'btMi Dci wbf i K'i | KuL. tmtP
tmiUldDMvj cvaú wbpZ_K cwi b D'Evjb qgZv Qwoq tMtj fviUKvj UvieBb cvaú
e'envi Kiv nq |

wbgjZ ev mvegiimej cvaú (Submersible Pump) Gi weeiY I KvhcYwj

G aiZbi cvaú Rb cvaú
nvD'R Kg RvqMvi
c'qvRb | wKš fviUKvj
UvieBb cvaú A_ev
tmiUldDMvj cvaú Z'bvq
G cvaú `qZv Kg |

wbgjZ ev mvegiimej cvaú (Submersible Pump) Pjvevi Rb th e`yZK gUi e'eüZ
nq Zv cvaú gZB cwi bi wbP vcb Kiv nq (PÎ-6.11) Ges GRbB GUvK wbgjZ
UvieBb cvaú ej | cwi bivaK K'vetji mrvh" gUiU'Z we`y ms'hvM t`qv nq | AZwaK
Mfxi bjkKci thLv b cwi bi tjtj AZš wbp vK tmlv b cvaú Rb AZwaK jav
k'vdu e'envi AbxthvM nq c'o | tm Kv'Y cvaú A'Z wbkU cvaú k'vdUi mv_
cwi bivaK Ae vq gUiU'K vcb Kiv nq | mvegiimej cvaú tQvU h_v 10 tm.wg. e'vm
wekó cBcI vcb Kiv thZ c'v | mZivs mvegiimej cvaú fviUKvj UvieBb cvaú
Z'bvq tQvU w`h' cBc c'qvRb nq | G aiZbi cvaú Rb cvaú nvD'R Kg RvqMvi
c'qvRb | wKš fviUKvj UvieBb cvaú A_ev tmiUldDMvj cvaú Z'bvq G cvaú `qZv
Kg |

G cvtV tivUvi cvaú, fviUKvj UvieBb cvaú I mvegiimej cvaú weeiY I KvhcYwj
maúK Avgv`i Rbv n'jv | tmB mv_ Avgiv AeMZ njvg th thLv b fMf cwi bi i tek
wbP tmlv b cwi b tmtPi Rb fviUKvj UvieBb Ges AZwaK wbp cwi bi i tbtg tMtj
mvegiimej cvaú e'envi Kiv thZ c'v | Zte evsjv`k fviUKvj UvieBb cvaú
e'envi e'vck |

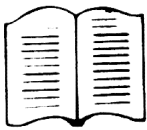
G BDwbU Avgiv cPijZ I AvaybK tmtP hšcwZi weeiY I KvhcYwji Dci Av'jvKcZ
Kijvg | Avgiv AeMZ njvg th t'vb I wmdwZ e'envi K'i fcp cwi b tmtP t'qv hvq |
Avgiv AeMZ njvg th n'Pw'jZ tU'Wj cvaú, tivqvi cvaú I Wqvdig cvaú Ges BbRb ev
gUi Pw'jZ tmiUldDMvj cvaú I t'w'c'vKUs cvaú e'envi K'i í MfxiZvq cwi b tZvjv
hvq | fviUKvj UvieBb cvaú I mvegiimej UvieBb cvaú e'envi K'i Mfxi bjkKc t_K
cwi b tZvjv hvq |

Gevi cieZx BDwbU km KZb, cwmqvKiY Ges gyM I `y Lvq'ii hšcwZi Dci
Av'jvKcZ Ki'ev I G,tjvi KvhcYwj Rvbi tPón Ki'ev |

K₁L.I c j_x Dbqb ⁻č

¶PÎ-6.10 fvi₁UK₁j Uvie₁Bb c₁áú

¶PÎ-6.11 mvegv₁i₁mej c₁áú



migg t ^tiv₁Uv₁x c₁áú K₁L.R₁g₁tZ ^tm₁†P₁i Rb^{''} eeüZ c₁†áú₁ ¶gZ₁ e₁x K₁iv₁ Rb^{''} e^{''}en₁vi K₁iv₁ n₁†q
_v₁†K₁ | ^thL₁v₁†b f₁M₁f⁻ c₁v₁bi ⁻i ^tek ¹b₁†P ^tmL₁v₁†b c₁v₁bi ^tm₁†P₁i Rb^{''} fvi₁UK₁j
Uvie₁Bb Ges AZ^{''}waK ¹b₁†P c₁v₁bi ⁻i ^tb₁†g ^tM₁†j mvegv₁i₁mej c₁áú e^{''}en₁vi K₁iv₁
^th₁†Z c₁†i | Z₁†e e₁v₁s₁j₁v₁†`†k fvi₁UK₁j Uvie₁Bb c₁†áú₁ e^{''}en₁vi e^{''}vcK₁ |



cvWËi gj`vqb 6.4

mVK DËi i cvk UK (✓) Pý v`b|

1. tKvbU mVK ?

- (K) fviUKvj UvieBb cvú mavYZ 7.5 gUv`ii Kg MfxiZvq cvb DËvj`b e`eüZ nq|
- (L) fviUKvj UvieBb cvú mavYZ 7.5 gUv`ii AaK MfxiZvq cvb DËvj`b e`eüZ nq|
- (M) fviUKvj UvieBb cvú mavYZ j`v k`vdu e`envi Abv`hMx n`j Mfxi bjk`ci cvb DËvj`b e`eüZ nq|
- (N) fviUKvj UvieBb cvú mavYZ 1000 gUv`ii AaK D`PZvq cvb DËvj`b e`eüZ nq|

2. tKvbU mVK ?

- (K) GKv`aK t`mUvdDMvj cvú`K mmi`R ms`hvRb K`i fviUKvj UvieBb cvú `Zix Kiv nq|
- (L) GKv`aK B`úvjvi mmi`R ms`hvRb K`i Zv cvb`Z bgv`4Z ti`L fviUKvj UvieBb cvú `Zix Kiv nq|
- (M) t`mUvdDMvj cvú Mfxi bjk`c cvb`Z bgv`4Z ti`L fviUKvj UvieBb cvú `Zix Kiv nq|
- (N) ti`m`cv`KUs cvú Mfxi bjk`c cvb`Z bgv`4Z ti`L fviUKvj UvieBb cvú `Zix Kiv nq|

3. tKvbU mVK ?

fviUKvj UvieBb cv`ú i mvKkb tnW -

- (K) 6.0-7.0 gUvi |
- (L) tKvb mvKkb tnW tbB|
- (M) 10.0 gUvi |
- (N) 1000 gUvi |

4. tKvbU mVK ?

- (K) mvegvimej cvú cvb`Z bgv`4Z tgvUi v``q Pvjv`bv nq|
- (L) mvegvimej cvú cvb`Z bgv`4Z Bb`Rb v``q Pvjv`bv nq|
- (M) mvegvimej cvú f`c`ô Ae`Z tgvUi v``q Pvjv`bv nq|
- (N) mvegvimej cvú f`c`ô Ae`Z Bb`Rb v``q Pvjv`bv nq|

e`enviK

cV 6.5 †U†Wj, †ivqvi I WqvdvG cVáú ch†e¶Y I c¶iPvjbv

G cV †k†I Avcib —



- †U†Wj, †ivqvi I WqvdvG cVáú i KvhcYwj ch†e¶Y Kiv|
- cVáú †b†R Pvjv†Z †Póv Kiv Ges †PÎ mnKv†i KvhcYwj eYbv Kiv|
- evsjv†`k †m†Pi †¶†Î †U†Wj, †ivqvi I WqvdvG cVáú i Dc†h¶MZv †j¶ce× Kiv|

†b†R Kiab :

- (K) (1) †U†Wj cVáú †b†R Pvjvb|
(2) †PÎ mnKv†i cVáú i KvhcYwj eYbv Kiab |
- (L) (1) †ivqvi cVáú †b†R Pvjvb|
(2) †PÎ mnKv†i cVáú i KvhcYwj eYbv Kiab |
- (M) (1) WqvdvG cVáú †b†R Pvjvb|
(2) †PÎ mnKv†i cVáú i KvhcYwj eYbv Kiab |

cV 6.6 †m¶UvdDMvj I †im†cv†K¶Us cVáú i †e¶fb Ask mbv ³KiY I c¶iPvjbv

G cV †k†I Avcib —



- †m†P e˘eüZ †m¶UvdDMvj I †im†cv†K¶Us cVáú c¶i`kb Kiv Ges KvhcYwj ch†e¶Y Kiv|
- †PÎ mnKv†i cVáú i KvhcYwj †j¶ce× Kiv|
- evsjv†`k †m†Pi †¶†Î Gme cVáú i f¶gKv †j¶ce× Kiv|

†b†R Kiab t

- (K) (1) †m¶UvdDMvj cVáú Pvjv†bvi c×¶Z eYbv Kiab|
(2) †PÎ mnKv†i cVáú i †e¶fb As†ki KvhcYwj eYbv Kiab|
- (L) (1) †im†cv†K¶Us cVáú Pvjv†bvi c×¶Z eYbv Kiab|
(2) †PÎ mnKv†i cVáú i †e¶fb As†ki KvhcYwj eYbv Kiab|



Povš gj`qb

iPbv gjK ck

- 1| t`v#bi cwb D#Ej b ¶gZvmn KvhcYwj eYbv Kib|
- 2| ¶PÎ mnKv#i ¶mD¶Zi KvhcYwj eYbv Kib|
- 3| ¶PÎ mnKv#i Wqv¶dg cv#ú i KvhcYwj eYbv Kib|
- 4| evsjv`k AMfxi bjk#c tKvb ai#bi cv#ú e`eüZ n#Q Ges Zvi KvhcYwj eYbv Kib|
- 5| evsjv`k t#Pi Rb` Mfxi bjk#c tKvb ai#bi cv#ú e`vckfv#e e`eüZ n#Q Ges Zvi KvhcYwj eYbv Kib|
- 6| tivUvix cv#ú i KvhcYwj eYbv Kib|
- 7| mvegvimej cv#ú i KvhcYwj eYbv Kib| Ges tKvb Ae`vq Mfxi bjk#c mvegvimej cv#ú e`env#i i Rb` mvwik Ki#eb ?



DĖigvjv

- cv#VĖi gj`qb 6.1 t** 1| L 2| K
- cv#VĖi gj`qb 6.2 t** 1| K 2| L 3| L 4| K
- cv#VĖi gj`qb 6.3 t** 1| K 2| L 3| K 4| K
- cv#VĖi gj`qb 6.4 t** 1| L 2| L 3| L 4| K