

विज्ञान

शिक्षक निर्देशिका

कक्षा १०

DRAFT

नेपाल सरकार शिक्षा
मन्त्रालय पाठ्यक्रम
विकास केन्द्र
सुनोठिमा, भक्तपुर

kpfzs M gkfn ;/sf/
lzIf dGqfno
kf7bjld ljsf; s]b|
;fgf7dl, eStk/

kf7bjld ljsf; s]b| ;fgf7dl, eStk/, @)^^

o; lgb[zsf;DaGwL ;DkOf{clwsf/ kf7bjld ljsf; s]b| ;fgf7dl, eStk/df lglxt 5 .
kf7bjld ljsf; s]b]lnlvt :jls[tljgf o;sf]k'}jf cflzs efu xax' kpfzg ug{
kl/jt6 u/] kpfzg ug{ sg}ljBtlo ;fwg jf cGo kljwaf6 /s8{ug{kltlnlk lgsfNg
kf0g]56 .

kyd ;:s/Of M lj= ;#@)%&
låtlo ;:s/Of M lj= ;#@)^^

db0f M

o; lgb[zsf;DaGwL sg}klg kpf/sf ;enfjxç ePdf kf7bjld ljsf; s]b| ;fgf7dl,
eStk/, ;Dkfbg tyf kpfzg zfvdf k7f0lbgxb cg/fv 5 . kf7sxçaf6 cfpq];enfjxçnf0{
of]s]b|:jfut ub5 .

xfdf]egf0

ljBfno txsf]lzlffnf0{p2Zodhs, Jofjxf]/s, ;d;fdlos / /fhuf/dhs agfpg ljleGg
;dodf kf7b]jd, kf7bk'ts ljsf; tyf kl/dfhg ug]sfof0{lg/Gt/tf lb0b}cfPsf]5 .
ljBfylf /fi6<</fli6& Pstf / nf]stfGqs ;sf/sf]efjgf kbf u/f0{g]tstf, cgzf;g /
:jfjnDagh:tf ;fdflhs Pjd\rf]/lqs u0f tyf cfwf/et eflifs tyf ul0ftlo ;ksf]ljsf;
u/L lj1fg, ;'rgf kljw, jftfj/Of / :jf:Yo;DaGwl cfwf/et 1fg / hljgfkof]ul ;ksf]
cfjZostf kl/kl'tsf nflu kf7b]jd, kf7bk'ts / cGo k's tyf ;xfos ;fdu| tof/ ug]
l;nl;nfdf slff !) df k7gkf7g u/fpg]lzlfsx&sf nflu of]lj1fg lzlfs lgb]zsf tof/
kfl/Psf]xf].

of]lgb]zsf lbg]zsd/ >]7, 8Da/Wjh cfab]j] /fdk;fb ;j]l, uf]Lz^s/ kf08] hljgxl/
>]7 / gGbsfhl >]7 /xsf]sfofnaf6 n]yg ePsf]xf]. o;nf0{lzlfs sfo&fnaf6 k[7kf]f0f
ln0{;DalGwt ljifo ;ldltaf6 clGtd &k kbf]g ul/Psf]xf]. o;sf]ljsf; sfof]xl/jfh vgrn,
zDek;fb bxfn ;d]sf]of]ubfg /xsf]5 . o;sf]ljifo:j:t';Dkfbg lbg]zsd/ >]7, 8Da/Wjh
cf-b]j] / /fdk;fb ;j]laf6, efiiff ;Dkfbg lji0fk;fb clwsf/L / nf]sk;fb kl08taf6, 6f0k
;l6^ efjgf zdf{tyf n]fp6 ho/fd s0s]haf6 ePsf]xf].

lzlfs lgb]zsf lzlfsx&nf0{dfu{lb]zg ug]tyf lzlf0f l;sf0df ;w];lj]o /fv]g]k's ;fdu|
xf]. o;df kf7b]jd / kf7bk'tsd/ lbg]z ul/Psf l;sf0 pknIAw÷lj]zi6 p2Z0 tyf ljifo:j:tsf]
ljZn]f0f jf lzlf0f l;sf0sf j]ddf lzlfsn]ckgfpkg]ljlw tyf ljBfylsf]l;sf0 pknIAw
cfsng ug]tl/sf lb0Psf]5 . o;n]kpgw]tds÷j0f]f]tds z]hlnf0{eGbf ljBfylsf]b] /
lj]ofsnfkdVl lj]wnf0{ckgfPsf]5 . o;df lbg]z ul/Psf lj]ofsnfkf0{Jofjxf]/df xax'
ptfg]Gbf klg o;sf cfwf/df cg]sf]cEof; Pjd\lj]ofsnfk agf0{ltgdf ljBfylf0{;xeful
u/fpg ;s]pglx&n]kbf]sf/L / kbf]uf]tds &kdf 1fg, ;lk / wf/Off l;Sg]cj;/ kfp]g]tyf
l;s]sf s/fnf0{Jofjxf]/df ptfg{;Sg]5g\eg]ck]ff ul/Psf]5 .

lzl0f sfo{lzlfsf]k]fut nug tyf ljBfylf]k]t ug];fdflhs tyf l;hGf]tds ;lk, :yfglo
kl/j]z / jftfj/Ofdf lge{ /xG5 . lzl0f cgej / Jofjxf]/s blftsf cfwf/df lzlfsn]kbf]
ug]ljlw tyf lj]ofsnfk ce kbf]sf/L xg ;S5g\ . o;nf0{ce Jofjxf]/s agfpg blf
lzlfsx&af6 /rgf]tds ;bf]jsf];d] ck]ff ul/Psf]5 .

g]kn ;/sf/
lzlff dGqfno
kf7b]jd ljsf; s]b]
;fg]7dl, eStk/

o; lgbIzsf sf]kpf; DaGwdf

- dfWolds lzIf kf7bjld @)^\$ cg';f/ kl/dfhg ul/Psf] slff !) sf]lj1fg ljifosf] lzIf0f l;sf0nf0{kpfj sf/L; ;xh / ;/n agfpg ;xof]l xg]x]h]of]lgbIzsf tof/ ul/Psf] 5 .
- x/ps Psf0cGtu{sf kf7xznf0{cy{k0f]lzIf0f l;sf0 ug{ljbfyl{s}b} lzIf0f lj]ofsnfkdf cfwf/t ljleGg lj]ofsnfkxznf]Jo j:yf ug]kpf; ul/Psf]5 .
- z]lfs ;fdu| / dNof^asg Psf0ut znkdf Psd:6 /flvPsf]5 . To;h]lzIfsn]kf7cg';f/s] z]lfs ;fdu| / dNof^asg kl]j]ofsf]5gf6 ug]kg]5 .
- o; lgbIzsfdf lbOPsf lj]ofsnfkxznf]dfzgnf znkdf lbOPsf]kf7sf]kps[tcg';f/ cGo j]sInks z]lfs ;fdu|xznf / ljBfyl{s}b} lzIf0f lj]ofsnfkxznf 5gf6 u/L lzIf0f ug] ;lsg]5 .
- x/ps Psf0sf nflu 56bfOPsf]3G6L cgdflgt dfq ePsf]kf7sf]kps[tcg';f/ kf7 3G6Lnf0{ ;dfof]hg ug] ;lsg]5 .
- Psf0ut znkdf pNn]v ul/Psf lj]zi6 p2]oxznf0{k/f ug]cfjZostfg';f/ slffut Jofjxfl/s p2]oxznf lgwf{0f u/L lzIf0f lj]ofsnfk ug]kg]5 .
- lzIf0f lj]ofsnfk ubf{lbOPsf]Psf0af6 ljBfyl{xznf]lj sf; xgkg]Jofjxfl/s 1fg, kl]j]ofut ;lk / ;sf/ftds ;f]sf]lj sf; ug]lzIfs ;hu / ;r] xgkg]5 .
- x/ps Psf0sf]cGtodf lzIfsnf0{kf7;u ;DalGwt yk cfjZos ljifoj:tsf]hfgsf/L lbgsf nflu lzIfsnf0{yk hfgsf/LcGtu{ lzIfssf nflu pkof]l 7flgPsf lj]jw klfsf]pNn]v ul/Psf]5 .
- cGtodf o; lzIfs lgbIzsf sf];wf/sf nflu ;Dk0f{lzIfs ;dbfoaf6 /rgfTds ;bfj sf] ck]ff ul/Psf]5 .

ljifo;ŦL

jld ; ^a Vof	zLif\$	k[7; ^a Vof
Psfo - !	an	!
Psfo - @	r fk	!)
Psfo - #	pŦhf{	!*
Psfo - \$	tfk	@@
Psfo - %	kŦfz	@^
Psfo - ^	ljBt\wf/f / rDasTj	#!
Psfo - &	tEjx¿sf]j ul\$ / of	\$@
Psfo - *	/f;folgs kltlj of	%)
Psfo - (	cDn, lff/ / njOf	%*
Psfo - !)	sŦl Uof;x¿	^#
Psfo - !!	wftx¿	^&
Psfo - !@	xf08Ŧfaf / o;sf ofusx¿	&\$
Psfo - !#	bŦgs hljgdf kŦfj xŦlj:tx¿	&(
Psfo - !\$	la?jf / hgfj/sf]j ul\$ / of	*^
Psfo - !%	ef0/;	(#
Psfo - !^	pQhgf / kltlj of	((
Psfo - !&	sf]f ljefhg	!)^
Psfo - !*	cdylgs / dylgs khgg	!!)
Psfo - ! (	ljhf0faf6 la?jfsf]khgg	!!#
Psfo - @)	dfgj z/L/df /St ;~rf/ lj of	!!^
Psfo - @!	jŦfgjld	!@!
Psfo - @@	kfl/l:ylts k4lt	!@&
Psfo - @#	k[j]lsf]0ltxf;	!#@
Psfo - @\$	jfod08n	!#&
Psfo - @%	aŦdf08	!\$#

Psf0 ! an (Force)

cgdfllgt 3G6L M !)

-s_ljIzi6 p2Joxz

o; Psf0sf]cGtodf ljBfylxZ lgDglnlvt sfofxZ ug{; lfd xg]5g\

!= Go6gsf]u?TjfsifQf;DaGWL lgodxZ jOfQ ug{.

@= u?Tj / u?TjfsifQfdf leGgtf 56bfpq .

#= lk08 / tfrndf leGgtf 56bfo{lk08 / tfrnsf]Psf0 JoSt ug{.

\$= ljleGg j:txZsf]lk08 gfkq .

%= sg}j:tsf]:jtGq v;f0 / tfrljxlgtsf]jOfQ ug{.

-v_kl/ro

o; Psf0af6 ljBfylxZdf Go6gsf u?TjfsifQf;DaGWL lgodxZsf]JofVof ug]u?Tj an / u?TjfsifQfalr leGgtf 56bfpq / ItglxZsf]kpf]usf ljleGg pbfx/OfxZ lbg ;Sg] lfdtsf]lj sf; ug{vfrhPsf]5 . ;fy}lk08, tfr, :jtGq v;f0, tfrljxlgtsf]jOfQ ug{ kpf]u u/] b]vfpq / b]gs hljgdf ItglxZsf]kpf]uaf/]kl/lrt u/fpq vfrhPsf]5 .

-u_lzlf0f ;fdu

- sf]klg\$; , Uoflnlnof]/ Go6gsf]kfrf] rDas, rDaslo sDkf; .
- b0{k/s tfr ePsf 9^aufsf 6j]fxZ, Pp6f l6gsf]kftf jf ljBfnodf 7f\$g]3G6L, :6kjfr, knfl:6s yhl, 7hf / ;fgf uRrfxZ -@%÷@% cfrf_, efrts t/fh', 9s .
- ^) ;ld hlt nfd]dl;gf]8&8L -5ftsf]tf/ klq xg ;S5, knnfdsf]8Nnf]/ wfuf].

-3_lzlf0f l;sf0 ljlpfsnfk

u?TjfsifQsf]kl/ro

- sf]klg\$; , Uoflnlnof]/ Go6gsf];fdfGo lrgf/laf/]5nknn ugxf]\. pknAw ePdf pglxZsf]kfrf]b]vfo{kpzQ ugxf]\.
- sf]klg\$; , Uoflnlnof]h]k]tt u/]sf uk / pkuxsf rfnaf/]lgDglnlvt s'fxZ atfpgxf]\
- ;g\1542 cl3sf dflg;xZ ;a}uk, tf/f, ;bfr]k[j]lsf]kl/j]ldf u/]sf]7fQy].

lzlfs lgb]zsf, lj1fg, slff - !)

- ;f008nsf ;a}ukxčn];b\$flkl/jldf ub\$ eGg];b{s}Gb| l;4fGt sfklg\$;n] k|tt u/]. o;af6 of]k|6 xG5 ls ;a}cfsfzlo lk08xčn] k|]lsf]kl/jldf ub\$g\.
- ;g\1600 lt/ Uoflnlnofh] b/bz\$ oGqn] x]] j[:klt j|/kl/ To;sf pkuk kl/jldf u/}f]b|v].
- sfklg\$;sf]lj rf/ Uoflnlnofh]kli6 u/].

■ ljBfylŁ;č;č lgDglnlvt kZgxč ;f]gxf] \ / 5nkın ugxf] \M

- k|]lnf0{lsG rGbpf]kl/jldf ub\$ <
- ;bG]k|]lnf0{lsG kl/jldf ub\$ <
- ;bG]v k|]l lsg 6f9f hfb\$ < To:t}k|]lb|v lsg rGbpf 6f9f hfb\$ <
- pko\$ t kZgxčaf/]ljBfylŁčalr ;dX agf0{5nkın ug{nufpg]_
- ljBfylŁčaf6 ;xl pQ/ gcfPdf lzlfsn]atf0lbgxf] \.
- rGbpf, k|]l / ;bAlr Psn]csf]nf0{cfsif0f ub\$g\ eGg] s/fdf hfB lbgxf] \.

■ kf7b0k:tssf]k[7 ! sf]u?Tjfsif0f eGg]kf7bfz ljBfylŁčnf0{k9g nufpgxf] \ / lgDglnlvt kZgxč ;f]gxf] \M

- Hj f/ef6f eg}f]s]xf] <
- ;dbpf Hj f/ lsg p75 <
- s];a}lk08xčalr cfsif0f xG5 < 5nkın u/fpgxf] \.

cGtodf lgDglnlvt s/fxč atf0lbgxf] \M

- x/} lk08xčalr cfsif0f xG5 .
- sb}b0Cf]f j:txčalr ltglxčsf]lk08sf sf/0fn]xb]cfsif0f annf0{u?Tjfsif0f elgG5 .

u?Tjfsif0f ansf]b/L / lk08;č ;DaGw

■ ljBfylŁ;č;č lgDglnlvt kZgxč u/L 5nkın ugxf] \M

- s_ sbgs sf/s tGjxčn]u?Tjfsif0f annf0{kpfj kfb5 <
- v_ lk08 kl/jtG xbf u?Tjfsif0f andf s]c;/ k5{<
- u_ b0{j:txčalrsf]b/L a9fpbf u?Tjfsif0f andf s]kl/jtG xG5 <

- IgDglnlvt kpfj kbpz ugxfj \ / IjBfylxnf0{c}nf\$g ug{nufpgxfj} \M
 - Pp6f rDassf]pQ/L wj k'fzflt/ k'isfpg nufpgxfj \. To;sf]glhs Pp6f rDaslo sDkf; /fvbf sDkf;nfo{rDasn]s]c;/ kfb5 < c}nf\$g ugxfj \.
 - sDkf;nfo{rDasaf6 la:tf/}6f9f ;fbf{sDkf;df s]kl/jt6 cfp5 < o;sf] sf/0f kQf nufpg IjBfylxnf0{k}f]flxt ugxfj \.
 - rDasdf h:t}k08sf]cfsif0f ug]lglZrt Ifj xG5 . b06f cfsfzlo lk08x;alr b7L a9bf Itglx;alr pTkGg xg]u?Tjfsif0f an klg sd xG5 . b7L 36bf u?Tjfsif0f an a95 egl kl6 kfgxfj \.
 - kf7bk'tsdf lb0Psf lrxq; !=@, !=# / !=\$ afBdf n]vgxfj \ / ;f]lrxnf0{ :ki6;ü JofVof ugxfj \. o;af6 lk08 / u?Tjfsif0f ansf]kl/df0falrsf];DaGw kl6 kfgxfj \.
 - kf7bk'tssf lrxq; !=%, !=^ / !=& afBdf n]vgxfj \. lrxsf]dfWodaf6 b0{ j:talrsf]b7L / Itglx;alr pTkGg xg]u?Tjfsif0f ansf]kl/df0falrsf];DaGw atfpgxfj \.

Go6gsf]u?Tjfsif0f;DaGwL IjZjJofkl Igod

- Go6gsf]u?Tjfsif0f;DaGwL Igod IjBfylxnf0{cf-cfCgf]sfklbf n]vg nufpgxfj \ / s}lnf0{k}l'tt ug{nufpgxfj} \.
- IjBfylxnf0{k}l'tt u/;f s/f ;xl 5gg\eg]lzlfsn]afBdf n]vbgxfj \.
- G=====;ü lgdf0f ug{l;sfpgxfj} \.
- pSt ;üdf G sf]cy{kl/efiff, dfg / Psf0 atfpgxfj} \.
- kf7bk'tsdf lb0Psf ul0ftlo ;d:ofsf pbfx/0fx; IjBfylxnf0{xn ug{nufpgxfj} \.
- gdbgfsf nflu s}l ul0ftlo ;d:ofsf pbfx/0fx; lzlfns]agf0{k}l'tt ugxfj \ / IjBfylxnf0{klg xn ug{nufpgxfj} \.

u?Tj an (Gravity)

- u?Tj ansf]kl/ro :ki6 kfgxfj \. u?Tj ansf]kl/efiff eGg nufpgxfj \.
- u?Tj an / u?Ejfsif0f analr leGgtf s]5 eGg nufpgxfj \.
- u?Tj an lx;fa ugI;ü $F = \frac{G.Mm}{R^2}$ s;/l eof] / o;df M, m / R n]s}s]s'/fsf] kl'tlglwTj u5{ :ki6 kfgxfj \.

- IjleGg cfsfzlo lk08x₂ ; b{ k[j]l, jk:klt, rGbpf cflbn]cfÇgf]ghs /x₃]1
lsnf]ud lk08 ePsf]sg}klg j:thf0{sltst u?Tj ann]cfÇgf]s]b|t/ tfG5,
lx;fa ug{nufpgxf] \ o; sf nflu cfjZos tYof^asx₂, h:t} tf/f, uk / pku₂x₂sf]
cw{of; / lk08x₂ pknAw u/fpgxf] \.
- ;b{hqf]7hf]tf/f rGbpf hqf]eof]eg]o;sf]u?Tj an k|t|lsnf]ud j:tdf slt
k5{< IjBfyl₂nf0{lx;fa ug{nufpgxf] \ / lzlfsn]l;sf0lbgxf] \.
- k[j]lsf]u?Tj an rGbpf]sf] eGb a9l xg'sf]sf/Of IjBfyl₂alr 5nkn ug{
nufpgxf] \-o:t}c₂ pbfx/Of klg b]vfpG ;lsG5_.

lzlfOf gfG

!= Pp6f lk08 cToGt Ijzfn -rGb| k[j]l jf tf/f hqf] / csf]lk08 cToGt ;fgf]eof]eg]
tl b0{-7hf]/ ;fgf] alr pTkGg xg]u?Tjfsif₀ ansf]c;/ ;fgf]lk08df dfq k/}sf]
b]vG5 . o;n]ubf{ ;fgf]lk08nf0{7hf]lk08n]cfÇgf]s]b|t/ cfsif₀ ub₅ . h:tf]
k[j]ln]o;sf];txdf /x₃f x/} j:thf0{cfÇgf]s]b|t/ cfsif₀ ub₅ . o;/l cfsif₀
ug]annf0{u?Tj an elgG5 .

sg]uk jf pku₂n]To;sf];txdf /x₃]1lsnf]ud lk08 ePsf]j:thf0{cfÇgf]
s]b|t/ cfsif₀ ug]ansf]gfknf0{To; uk jf pku₂sf]u?Tj an elgG5 .

uk jf pku₂sf]u?Tj an lx;fa ubf{-u?Tj an $F = \frac{GMm}{R^2}$ - ;b nufG5 . oxf^am
eg'sf]uk jf pku₂sf]lk08 / R eg]cw{of; xg\ . oxf^auk'sf]cw{of; g]b0{j:t'alrsf]
b/L dfllG5 lsgeg]csf]j:t'w} ;fgf]xg]xbf To;sf]cw{of; Hofb}sd -guGo_
xG5 .

u?Tj ansf]c;/ / u?Tj k[j]u

- k[j]lsf]u?Tj ann]oxf^a/x₃f j:tx₂df s]kpfj kb₅g\egl IjBfyl₂nf0{;f]g]/
ltglx₂af6 k|kt pQ/ 7ls 5÷5₂ atf0lbgxf] \ .
- u?Tj k[j]usf]kl/efiff, u?Tj k[j]usf]cf;t dfg / Psf0af/]5nkn ug{x} \.
- kf7bk'tsdf lb0Psf]Ij]ofsnfk 1.1 u/} b]vfolbgxf] \.
- 7hf]9^auf / ;fgf]9^auf Ps}7fpäf6 v;fNbf b'j};ü}v:5g\ t/ 9^auf / sfuhsf]
6j]fx₂ Ps}7fpäf6 v;fNbf 9^auf klxn]v:5 . pko₅t tYox₂sf sf/0faf/]5nkn
ug{x} \.

- Uoflnlnofh]u/šf]Kjfv l;Ssf]kpf] j ofg ugxf] \. pSt kpf]n]l;sfpg]j]lfgs wf/Off u?Tj k]j] ;a}j:tdf a/fa/ xG5 eGg];DaGwdf JofVof ugxf] \.
- kf7ok:tssf]lj]ofsnfk 1.2 k}zG ugxf] \.
- k:t sdf lbOPsf]lj rf/Oflo k}gxč sf]pQ/ ljBfylčnf0{eGg nufpgxf] \. pQ/ ;xl gePdf atfOlbgxf] \.

cw{of; / u?Tj k]j]uLrsf];DaGw

- k[j]lsf]cw{of; ;f/el/ ;a}7fpdf ;dfg 5g . pbfx/Ofsf nflu w]lo lfgdf cw{of; edWo]/ylo lfgdf sd 5 egl atfpgxf] \ .
- k[j]lsf]dfdf cfsf/ afBdf n]y] cw{of; 7fpčg';f/ km/s xgfsf sf/Of JofVof ugxf] \.
- $g = \frac{GM}{R^2}$;q l;4 u/l b]yfOlbgxf] \.
- $g = \frac{1}{R^2}$ xG5 egl kpf]lft u/] b]yfpgxf] \.
- g sf]cf};t df g a/fa/ 9.8 ld÷;] xG5 egl k]6 kfl/lbgxf] \.

k[j]ldf u?Tj k]j]u

- k[j]lsf]lk08 6×10^{24} lsnf]fd xG5 / o;sf]cw{of; w]lo lfgdf 6357 lsnf]d6/ / edWo]/ylo lfgdf 6378 xG5 egl atfpg]lrq klgt ug{nufpgxf] \.
- w]lo lfgdf / edWo]/ylo lfgdf g sf]dfg sltslt xG5 < ljBfylčnf0{lx;fa u/] lgsfNg nufpgxf] \.
- dfgf]k[j]lsf]cw{of; 6378 lsnf]d6/ eP ;u/dfyfsf]6kkdf -prf08.8 lsnf]d6/_ g sf]dfg slt xG5 < lx;fa ug{nufpgxf] \.
- ljBfyl]ug{g;s}sf]cj:yfdf pko\$tlx;faxč lz lfs cfk]h]u/] b]yfpgxf] \. pko\$tlg}7fpSf]u?Tj k]j]u bfh] b]yfpgxf] \.
- u?Tj k]j]usf]dfg k[j]ldf 7fpčg';f/ km/s xG5 eGg]s/f JofVof ugxf] \.
- u?Tj k]j]usf]dfg kl/jtg xgfsf sf/Of JofVof ugxf] \.

cGo uX / pkuxdf u?Tj kJj

- IjleGg uXxZ h:t} d^un, zlg, jk:kl, pkux rGbdf cflb 7fpdf klG u?Tj kJj kJjldf hlQs}xG5 ls k/s xG5 egl ;fJgxf\.
- kJjL, d^un, zlg, jk:kl uXxZsf]lrq afBdf nJy bJfpgxf\ . lrq nJbf ltglxZsf] ;f0h k/s kfgJkfo}sf]cw{of; / lk08 klG nJy bJfpgxf\.
- tYof^ssf nflu kf7bk'tssf]@%@ khsf]25.3 tflnsfsf]d2t lngxf\.
- ol IjleGg uXdf u?Tj kJj kJjldfeGb k/s xGfsf]sf/Of JofVof ugxf\ . uXsf] lk08 / cw{of;n}u?Tj kJjunf0{c;/ ub5 egl kJ6 kfgxf\.
- ol uXxZdf u?Tj kJj sltslt xG5 < IjBfylxZnf0{lx;fa ug{nufpgxf\.
- IjBfylxZn}ug{g;s}df lzlfns}u/J bJfpgxf\.

rGbdfsf] ;txdf u?Tj kJj

- rGbdfsf] ;txdf u?Tj kJj slt xG5 lx;fa ug{nufpgxf\.
- sb}Ps hgf JolStn}kJjldf hlt tJh p7fpg ;S5 cGo uX jf pkuxdf klG Tolt g} tJh p7fpg ;S5 egl JofVof ugxf\.
- kJjldf hlt g}tJh rGbdfdf klG p7fpg ;lsG5 t/ kJjldf hlt lk08 p7fpg ;lsG5 xJTotfGbf a9l lk08 rGbdfdf p7fpg ;lsG5 lsgls kJjldf hlts}tJh kfofpg rGbdfdf a9l lk08 cfjZos kb5 eGg]s/fsf]JofVof ugxf\ . -oxf"rGbdfdf klG cGo cj:yfxZ ;fdfGo ePsf]dfgJ JofVof ugJ

lk08 / tJh

- lk08 / tJhsf]kl/efiff IjBfylxZ;u ;fJgxf\ . IjBfylxZn}eGg g;s}df lzlfns} atf0lbgxf\.
- lk08 / tJhaf/]kf7bk'tsdf ePsf s'f cwoog ug{nufpgxf\.
- cwoogkl5 IjBfylxZnf0{lk08 / tJhalsf]leGgtf cf-cfGgf]sfklf nJg nufpgxf\.
- IjBfylxZn}nJy}sf]s'f eGg nufpgxf\ . cfjZos k/Jdf lzlfns} ;Rof0lbgxf\.
- IjJofsnfk !=# u/J bJfpgxf\.
- tJh / u?Tj kJjJalrsf] ;DaGw JofVof ugxf\.
- lgDglnlvt :yfgxZdwo]sgdf j:t}sf]tJh a9l xG5 < sf/Of;lxT 5nkln ugxf\ . klxn}IjBfylxZ;u ;fJg]cfjZos eP lzlfns}atfpgxf\.

-s_ k[j]lsf]edWo]/ylo lfg / w]lo lfg

-v_ g[kfnsf]t/f0{/ cUnf]kxf8

-u_ ;db| ;tx / ;u/dfyfsf]6Kkfdf

:j tGq v;f0

kf7bk'ts kh 8 lrq 1.11 afBdf n]vgxf] \ / lgDglnlvt kZg ;f]vgxf] \M

-s_ gnleq xfjf /x]sf]j]hf l;Ssfegbf Kjfv l9nf]v:g]sf]sf/0f s]xf]<

-v_ gnleq xfjf leis]kl5 Kjfv klg l;Ssf h:t}l56f]ultdf v:g]sf]sf/0f s]xf]<

- pkoSt kZgxZsf]pQ/ l]Bfyl6f6 pknAw gePdf lzlfns]JofVof ugxf] \.
- xfjf ePsf]7fpdf / xfjf gePsf]7fpdf Kjfv v:bf s]k/s kfpq ;lsG5 <
- :j tGq v;f0sf]kl/efiff lbgxf] \.
- k[j]ldf sg cj:yfdf j:t]sf]v;f0 :j tGq xg ;S5 < Ps 6j]f 9^auf jf l;Ssf xfjfdf v;fNbf s]:j tGq v;f0 xg ;S5 < ol kZgxZaf/]5nkln ugxf] \.
- rGbd]fsf];txdf x/]s j:t]sf]v;f0 :j tGq xG5 egl JofVof ugxf] \.
- :j tGq v;f0sf]j]hf j:t]sf]k]j To; 7fp]sf]u?Tj k]j;ü a/fa/ xg] s'/f :ki6 kfgxf] \.

tf]ljxlgtf

- kf7bk'tssf]kh 15 sf]lj]ofsnfk 1.4 k]bzg ugxf] \. oxf"kp vl;/x]sf]cj:yfdf k]dsf]alrdf knfdfs]ufhf c8]sf]b]vG5 . k]d 6]andf c8b]P/ wfuf]5f]b]f eg] ufhf cl8b] . o;/l vl;/x]sf]j]hdf dfq ufhf cl8g]sf]sf/0f JofVof ugxf] \.
- tf]ljxlgtfsf]kl/efiff atfpb]JofVof ugxf] \.
- kf7bk'tssf]lrq 1.15 afBdf n]v] jofg ugxf] \.
- pSt lrqcg';f/ Plne] / vl;/x]sf]cj:yfdf To;leqsf]s]fn]an xfjfdf cl8/x]sf] b]y5 . lsgls Onp] /, s]f] / an ;dfg u?Tj k]j]un]tn em//x]sf xG5g\ . cyf{ \tl tlg]sf]v:g]ult ;dfg xG5 . 7ls To:t}cGtl/lfdf /x]sf]cGtl/lfofg leqsf ofqxZsf] klg pSt s]fsf]h:t}cj:yf xG5 . ofg, ofq' / cGo j:t]sf :j tGq v;f0 ;dfg ultdf v;]sf]xG5 egl JofVof ugxf] \.
- kf/f;6 s;/l v:5 < s]kf/f;6sf]klg :j tGq v;f0 xG5 < ol kZgxZ l]Bfyl6f0{ ;f]vgxf] \ . ;xl pQ/ gcPdf lzlfns]JofVof ugxf] \.

-a_dNofa'sg

- sg}j:tstf]tfn k[jl / rGbpfdfwo]sx" a9l xG5 / lsg <
- sg}j:thf0{Psk6s edWo/ylo lfg / cstfk6s wjlo lfgdf ;dfg prf0df v;fnbf sx"l56f]v:5 / lsg <
- kxf8sf]k]ldfeGbf kxf8sf]6Kkfdf j:tstf]tfn lsg sd xG5 <
- u?Tjfsif] cr/ (G) eg}sf]s]xf] < o;sf]dfg / Psf0 nVgxf] \.
- k[jldf 60 lsnf]ufd lk08 p7fpg ;Sg]ef/Qf]nsn] rGbpfdf slt lk08 p7fpg ;Snf < lx;fa u/L b]fpgxf] \.
- sg cj:yfdf Pp6f l;Ssf / Kjfv ;ü}v:5 < To;/L ;ü}v:gSf]sf/Of s]xf] <
- k[jlsf]lk08 6×10^{10} lsnf]ufd / cw]of; 6380 lsnf]d6/, rGbpfdf]lk08 7.2×10^{22} lsnf]ufd / cw]of; 1.7×10^6 ld6/ 5g\ . 1 lsnf]ufd lk08 ePsf]j:tbf k[jlsf]u?Tj an slt k5{/ rGbpfdf]u?Tj an ;f]lk08df slt k5{< k[jlnf0{rGbpf hfqf] xgbu/L vfbg ;lsf]eg]o;sf]u?Tjan slt xG5 <
- ;db] Hjf/ eg}sf]s]xf] < Hjf/ s;/L p75 <
- rGbpf ;Ddv k/]sf]j]hf p7g]Hjf/ 7hf]xG5 t/ ;b{;Gdv k/]sf]j]hf p7g]Hjf/ ;fgf]xG5 lsg <
- jGhl hdk ubf{;f]JolStsf]v;f0nf0{;jtGq v;f0 dfGg ;lsG5 ls ;lsb} < :ki6 JofVof ugxf] \.
- tfn]jxgtf eg}sf]s]xf] < Pp6f pbfx/Of;xt tfn]jxgtf]sf]:ki6 JofVof ugxf] \. kZgxZsf dfWodaf6 dNofa'sg ugxf] \.

-r_lzlfnsnf0{yk hfgsf/L

u?Tjk]j]ufd lk08sf]c;/

ljleGg j:txZ k[jlsf];txlt/ v:b}u/]sf]cj:yfdf tl j:tstf lk08n]ltgxZsf]u?Tj k[j]ufd c;/ kb} . To;h]7hf]/;fgf]9a]uf v;fnbf b}];ü}v:5g\ . fgf]/ 7hf]eP tfklg b}]Pp6}j:t'-3gTj a/fa/_ ePsf]xfjfsf]c;/ ;dfg Zkn]/ guGo dfqdf k5{. To;h] k[j]u ;dfg ePsf]xf] .

8Nnf]k/]sf]sfuhsf];txsf]lf]k]n sd / 8Nnf]gkf]/Psf]sfuhsf]kfgfsf];txsf]lf]k]n a9l ePsf]xfjfsf]cj/f]v 8Nnf k/]sf]sfuhdf sd k5{. sfuhsf]kfgdf xfjfsf]cj/f]v a9l kg[ePsf]la:tf/}dfq v:5 .

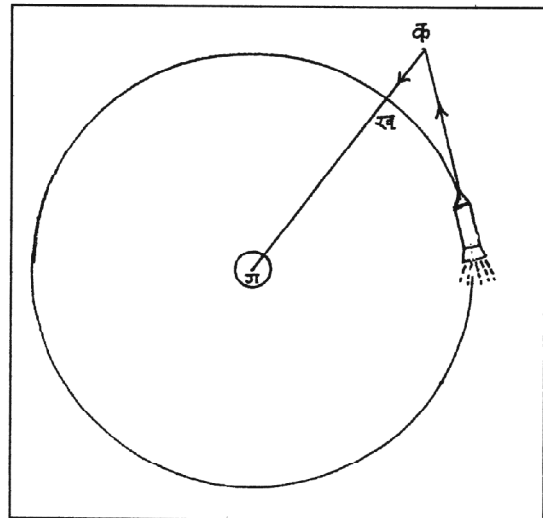
To:t}rGbpfdf];txdf xfjf 5g . v:b}u/]sf]j:thf0{cj/f]v ug]Toxf" cZ s]L dfWod 5g . To;h]uxh]f]j:t'-3g_xf]vof xnSf -Kjfv_xf] \;a}sf]u?Tj k[j]u ;dfg xG5 . To;h] ;a}j:t' ;ü}v:5g\ .

tfh]jxlgtf

k[jlsf]s]baf6 hlt 6f9f uof]plQ g}j:t}sf]tfh sd xb}hf65 lsgeg]k[jlsf]u?Tj lfgsf] tlj]tf k[jlsf]b/ a9]cg;/ 36b}hf65 . hlt rGbpf]sf]glhs uof]Tolt g};f]j:t}df rGbpf]sf] u?Tj lfgsf] tlj]tf a9b}hf65 . To;h]k[jl / rGbpf]sf alr sxl“o:tf]ljGb'x65 hxf“;f] j:t}df kg]k[jlsf]u?Tj lfgsf] tlj]tf / rGbpf]sf]u?Tj lfgsf] tlj]tf a/fa/ t/ ljk/lt lbzdf nfu]sf x65g\ . ;f]ljGbdf j:t}sf]jf:tljs tfh z6o b]v65 . ;f]ljGbhf0{ t6:y ljGb' (null point) elg65 .

To:t}k[jlsf]sb}lg]Zrt b/Ldf /x] k[jlsf]kl/j]df ub]u/]sf]c6tl/lf ofgleq /x]sf c6tl/lf ofql / c6o j:t}df tfh z6o h:tf]b]v65 . To;h]u?Tj ansf]c;/ ;f]j:tx6df kb] lsgeg]c6tl/lf ofg;lx t l j:tx6 :j t6q v;f0sf]cj:yfdf /x65g\.

;u]sf]lrq cWoog u/f}. dfgf} c6tl/lf ofgn]cf6gf]slfnf0{5fB} ;/n /yfdf uPsf]eP sb}lg]Zrt ;dodf 's' :yfgdf kl]g]lyof]. cf6gf] slfsf]lg]b]6 :yfg 'v' af6 s]l b/L -k[jlsf]s]b]v 's', 'u' b/L 6f9f kl]g]lyof]. ca k[jlsf]u?Tjfsif]fn ubf{;f]ofgn]cf6gf]slfnf0{5fB} hfg ;Sb] . ;f]cj]wdf c6tl/lf ofg 's, v' b/L k[j]lt/ v;] 'v' :yfgdf kl]sf] x65 . o;/L j]Qsf/ slfdf kl/j]df ubf{c6tl/lf ofg lg/Gt/ k[j]lt/ v:b} u/]sf]x65 . o;n]ubf{tl c6tl/lf ofg lg/Gt/ :j t6q v;f0sf]cj:yfdf /x]sf x65g\ . c6tl/lf ofgsf]:j t6q v;f0sf sf/0fn]leqsf c6tl/lf ofqln]tfh]jxlgtf]sf]cgej ub]5g\.



kf/f;6sf]v;f0 ;?df -ha;Dd kf/f;6 vhf]sf]xb] :j t6q cj:yfdf x65g\ . To; j]hxfj]sf] cj/f]v gu6o x65 . ha kf/f;6 vN5 clg xfjfn]clws cj/f]v pTkGg u5{. kf/f;6df nfu]sf]xfj] kf/f;6sf]s]baf6 lsgf/flt/ ;5{. o;/L ;bf{kf/f;6sf] ;txdf 3if]f x65 . ;f]xfj]sf]ult sd x65 . o;n]ubf{kf/f;6sf]dlg xfj]sf]rfk clws x65 . pSt clws rfkn]kf/f;6sf]k]j z6o e0{;dfg ultdf tn e5{.

Psf0 @

r fk (Pressure)

cgdfigt 3G6L M !!

-s_ ljlzi6 p27oxz

o; Psf0sf]cGtddf ljbfylx; lgDglnlvt sfox; ug{; lfd xg]5g\

!= t/n kbfsf] rfk kpx; ug{.

@= kf:snsf]lgod l;4 ug{.

#= b]gs hljgdf cfls[dl8hsf]l;4fGtsf]kpfu pbfx/0f; lxt JofVof ug{.

\$= KnjgzLntfsf]lgod kpx; ug{.

%= cfls[dl8hsf]l;4fGt / rfk; DaGwl ;/n ul0ftlo ;d:ofx; xn ug{.

-v_ kl/ro

o; Psf0df rfksf]kl/ro, o;nfo{c;/ kfg]sf/s tEjx;af/]ljbfylx;n]hfgsf/l k|t ug]5g\ t/n kbfsf]tfk / o;nfo{c;/ kfg]tEjx; vf;u/l t/nsf]ulx/f0af/]1fg k|t u/l b]gs hljgdf t/n rfksf]pkofu / ;d:of ;dfwfg ug{; lfd xg]5g\ kf:snsf]lgod / b]gs hljgdf o;sf]pkofusf pbfx/0fx; JofVof ug{/ k|t't ug{l;sfpgkg]5 . cfls[dl8hsf]l;4fGt, KnjgzLntfsf]lgod kpx; / JofVof ug{/ ;DaGwt ul0ftlo ;d:ofx; ;dfwfg ug{; lfd xg]5g\ To; ;DaGwl b]gs hljgdf kpfu ul/Psf pbfx/0fx; k|t't ug{;Sg]u/fpg v]hPsf]5 .

-u_ lzlf0f ;fdul

k|f]dsf]rs6L, 06f jf sf7sf]Ans, Knfl:6s af6n -nfDrf]cfsf/sf], afSnf]Knfl:6ssf]yhl, l:kPjofn];, ljs/, 9^aufsf]6j]f, wfuf]sv/fssf]knh, gg, afN6L, k|nfdsf]lsnf, k|nfdsf]s/fxl jf cGo ef8f]cf/Cnf]b], /a/ j^as, sf7sf]ss{k/lif0f gnl, l; ;fsf uRrfx; 6kKofg Jofn];, xf08f]d6/, NofS6f]d6/, afN6g .

-3_ lzlf0f l;sf0 ljlfsnfk

an, ;txsf]lf]kn / rfk

- b]gs hljgdf rfksf]kpfu u/l ul/g]sfox; s]5g\ljbfylx; ;f]gxf]\ / ;xl hjfk gcfPdf lzlf]sn]atfpgxf]\.

- $kf7ok'tssf]lj|ofs nfk_{2.1} k\dot{p}z\dot{g} ug\{f\} \backslash$. $k\dot{m}\dot{p}sf]$; $66f skf$; $jf g/d df6f]k\dot{p}f]$ $ug\{;lsG5 . glthf af\dot{p}\dot{d}f n\dot{v}gxf\} \backslash$.
- $ljBf\dot{y}\dot{x}\dot{z}nf0\{k\dot{p}f]sf]glthf tflnsf agf0\{n\dot{v}g nufpgxf\} \backslash$.
- $ljrf/0f\dot{lo} k\dot{z}gx\dot{z} -kf7ok'ts k\dot{h} @)_ sf cfwf/df 5nk\dot{m}n ug\{f\} \backslash$.
- $ann]lbg]rfk ansf]kl/df0f;\dot{u} ;dfgkflts xG5 eGg\dot{a}f/]5nk\dot{m}n ug\{f\} \backslash$.
- $an rfk n\dot{f}Ug]7fp\dot{S}f]l\dot{f}gk\dot{m}n;\dot{u} Jo\dot{T}j]dfgkflts xG5 egl Jo\dot{f}Vof ug\{f\} \backslash$.
- $rfk = \frac{an}{l\dot{f}gk\dot{m}n}$; $\dot{q} agfpg l;sfpgxf\} \backslash$.
- $rfsf]kl/efiff / Psf0 n\dot{v}g nufpgxf\} \backslash$.
- $cEof; / pbf\dot{x}/0f\dot{d}f lb0Psf rfk;DaGw\dot{L} ul0ft\dot{lo} ;d:of\dot{x}\dot{z} ljBf\dot{y}\dot{x}\dot{z}nf0\{xn ug\{nufpgxf\} \backslash$.
- $ul0ft\dot{lo} ;d:ofsf s\dot{x}\dot{L} g\dot{d}b\dot{f} k\dot{z}gx\dot{z} lbP/ xn ug\{nufpgxf\} \backslash$.

$t/n kbfy\dot{s}f]rfk / ulx/f0$

- $kf7ok'tssf]lj|ofs nfk_{2.2} k\dot{p}z\dot{g} u/\dot{f} b\dot{y}fpgxf\} \backslash$. ; $a\dot{p}Gbf tNnf]Kjfnaf6 kfgl$ $lsg a9L hf\dot{p}n]cf0f] ;f\dot{v}gxf\} \backslash$.
- $t/n kbfy\dot{s}f]lbg]rfk / ulx/f0a\dot{l}r s:t\dot{f}] ;DaGw xG5 egl k\dot{z}g ;f\dot{v}gxf\} \backslash$.
- $rf/s\dot{g}] / af6hf\dot{f}] ;txsf]l\dot{f}gk\dot{m}n lx;fa ug\{l;sfpgxf\} \backslash$.
 $l\dot{f}gk\dot{m}n = nDaf0 \times rf\dot{p}f0$
 $af6hf\dot{f}]l\dot{f}gk\dot{m}n = r^2 \text{ oxf}'' = 3.14 / r \text{ cw}\dot{f}of; x\dot{g}\backslash$.
- $ljleGg cfsf/sf ef8fx\dot{z}sf]leql cfotg lx;fa ug\{l;sfpgxf\} \backslash$.
 $cfotg = nDaf0 \times rf\dot{p}f0$
 $l;lnlG8sn ef8f\dot{s}f]cfotg = l\dot{f}gk\dot{m}n \times prf0 = r^2 \times h$
- $t/n kbfy\dot{s}f]lbg]rfk (P)=hdg l;4 u/l b\dot{y}fpgxf\} \backslash$.
- $t/n kbfy\dot{s}f]rfk o;sf]ulx/f0;\dot{u} ;dfgkflts xG5 egl sf/0f;lx\dot{t} Jo\dot{f}Vof ug\{f\} \backslash$.
 $h:t\dot{y}\dot{M} olb \dot{d} / g l:y/ /flvof]eg]Ps\dot{y}7fp\dot{d}f /flvPsf]Pp6\dot{y}t/n eP o;n]lb0g]rfk$ $ulx/f0;\dot{u} ;dfgkflts P - H xG5 . ulx/f0 a9L ePsf]7fp\dot{d}f rfk a95 . ulx/f0 sd$

ePsf]7fpđf rfk klg sd xG5 . csf]zAbdf eGgkbf{sg}laGbbf t/nn]lbg]rfk ;f] laGbeGbf dfly /x}f t/nsf]prf0 (h) ;ũ ;dfgkflts xG5 .

- t/n kbfsf]rfk o;sf]3gTj;ũ ;dfgkflts xG5 p d egl l;sfpgxf] \h:t} olb h / g l:y/ 5g\eg] t/n kbfsf]3gTj a9]rfk klg a95 / 3gTj 36]rfk klg 365 . ljeGg 3gTj ePsf t/n kbfsf] ;dfg prf0;Dd ef8f]f /fvbf lkWdf lbg] rfk k/s xG5 .
- t/n kbfsf]rfk u?Tj k]ucg';f/ klg k/s xG5 egl JofVof ugxf] \h:t} P g olb h / d l:y/ 5g\eg] sg}ef8f]f /flvPsf] t/n kbfsf]f0{ljeGg 7fpđf nUbf o;n]lkWdf lbg] rfk k/s xG5 .
- t/n kbfsf]lbg]rfk;DaGwl ul0ftlo ;d:ofxŁ lbP/ lJBfylf0{xn ug{nufpgxf] \. lJBfylf]g;sf] lzlfns]u/ b]fpgxf] \.
- kf7ok:tssf]cEof; g=11, 12, 13 xn ug{lbgxf] \. cfjZos k/df lzlfns]xn u/L b]fpgxf] \.

kf:snsf]lgod

- Anh kf:snsf]kf]b]fP/ pgsf]kl/ro lbgxf] \.
- kf:snsf]lgod atfpgxf] \ pSt lgods]JofVof ugxf] \.
- kf7ok:tssf]lj]ofsnfk 2.3 u/ b]fpgxf] \ lJBfylf0{lj]ofsnfkaf6 s]l;Sof} egl kZg ;f]gxf] \.
- lj]ofsnfksf]lgisifaf/]5nkın ugxf] \.
- kf7ok:tssf]lrq 2.5 nf0{af8f] ;f/ o;sf]d2taf6 kf:snsf]lgod JofVof ugxf] \.
- pSt lrqdf sg]lk:6gdf rfk k7fpbf afSŁ 7hf;fgf ;a]lk:6gxŁdf rfk a/fa/ xG5 egl lx;fa u/L b]fpgxf] \.
- rfk a/fa/ xg]xbf 7hf]lk:6gdf a9l an pTkGg xG5 / ;fgf]lk:6gdf sd an pTkGg xG5 egl ul0ftlo dfllodaf6 b]fpgxf] \.

xf08f]ns k]

- xf08f]ns k] sf]kl/ro lbgxf] \. o; oGqn]kf:snsf]lgoddf cfwfl/t eP/ sfo{ub5 eGg]s/f ;Derfpgxf] \.
- xf08f]ns k] sf] ;/n lrq -kf7ok:tssf]lrq g=2.6 n] o;sf]agf6 j0f6 ugxf] \.

- $x_{f08} \text{ns } k]n]s; /l \text{ sfo}\{ub_5 \text{ eGg}\}af/]kZg \text{ u/} l \text{ 5nk}n \text{ ug}\{f\} \backslash.$
- $x_{f08} \text{ns } k]s]b]j]lk:6gdf \text{ a/fa/} \text{ rfk } pTkGg \text{ xg]xbf } 7hf]lk:6gdf \text{ an } k]46 \text{ xg] s'/sf]JofVof ug}\{f\} \backslash.$
- $x_{f08} \text{ns } k]df \text{ s; /l } t]n / \text{ Ifg}k\text{nsf]cgkft} ; fgf]7hf]lk:6gdf \text{ xg]t]n / Ifg}k\text{ns cgkft}; \text{ü } a/fa/ \text{ xG5 } b]fpgxf] \backslash.$
- $jf:tl]s \text{ } x_{f08} \text{ns } k]s]lrq \text{ -kf7ok:tssf]lrq } g \neq 2.7) \text{ af}Baf \text{ n]y] o;df } s; /l \text{ lgDglnlvt } k\text{nf0bfx} \text{ } xG5g\text{legl } JofVof \text{ ug}\{f\} \backslash \parallel$
- s_ $x_{f08} \text{ns } k]n]an \text{ k]46 } ub_5 .$
- v_ $x_{f08} \text{ns } k]n]ansf]lbzf \text{ kl/j } t6 \text{ ub}_5 .$
- $x_{f08} \text{ns } k]; DaGwl \text{ uloftlo} ; d:ofx \text{ } lbP/ \text{ lgDglnlvt} ; \text{ü } kbf]u \text{ u/} l \text{ tl} ; d:ofx \text{ } ljBfyl\text{nf0}\{xn \text{ ug}\{nufpgxf\} \backslash.$

$$\frac{;fgf]lk:6gdf \text{ an } (F_1)}{;fgf]lk:6gsf]Ifg}k\text{ns } (A_1)} = \frac{7hf]lk:6gdf \text{ an } (F_2)}{7hf]lk:6gsf]Ifg}k\text{ns } (A_2)}$$

$t/n \text{ kbfy}\{ / pWj\{fk \text{ (Upthrust)}$

- $kf7ok:tssf]lj\text{ofs}nfk \text{ } 2.4 \text{ k}pZ6 \text{ ug}\{f\} \backslash.$
- $9^a\text{uf } kfgldf \text{ 8a}sf]cj:yfdf \text{ t]n } sd \text{ xg]sf]sf/Of } ljBfyl\text{ } \text{ü} ; f]gxf] \backslash. \text{ } ljBfyl\text{ } af6 ;xl \text{ pQ/ } gcfPdf \text{ lzIfsn]atfpgxf] \backslash.$
- $cky|6sf]kl/ro \text{ lbgxf] } \backslash. \text{ } cky|6 \text{ gfk}g] \text{ lgDglnlvt} ; \text{ü } af/] \text{ JofVof } ug}\{f\} \backslash \parallel$
 $pWj\{fk \text{ -cky|6}_ = j:t]sf]t]n - t/nleq \text{ /xbf } j:t]sf]t]n$
- $kfgldf \text{ h:t}\}j\text{fob08ndf } kl\text{g } xfjfsf]cky|6 \text{ xG5 } eGg]s'/sf]JofVof \text{ ug}\{f\} \backslash.$
- $cky|6; DaGwl \text{ ljleGg } uloftlo ; d:ofx \text{ } lbP/ \text{ ljBfyl}\text{ü}\text{nf0}\{xn \text{ ug}\{lbgxf\} \backslash.$

$3gTj / ;fk]lfs \text{ } 3gTj$

- $3gTj \text{ sf]kl/efiff, Psf0 / ;ü; lxt } kl/ro \text{ lbgxf] } \backslash.$
- $s\text{ü} \text{ kbfy}\text{ü}\text{sf] } 3gTj \text{ atf0lbgxf] } \backslash.$
- $3gTj \text{ a9l } ePsf \text{ kbfy}\{uxf\} / 3gTj \text{ sd } xg] \text{ kbfy}\{xn\text{sf } xg]s'/f \text{ JofVof } ul/lbgxf] \backslash.$

- ;fk]lfs 3gTj sf]kl/efiff / ;q; lxt kl/ro lbgxf] \.
- ;fk]lfs 3gTj b0{3gTj sf]cgkft ePsf]Psf0 gxb]sf/Of JofVof ugxf] \.
- ufd klt3g; 6ld6/ Psf0df sg}j:t5f]3gTj / ;fk]lfs 3gTj sf]dfg a/fa/ xg] s/f JofVof ugxf] \.

pWj{fk / t/nsf]3gTj

- t/n kbfsf]pWj{fk kpf]usf]kpxg u/L kl/ro lbgxf] \.
- t/nsf]rfk (P) t/nsf]3gTj (d) xG5 egl l;4 u/] b]fpgxf] \.
- lj]ofsnfk 2.5 kpxg ugxf] \.
- kfglsf]3gTj a9k15 To; sf]pWj{fk klq j[4 ePsf]5 . o:t}cG0 t/n kbfsf]klq 3gTjcg';f/ pWj{fk a95 egl atfpgxf] \.

cfls{dl8hsf]l;4fGt

- cfls{dl8hsf]kpf]kpxg u/] 5f]kl/ro lbgxf] \.
- Pp6f kinfdsf]lsnf kfgldf 8A5 t/ kinfdn]ag]sf]hxhf g8Ag'sf]sf/Of ljBf]l; ;u ;f]gxf] \.
- Pp6f kinfdsf]lsnf afN6gsf]kfgldf /fv] 8a'sf]kpxg ugxf] \. To:t}kinfdsf] s/fxl jf cG0 ef8f]kfgldf t/Psf]kpxg ugxf] \.
- lj]ofsnfksf]lgisifaf/]5nkkn ugxf] \.
- lgDglnlvt kZgx; ;f]gxf] \
- * kinfdsf]lsnf / ef8f]cfsf/df s]leGgtf 5 <
- * kinfdsf]lsnf / ef8f]w0]sgn]a9l kfgl lj:yfikt ub5 <
- cfls{dl8hsf]l;4fGt atfpgxf] \ JofVof ugxf] \.
- kf70k'tssf]lj]ofsnfk 2.6 kpxg ugxf] \ / l;4 ugxf] \ pWj{fk = lj:yfikt t/nsf]tfp

knjgsf]lgod

- kf70k'tssf]lj]ofsnfk 2.7 kpxg ugxf] \. ljrf/Oflo kZgaf/]5nkkn ugxf] \. klxn]ljBf]l{f0{pQ/ lbg]dfsf lbgxf] \.

- Knjgsf]lgod atf0{JofVof ugxf] \.
- Ij]ofsnfk 2.8 kǝzǝ u/L l;4 u/7 b]vpgxf] \. t/ndf t]vg]j:t'sf]tǝ = Ij:yflkt t/nsf]tǝ
- kf7ǝk:t'ssf]Ij rf/0fǝ kǝgxǝaf/]5nkǝn ugxf] \.

xf08ǝd6/

- xf08ǝd6/ kǝzǝ u/L o;sf]sfo{/ kǝf]u j0fǝ ugxf] \.
- t/n kbfsf]eǝbf sd 3gTj ePsf]j:t'o;df t]vg]sf]sf/Of IjBfy,{ǝ ;f]vgxf] \.
- t/nsf]eǝbf a9L 3gTj ePsf j:t' t/n kbfsf] t]vg]cj:yf JofVof ugxf] \.
- xf08ǝd6/sf]pkof]utf j0fǝ ugxf] \.

-a_dNof^sg

!= cfls[dl8hsf]l;4fǝt n]vgxf] \. tftf]xfjf el/Psf]a]ǝ s;/L cfsfzdf dfly p85 <

@= lk:6gsf]a,b / c sf]lfǝkǝn j]dzǝ 10 ;]d, 8 ;]d / 6 ;]d 5g\. lk:6g 'a'df 10 ǝ6gsf]an nufpǝf lk:6g b / c df sltslt an pTkǝg xǝ5 < kf:snsf]lgod egǝf] s]xf]n]vgxf] \.

#= t/n kbfsf]lbg] rfknf0{ sǝsǝ tǝjxǝn] c;/ ubǝg\< sf/Of vhf0{ JofVof ugxf] \.

\$= t/n kbfsf]lbg] pǝj]fk -cky|6nf0{ sǝsǝ tǝjxǝn] c;/ ubǝg\< JofVof ugxf] \.

%= kfgldf cflǝs 8aǝf]j:t'xn'sf xǝsf]sf/Of s]xf]<

^= Pp6f 0ǝfsf]lk08 2 lsnf]j]d 5 / o;sf]nDaf0 20 ;]d / rfǝf0 10 ;]d 5g\eg]0ǝf /flvPsf]7fpǝf slt rfk lbǝ5 <

&= kfgleǝbf a9L 3gTj ePsf]j:t' sǝ cj:yfdf kfgldf t]vǝ5 < cflb kǝgsf]dfNodaf6 dNof^sg ugxf] \.

-r_lzlfsnf0{yk hfgsf/L

$$j:t'sf];fk]lfs 3gTj = \frac{j:t'sf]3gTj}{\$) c tfkj]d /xǝf]kfglsf]3gTj}$$

aKnjgsf]lgod

hxfhsf]3gTj kfglsf]eGbf w}}a9L eP tfklg kfgldf w}}nfB; lxt tVg'sf]sf/Ofhxfhnf0{
lbOPsf]; dlr t cfsf/ g}xf]. hxfh vfnL cj:yfdf o; sf]s}L efu dfq kfglleq /xG5 .
nfB yKb}uPkl5 hxfhsf]a9LeGbf a9L efu kfglleq 8A5 . o;n]ubf{lj:yflkt kfglsf]tfh
nfBcg';f/ a9b}hfG5 . hxfh tV/x}f]tfheGbf lj:yflkt kfglsf]tfh sd ePdf hxfh
8A5 . To;sf/Of hxfhsf]nfB af\$g ;Sg] lfdtf lgwf{Of u/L ;a}S} :jZk /flvPsf]
xG5 . hxfh aflx/ kfglsf]; tx ;f];a}S}eGbf dfly cfpg]u/L nfB /fvGxbg} .

j:t'sf]3gTj / Knjg

a/kn kfgldf pqG5 lsgeg]a/knsf]3gTj)=(@ ufd klt 3g;ld 5 eg]kfglsf]3gTj !
ufd klt 3g;ld 5 . To;h}j/kn kfgldf tV/G5 . knfdsf]3gTjeGbf kf/f}f]3gTj a9L
xG5 / kf/f] t/n ePsf]o;df knfd tV/G5 . d6k6thdf ss{tV/G5 . kfgldf sf7
tV/G5 . kf/f}f] knfd, l; ;f h:tf wft'klg tV/G5g\.

Psf0 #

pṁhf{(Energy)

cgdfllgt 3G6L M %

-s_ljIzi6 p27oxč

o; Psf0sf]cGtodf ljBfylč lgDglnlvt sfoč ug{; lfd xg]5g\

!= pṁhf\$]kl/efiff lb0{o;sf ;f / pkof]uttsf]j0f ug{.

@= kf/df0fljs kltljlofxčnf0{;f{pṁhf\$] ;f]sf]čkdf j0f ug{.

pṁhf{;^s6sf ;d:ofxč / ;Af0sf pkfoxč klxrfg u/L j]ṁNks pṁhf\$;f]xč j0f ug{.

-v_kl/ro

pṁhf\$]kl/efiff lbg / ljleGg kṁf/sf pṁhf{ ;f]xčsf] j0f ug{ljBfylčnf0{; lfd agfpgkg]5 . pṁhf{;^s6sf]kl/ro lbg, sf/Of JofVof ug{/ ;dfwfgsf pkfoxč j0f ug{ljBfylč ; lfd xgkg]5 . j]ṁNks pṁhf\$;f]xč atfpg / :yfglo ;Gbečf pṁhf{;^s6 Gog ug]pkfoxč atfpg ;dy{xg]5g\.

-u_lzlf0f ;fdu

▪ ;b{ k]jl, j]k:klt cflbsf]lrq, hnljBt\uksf]lrq jf tl:a/, sf0nf, kṁh, l8h, d66t]h cflbsf]gdgf, sfuhsf] ;fg]k^vf .

-3_lzlf0f l;sf0 lj]ofsnfk

zlStsf] ;f]

▪ s]s]sfdsf nflu zlSt cfjZos kb5 egl kZg ;f]gxf] \.

▪ zlStsf k]s[ts ;f]xč s]xg\< ljBfylč ;f] afṁdf gf ugxf] \. cfjZos k/ṁ cfk] klg ykgxf] \.

▪ zlStsf ;f]xč b0{;dXdf afṁgxf] \ gjls/Oflo / cgjls/Oflo .

▪ gjls/Oflo / cgjls/Oflo zlStsf ;f]xčsf]kl/efiff atfpg nufpgxf] \.

;b{ zlStsf]dh ;f]

▪ ;b\$]lrq afṁdf n] o;sf]agfṁaf/]atfpgxf] \.

- ;b\$]Jof;; lk08, k[jlaf6 b/l cflb afBdf n\vgxf] \ / of]cGo u\kx\sf]thgdf w[j]jzfn 5 eGg]s/f atfpgxf] \.
- ;b\$];txsf]tfkj]d, sf]b\$]tfkj]d, ;b\$]5fB\$]zlst / k[j]ldf k[kt xg]k[t]ju[d6/zlst afBdf n\vgxf] \.
- Çohg k[tlj]of / GolSno/ p[hf\$] / ;fdfGo kl/ro lbgxf] \cg';q ulx/f0df hfg'kb\$.
- ;b\$ Çohg k[tlj]of xgsf nflu cfjZos cj:yfx\ s\$]5g\ atfpgxf] \.
- 'hnljBt\ h]j s p[hf{ hLj]jz]f p[hf{ jfo'p[hf{cflb ;a};f\$]zlst s}pkh xg\ eGg] syg afBdf n\vgxf] \ / l]Bfyl\k\nf0{kli6 ug{nuf0{cGtodf :ki6 kfgxf] \.

hLj]jz]f p[hf{

- hLj]jz]f p[hf\$ af/]df l]Bfyl\k\nf0{yxf ePsf]s/f eGg nufpgxf] \.
- hLj]jz]f p[hf{/ h]j s p[hf\$ leGgtfaf/]5nk\in ugxf] \.
- sf]nf, k\$]n, l8h]n d6k6t]n cflbsf]gdgf k\$z\$ ugxf] \.
- sf]nf / vlgh t]hsf]kl/ro, ol p[hf{aGg]k[j]of / ol p[hf\$]dxEjaf/]JofVof ugxf] \.

hnljBt\ux

- hnljBt\uxsf]k[rf]k\$z\$ u/l hnljBt\s; /l pTkfbg ul/G5 eGg]af/]df l]Bfyl\k kZgrQ/ ugxf] \.
- s\$]sfo\$ nflu hnljBt\cTofjZos k5{;f] afBdf gf\$ ugxf] \.
- gkfnnf0{hnljBt\$]bf]f]wgl b]z dflgg\$ sf/Of 5nk\in ugxf] \.
- hnljBt\lsg gj]ls/Oflo / kplf0f/lxt 5 < JofVof ugxf] \.
- hnljBt\$]pkof]utfaf/]l]Bfyl\k\nf0{kZg u/l ;'t agfpg nufpgxf] \.

p[hf\$ j\$]INKs ;f]x\

- j\$]INKs p[hf{sgsg xg\< ;f] afBdf n\vgxf] \ / Itglx\nf0{j\$]INKs p[hf{lsg elgPsf]eGg]af/]5nk\in ugxf] \.
- j\$]INKs p[hf\$] ;f]sf]kl/efiff eGg nufpgxf] \.

h]j s p[hf{

- h]j s p[hf{eg\$]s]xf]< o;nf0{lsg j\$]INKs elgG5 / o;nf0{lsg gj]ls/Oflo p[hf{ ;f] elgG5 cflb kZgx\af/]5nk\in ugxf] \.

GolSno/ pñhf{

- GolSno/ pñhf{sf]kl/ro sf ;fy}Çohg / lkñ;g kltlj|ofdf ;fdfGo leGgtf atfpgxf] \.
- GolSno/ pñhf{sf knf0bf / a]knf0bfaf/]5nkñn ugxf] \.

Hjf/ef6f pñhf{

- Hjf/ef6f / ;db| 5fnaf6 s;/L ljBt\pTkfbg ul/G5 j0fg ugxf] \.

jfo' pñhf{

- xfi jfn]k^aVf s;/L 3dfp5 < sfuhsf];fgf]k^aVf agf0{kp zç ugxf] \. o;n]8f0gdf] 3dfpg ;S5÷;Sbç ;f]gxf] \.
- jfo' pñhf{egs]s]xf] < of]s;/L kpñ ul/G5 < 5nkñn ugxf] \.

lhofydfñ pñhf{

- lhofydfñ pñhf{sf]kl/ro lbgxf] \.
- s:tf]7fpdf lhofydfñ pñhf{k|t xG5 < atfpgxf] \.
- lhofydfñ pñhf{s;/L kpñ ul/G5 < 5nkñn ugxf] \.

pñhf{pkof]usf] j tçfg l:ylt

- ljZjdf j tçfg cj:yfdf sbgsb ksf/sf zlstxç a9l dfqfdf kpñ ul/G5 < afpç n]gxf] \.
- pñhf{kpf]usf] j tçfg l:ylt atfpgxf] \.

pñhf{sf] ;^as6

- pñhf{ ;^as6sf af/ñf ljBfylçnf0{cfçgf]egf0 k|t't ug{nufpgxf] \.
- 5nkñnsf cfwf/df pñhf{ ;^as6sf]kl/efiff eGg nufpgxf] \. pñhf{ ;^as6sf]sf/Of ljBfylçñ ;ñ] afpç gfç ugxf] \.
- pñhf{ ;^as6sf kpV sf/Ofxç j0fg ugxf] \.
- pñhf{ ;^as6 Gog ug]pkfoxç sç]xb ;S5g\ < ljBfylçnf0{eGg nufpgxf] \.

-a_dñof^as6g

!= ;bçf];tx / s]b|o efudf tfkj|d nueu sltslt xG5 <
@= ;ç{zlstnf0{zlstsf]dh ;f] lsg dflgG5 <

#= Golsno/ Çohg egşf]s]xf]< o;sf nflu cfjZos cj:yfxç şş]xb\<
 \$= hlj fj zİf pñhf{egşf]s]xf]< of]pñhf{cgjls/Oflo egl yfxf kfpb{kfpb}lsg o;sf
 Jofks kpfu ul/G5 <
 %= gkfnsf];Gbe{kpfv jşİnks pñhf{;İ şg xf]< sf/Of;ixt nİgxf]\.
 ^= hnlijBtsf]dVo b0çf pfkofutfxç atfpgxf]\.
 &= jşİnks pñhf{;İ egşf]s]xf]< sg}b0çf pbfx/Of lbgxf]\.
 *= pñhf{;aş6 egşf]s]xf]< o;nfo{Gog ugIb0çf pkfoxç şş]xb\<

-r_ lzlfsnf0{yk hfgsf/L

sfñf

kIjlsf]0ltxf;df şpñfş sfndf sfñf aGg]kljlof ePsf]lyof]. wİh;f]sfñf
 kİl;Neflgog sfndf agşf lyP . o;f]eGgn]#% nfvbİv @% s/fş jif{cufl8sf];do
 xf]. şpñf]lsnf]d6/;Dd kİİnPsf sfñfsf txxç hldgdİg eİ6G5g\ . İ;d jf bnbnn]
 hldgdf ePsf cgş la?jf, çvxç İjzİf u/L cUnf hfltsf plgpçç ufl8Pkİ5 df6f]
 afnİfn]5İkf şlxgaf6 aR5 . JofS6I/ofxçn] tl la?jfdf ePsf kfgl / şİl efu
 Uof;df kl/Of t u/L afİx/ İg:sG5 . afŞl /xşf şfağ hDdf xb}hfG5 . kİoş jif{hDdf
 ePsf ol şfağsf txxç afŞnf]xb}eİşleş kl/jİğ xbf kl/g hfG5 . tl tx dfly kgİ
 r66fgsf]rfkn]kfgl hİt İglvP/ şfağ dfq}afŞl /xg uof] / wİ};dokİ5 ş8f e0{
 sfñfndf kl/Of t xG5 .

vlgh tİh

vlgh tİh aGg]kljlof sfñf aGg]kljlofeGbf cln İeGg 5 . wİh;f]vlgh tİh s/fşjif{kİxn]
 agşf xg\ . ;dbİdf ePsf hljxç d/Iİ5 ;dbşfİkİwdf hDdf xg uof] / İ56}gİxnİ afnİfn]
 To;nfo{kl/lbİf şlxg kfPgg\ . ;fy}çç kİfİl / cŞ;İs/Of xgaf6 hfİuP . kİjİleqsf]tfk
 cgşh dfqdf pknAw xbf Ps kşf/sf]JofS6I/ofn]tl %ofpnf0{vlgh tİh / Uof;df kl/Of t
 ul/lbP . o; sfoşf nflu tfkjİd ^) bİv !^) İ8ul ;İ6uİ alrdf xgk5{. cGoyf vlgh tİh
 aGg]kljlof xbş . o;/L agşf vlgh tİh İ5bİst r66fgdf hDdf e0/xG5g\ . tİh / Uof;
 hDdf ugİol r66fgnf0{/hEjİf/ r66fg elgG5 . o:tf r66fgsf]dlg / dflyaf6 İ5bİgePsf
 r66fg h:t};İ (shale) ePsf]xgk5{. cGoyf tl alg;şşf]tİh / Uof; kİİTsG5 jf x/fP/
 hfG5 . o;/L İ/hEjİf/ r66fgnf0{;İn]5İkP/ /xşfn]tİh vfgİxç ;İİft eP . ol vlgh
 tİhxç sRrf tİh (crude oil) sfİçkdf vİglaf6 kİkt xG5 . o;nfo{kİİS;gn İ8İ:6n]g u/L
 kİİn, d6İ6tİh, İ8hİ cİlb kİkt xG5 . o;af6 İg:sg]şİl /f;folgs kbİyççaf6 İjİeGg
 cİİw, knfl:6s, sİqd /İf, /a/fİug, k/Çobİ cİlb agfpg pfkofu ul/G5 .

Psf0 \$

tfk (Heat)

cgdfigt 3G6L M ^

-s_ljzi6 p27ox¿

o; Psf0sf]cGtodf ljBfyl¿¿ lgDglnlvt sfo¿¿ ug{; lfd xg]5g\\M
!= tfk / tfkj|dalr leGgtf 56bfpq .
@= ljzi6 tfkwf/Of zlstsf]JofVof ug{/ tfk cfbfg kpfgsf] ;dls/Of lgsfNg .
tfksf]gfsf Psf0x¿ JoSt ug{.
\$= tfk;DaGwL ;/n ;d:ofx¿ xn ug{.

-v_kl/ro

o; Psf0cGtu{sf kf7n]ljBfyl¿¿df tfk / tfkj|dsf]kl/efiff lbg, tfk / tfkj|dsfPsf0x¿
JoSt ug{ tfk / tfkj|dalr sf]leGgtf pkoSt lj|ofsnfkåf/f k]6 kfgI ; lfdtsf]lj sf;
xg] 5 . ;fy}k|tt kf7n]ljzi6 tfkwf/Of zlstsf]JofVof ug{/ tfk cfbfgkpfgsf]
;dls/Of lgsfNg, tfkwf/Of zlstsf]s|k|ffnldf Psf0 JoSt ug{tyf tfk;DaGwL ;fwf/Of
ul0ftlo ;d:ofx¿ xn ug{;Sg]lfdtsf]lj sf;df hfB lb0Psf]5 .

-u_z]lfs ;fdul

kfglsf] clgoldt k|f/sf] rf6{ ydfId6/, ljs/, kfgl, ag{, vfg] t]h, :6bf08,
;nf0\$]sf6l, a/k|, lasf]lxtsf]af]n, ljleGg Psf0 c^ast ydfId6/ .

-3_lzlf0f l;sf0 lj|ofsnfk

- tfk / tfkj|d;DaGwL ljBfyl¿¿sf] aef0 yxf kfpq warming up sf lj|ofsnfk
ugxf] \.
- cf0fljs rfnsf cfwf/df tfk / tfkj|ddf k|/s :ki6 xg]u/L 5nk|n ugxf] \.
- Pp6f aln/x]sf] ;nf0\$]sf6l / Pp6f ljs/df ttfPsf]kfglaLrsf] ;DaGw 5nk|n
u/L tfksf]kl/df0f, kbrydf /x]sf c0fx¿sf] ;^vof / c0fx¿sf]cf] t ult zlstdf lge{
ub\$ egg]s/f lgisifdf kUgxf] \.
- ! hh eg]sf]s]xf] < ! Sofnf]L eg]sf]s]xf] < hh / Sofnf]ldf s] ;DaGw 5 <
cfibaf/]5nk|n u/L ! hhsf]kl/efiff tyf ! Sofnf]lsf]kl/efiff :ki6 ug\$;fy}hh
/ Sofnf]laLrsf] ;DaGw atfpgxf] \.

- tfkn]j:tđf s]c;/xč ub5 < ljBfylčnf0{kfn}kfnf]kZg ugI ljBfylčnf0{af6 cfPsf pQ/df 5nkn u/l pkoSt ljleGg pbfx/0fxč lb0{tfksf c;/xč atfpgxf] \.
- kbfsf tlg c]f c j:yfxčdf kfglsf]clgoldt k;f/ xč5 egl rf6{kčzč u/l :ki6 ugxf] \.
- tfkjldaf/] :ki6 kfgsf ;fy}kf7bk'tssf]ljlfnsnfk 4.1 kčzč ugI/ ljBfylčnf0{kfn}kfnf]c jnfsg u/f0;skl5 5nkn u/f0{a/fa/ dfqdf tfk lbff sd lk08 ePsf j:t'sf] tfkjld a9l / w}]lk08 ePsf j:t'sf tfkjld sd xč5 egl lgisifdf klugxf] \.
- ljBfylčnf0{ljleGg Psf0 c'ast ydf]d6/xč kčzč / c jnfsg u/f0{tfkjldsf] gfk / ydf]d6/df kpfu ul/Psf t/n kbfs{hdg]ljčb' tyf pDng]ljčbaf/]kpfu kčzčaf6 l;sfpgxf] \.
- tfk / tfkjldalrsf]leGgtfaf/] :ki6 kfgxf] \.
- kf7bk'tssf]ljlfnsnfk 4.2 kčzč, c jnfsg / 5nkn u/l ljleGg j:t'sf]tfkwf/Of lfdtsf]kl/efiff atfpgxf] \.
- leGbffečb}tfkjld ePsf b0čf] j:txč Ps cfk;df ;č}/fvbf s]xč5 < 5nkn ugxf] \. a9l tfkjld ePsf j:th] tfk zlst udfpbf / sd tfkjld ePsf j:th]tfk zlst uxf ub5 egl :ki6 kfgxf] \. j:th] uxf u/]f jf udfPsf] tfk zlstsf] kl/df0f To; j:t'sf]lk08 (m), lj]zi6 tfkwf/Of lfdtf (s) / j:tđf xg] tfkjlddf kl/jtčsf]u0fgkn;č a/fa/ xč5 egl atfpgxf] \.

$$Q = m \times s \times dt$$

- tfk;DaGwl ;fwf/Of ul0ftlo ;d:ofxč dflys] ;čsf čfwf/df xn ug{nufpgxf] \.

-a_d\of^sg

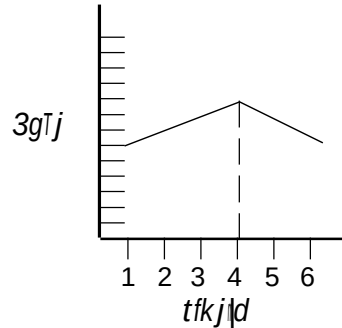
- != kf7bk'tsdf lb0Psf]kZg g=!, @, #, \$ / % sf]hjfk ljBfylčnf0{lbq nufpg].
- @= tfk zlst eg]f]s]xf] < tfksf]kl/df0f sgsg s/fdf lge{ ub5g\<
- #= tfk s:t]kpf/sf]zlst xf] < s klffnldf tfk zlstsf]Psf0 sg xf] <
- \$= tfksf c;/xč s]xg\<
- %= w}]lr;f] dhSdf kfy/lsf] ;txsf] kfgl. a/k eP/ hd] klq To;leqsf df5fxč aff'r/xč5, lsg <

^= lraqdf blyfOPsf]ufkndf kfglsf]3gTj / tfkj|d;ũ ; DaGw blyfOPsf]5 . lraqsf]
cWoog u/L lgDglnlvt kZgxčsf]pQ/ nly M

(i) kfglsf]3gTj ; ačbaf a9l sg
tfkj|ddf 5 <

(ii) kfglsf]cfotg ; ačbaf sd sg
tfkj|ddf 5 <

(iii) kfglnf0{4°c tfkj|dečbaf dfly ttfP jf
Točbaf tn lr:ofP s]xf]hf <



&= hf8f];dodf Pp6}sf]fleq /flvPsf sf7sf d} / kñfdfs]d}dWo]kñfdfs]d}df
a:bfa9l lr ; f]cgej xč5, lsg <

*= hf8f]ofdfs]7č8l /ftdf kfoM kfglsf kf0kxč kñčg ; S5g\ lsg <

(= kñfdfs]lj|zi6 tfkwf/of lfdtf 460J/kg° c ečgsf]cy{s]xf]<

!)= ; šfpg]sfddf tftf]kfgl g}kčf]u ul/č5, lsg <

!!= tftf]kfgln]ečbaf t}hn]a9l kñ]5, lsg <

!@= kfgl / d6lčt]sf]lj|zi6 tfkwf/of lfdtf j|dZM 4200J/Kg°c / 2200J/Kg°c 5g\ ol
b}j}kbfyšf];dfg lk08nf0{30sec ;Dd ;dfg tfk lbčf sg rflxšf]tfkj|d a9l xč5,
lsg <

!#= kf7b]j]dfs]cEof;df lbOPsf ul0ftlo ;d:ofxč ^, &, * / (xn u/fpg].

!\$= Pp6f k]/sš/sf]lk08 1.5Kg / tfkj|d 30°c 5 . olb k]/sš/ agšf]ldl>t wftšf]
lj|zi6 tfkwf/of lfdtf 1000J/kg°c 5 eg]7.5 x 10⁴J tfk lb0of]eg]pSt k]/sš/sf]
tfkj|d slt x]f]hf <

!%= rf]/t/ ;dbh]3V/Psf]6fkdf jifēl/sf]tfkj|ddf Toltsf]cčt/ cfpbč, lsg <

-r_lzlfnsnf0{yk hfgsf/L

- kbfyčč clt ;Td c0fxč ldnL agšf xč5g\ . tfkn]c0fxčdf sf0g]6s zlst (Kinetic energy) pTkčg u/fp5 . sf0g]6s zlst tfk zlstdf lge{ ub5 . c0fxčsf]sf0g]6s zlst a9l ePsf]kbfyšf] tfk klq a9l xč5 .
- kbfyšf]tfkj|d kbfyčf /xšf c0fxčsf]sf0g]6s zlstdf lge{ ub5 . kbfyšfc0fxčsf]sf0g]6s zlst a9l 5 eg]tfkj|d a9l xč5 . sf0g]6s sd 5 eg]tfkj|d klq sd xč5 .

- IjleGg j:tx₂df xg] tfkj]dsf]leGgtf xfd[] z/L/sf]5fnfn]xfj fâf/f dfq ug{;S5 . 5fnfleq ;tx glhs tfk ;~~h~~s :gfox₂ (heat sensor) xG5g\ . sg}j:t'5bf jf j:t' glhs kbf{j:tâf6 xfd[]5fnfdf tfk ;5{/ tl :gfox₂n]t?Gt}rfn kfp5g\ .
- tfkj]d gfk_g kpf]u ul/g]ydf]d6/df cNsf]kn jf kf/f] t/n kb_{fy}sf] ₂kdf kpf]u ul/Psf]xG5 . tfkj]d ;N;o; jf k_m/dxf06 jf s]Neg Psf0df gfk_g ;lsG5 . tfkj]dsf]Psf0 kl/jt₆ lgDglnlvt ;âaf6 ug{;lsG5 M

$$\frac{C-O}{100} \quad \frac{F-32}{180} \quad \frac{K-273}{100}$$

- tfkn]j:t'sf]k₂f/ xG5 eg]lr ;f]ubf{j:t'vDrG5 .
- a9l tfkj]d ePsf]j:tâf6 sd tfkj]d ePsf]j:tâf tfk ;5{. z/L/sf]tfkj]deGbf sf]fleqsf]xfjfsf]tfkj]d sd xgfn]z/L/af6 tfk sf]fsf]xfjfdf ;5{. hf8f]ofddf c_f5bfgleq tftf]/ aflx/ lr ;f]xG5 .
- kfglsf]ljzi6 tfkwf/0f lfdtf ;a₂Gbf a9l 4200J/Kg°C ePsf]n]tfk zlst ;l~rt u/]/fv_g ;S5 .
- ljzi6 tfkwf/0f lfdtf a9l ePsf]j:t'la:tf/}tflt_g/ ;hfp_g]ub₅ t/ ljzi6 tfk wf/0f lfdtf sd ePsf]j:t'l566}tflt_g/ ;hfp_g]ub₅ .
- zlstsf] ₂kfgt/cg';f/ j:th]udfPsf] tfk zlstsf]kl/df0f j:th]u_k0f u/}sf] tfk zlstsf]kl/df0f;û a/fa/ xG5 .

Psf0 %

kḡfz (Light)

cgḡflgt 3ḡ6L M *

-s_ ljlzi6 p2ḡoxḡ

o; Psf0sf]cḡTodf ljbḡfylḡḡ lgḡḡlnlvt sfoḡḡ ug{; lfd xḡ]5g\

! = nḡ; af6 kḡfz hḡḡ]ljḡof kḡzḡ ug{/ lḡqxḡ nḡḡ .

@ = bḡs hlḡḡdf nḡ; sf]-Sofd/f, xftḡḡ; , ḡbzḡ ḡḡḡ; ; ḡdbzḡ ḡḡḡ kḡḡḡaf/]jḡḡḡḡḡ.

bḡḡḡḡḡ jḡḡḡ u/L ; ḡf/sf pkfoxḡ atḡpg .

-v_ kl/ro

o; Psf0cḡtu{sf]kf7n]ljbḡfylḡḡdf ljleḡḡ pks/ḡfxḡ -Sofd/f, ; ḡdbzḡ ḡḡḡ, bḡbzḡ ḡḡḡ cflb_ nufot xfdḡ]cfḡḡdf klḡ nḡ; xḡ5 eḡḡ]atḡpgsf ; fy]ljleḡḡ kḡf/sf nḡ; xḡsf] kl/ro lbg vḡḡḡ]5 . kḡtḡt kf7n]nḡ; af6 xḡ]cfj tḡ ljḡof, nḡ; ; DaḡL zAbfjnL, nḡ; af6 bḡḡḡ]j : tsḡ]cfs[t, nḡ; sf] ; fdḡḡ / lj : tḡt ; DaḡL ulḡftlo ; d:ḡf xn ugḡ]cflb lj ifoxḡnf0{ ; dḡḡ]kḡf; ul/Psf]5 . o; df sḡL cḡḡ6sn pks/ḡfxḡ -Sofd/f, ; ḡdbzḡ ḡḡḡ, bḡbzḡ ḡḡḡ sf]agfj6 / kḡḡḡaf/]ls/ḡf / ḡf lḡḡḡf/f kḡ6 kḡḡḡ ; fy}dfḡj cfḡḡsf]agfj6 / cfḡḡsf]xḡ]zlStdf sdhfḡḡaf/]ljbḡfylḡḡnf0{hḡḡsf/L lbg]kḡf; ul/Psf]5 .

-u_ zḡḡfs ; fduḡ

ljleḡḡ kḡf/sf nḡ; -sḡḡ; nḡ; , sḡḡḡ nḡ; _ cḡḡ6sn aḡr, :6ḡ8, dḡḡḡ, :6ḡ8; lxtsf] kḡf{cfḡḡsf]ḡḡḡ, bḡbḡ6 / cbḡbḡ6sf rf6ḡḡ, xftḡḡ; , Sofd/f, sfnf]sf8ḡḡ{kk/; , hḡḡ sḡL, ; ḡdbzḡ ḡḡḡ, /ḡḡ8a6d ḡnf; s .

-3_ lzlfḡf l; sf0 ljḡḡsfnfk

- ljbḡfylḡḡn]nḡ; ; Daḡḡdf hḡḡsf/L yxf kḡpg ḡḡlxḡn]kḡḡḡ ubḡcfPsf jf kḡḡḡ ubf{bḡḡsf ljleḡḡ nḡ; kḡḡḡ ul/Psf ; fduḡxḡsf] ; ḡL tof/ u/L ltḡlxḡsf]lḡḡ / pkḡḡḡ sḡḡf 5 atḡpg nufḡḡḡ\.
- ljleḡḡ kḡf/sf nḡ; xḡ kḡzḡ u/L sḡḡ; nḡ; / sḡḡḡ nḡ; sf]kl/ro lbgḡsf ; fy} sḡḡ; nḡ; n]kḡfznf0{sḡḡḡ ugḡ / sḡḡḡ nḡ; n]kḡfznf0{ljsḡḡḡ u5{eḡḡ sḡf kḡḡḡaf/f kḡ6 kḡḡḡ\.
- rf6{kḡzḡ u/L nḡ; ; DaḡL sḡL zAbfjnlxḡ atḡḡḡḡ\.

- kf7bk't:ssf]lj|ofsnfk %=! u/L sGe\$; n];sf] s]b|s/Of b/L kQf nufpg] tl/sfaf/]atfpg nufpgxf] \.
- j:thf0{sGe\$; n];af6 2f eGbf 6f9f, 2f df, 2f / f sf]alrdf /fvbf, f / n];sf]alrdf /fvbf sGe\$; n];n]agfpg]ljleGg cfs[txčsf]ls/Of /vflrq lvRg]lgodxč atfpg] / tl lgodsf cfwf/df ljBfylčnf0{ls/Of /vflrq lvRg nufpgxf] \.
- j:thf0{sGe\$; n];af6 ljleGg b/Ldf /fvbf sGe\$; n];n]agfpg]cfs[tsf]kš[t lgDglnlvt lj|ofsnfkaf6 :ki6 kfg{;lsG5 M
kf7bk't:ssf]lj|ofsnfk %=! cg';f/ sGe\$; n];sf]s]b|s/Of b/L kQf nufpgxf] \.
d] aQl afn] :6bfG8df /fvL n];af6 s]b|s/Of b/Lsf] b]a/ b/L (2F) df /fvGxf] \. n];sf] csf]t/ :6bfG8; lxtsf] kbff /fvGxf] \. kbff0{n];af6 6f9f / glhs ;f/] d] aQlsf]cfs[t agfpgxf] \. d] aQlsf]cfs[t l:ylt / kš[t c]n]fsg u/fpgxf] \. pko\$ t ljwcg';f/ j:thf0{-d] aQl_ k/sk/s b/Ldf 2F eGbf 6f9f, 2F / F sf]alrdf, F / n];sf]alrdf /fvL d] aQlsf]cfs[tsf]l:ylt / kš[t c]n]fsg u/fpg ;lsG5 .
- rf6{k]z] u/L sGs] n];af6 b]vg]j:tsf]cfs[t ;N6f] ;fgf] / c]f:tl]s cfs[t agfp5 egl :ki6 kfgxf] \.
- n];sf] ;fdYo\$]kl/efiff lb0{n];sf] ;fdYo{lgsfNg] ;đ atf0{n];sf] ;fdYo{DaGwl ul0ftlo ;d:of xn ug{nufpgxf] \.
- n];sf]lj:t[tsf]kl/efiff lb0{lj:t[t gfkg] tl/sf atfpgsf ;fy}lj:t[t lgsfNg] ;đ atf0{lj:t[t;DaGwl ul0ftlo ;d:of xn ug{l;sfpgxf] \.
- xft]n]; Ps kšf/sf] ;/n ;'dbz\$ oGq xf]egl atfpgsf ;fy}o;n]s;/L j:tsf] cfs[t 7hf]kf5{egl k]z] u/L :ki6 kfgxf] \ / o;sf]k]p]uaf/]5nkin ugxf] \.
- Sofd/fsf]agf]sf]lrq jf ;Dej ePdf Sofd/f k]z] u/L o;sf ljleGg efuxčsf kl/ro lb0{Sofd/fn]s;/L sfid u5{eGg] ;DaGwdf k]zg] / ugxf] \.
- cfvvsf] x]l zlstdf sdhf]l egšf] s] xf] < ljBfylčnf0{ k]zg ;f] 5nk]nsf cfwf/df cb/b]6 / b/b]6 u/L cfvvsf]sdhf]l b0{kšf/sf xG5g\egl :ki6 kfgxf] \.
- cb/b]6 ePsf]cfvvsf]gdgf tof/ kfg]sfo{
Pp6f /fpG8 a6d Čnf:s ln0{To;df Čnf]l;gsf]3f] egxf] \. Čnf:ssf]Jof;eGbf sd s]b|s/Of b/L ePsf]sGe\$; n]; Čnf:ssf]Psflt/ ;h]k]nc8b]pgxf] \. n];af6 kšfz k7fpgxf] \. kšfzsf]ls/Of sxf"s]b]t eof]/ lsg < sGe\$; n];sf]cufl8

sGse n; /fvbf kpfzsf]ls/of Çnf:ssf]lj k/lt efudf lsg s]b]t eof] < 5nkñn u/l cb/b[i6 xgfsf sf/of / o;kpf/sf] sdhf]l x6fpg] tl/sfaf/] lgisif] kUgxf] \.

- b/b[i6 ePsf]cfv'fsf]gdbf tof/ kfg{
Pp6f /fpG8 a6d Çnf:s lng]/ To; leq Çnf]l; gsf]3fh egxf] \. Çnf:ssf]Jof; eGbf s]l 7hf]s]b]s/of b/l ePsf]sGe\$; n; Çnf:ssf]Psflt/ ;hf]kn]c8bfpqxf] \. n; af6 kpfz k7fpgxf] \ / c]nf]sg u/fpgxf] \. kpfzsf ls/0fxç sxf" s]b]t eof] < kpfzsf ls/0fxç Çnf:ssf]csf]t/ s]b]t ug{s]ug{k5 / s; /L < ljBfylççalr 5nkñn u/f0{b/b[i6 xgfsf sf/of / o;kpf/sf] sdhf]l x6fpg] tl/sf atfpgxf] \.
- sDkfpG8 ;Idbz\$ oGq kþzç u/l o; sf]agfj6 / ljleGg efuxçsf]gfd atfpgsf ;fy]jof]oGqn]s; /L ;Id j:thf0{7hf]agfp5, ls/of /yflrqâf/f kl6 kfgxf] \. o; sf] pkof]utfaf/] atfpgxf] \.
- kf7bk:t:ssf]lj]ofsnfk %=\$ cg';f/ sDkfpG8 ;Idbz\$ oGqsf]gdbf ljBfylççnf0{ tof/ kfg{nufpgxf] \.
- pknAw 5 eg]6]n:sf]k -b/bz\$ oGq_ kþzç u/l o; sf]ljleGg efuxçsf]gfd / sfoâf/] 5nkñn ugxf] \. 6]n:sf]kn]6f9sf]j:j:t'glhs / :ki6 xG5 eGg]s/f ls/of /yflrqâf/f :ki6 kfg\$;fy]ljBfylççnf0{klg ls/of /yflrq sf]nufpgxf] \.
- kf7bk:t:ssf]lj]ofsnfk % ^= cg';f/ 6]n:sf]ksf]gdbf ljBfylççnf0{ tof/ kfg{nufpg] / o; sf]dNof^sg;d] ugxf] \.

-a_dNof^sg

!= sGe\$; n;nf0{sGelhf^ n; elgG5, lsg <
@= sGse n;nf0{8f0elh^ n; elgG5, lsg <
#= kl/efiff lbgxf] \||
-s_ s]b]s/of ljGb' / -v_ s]b]s/of b/l
\$= jf:tljs cfs[t / c]f:tljs cfs[ta]r b0çf]f km/s n]vgxf] \.
%= n; sf] ;fdYo{eg\$]s]xf] < of]sg Psf0df gflkG5 <
^= lj:t[tsf]kl/efiff lbgxf] \. n; sf]lj:t[t s; /L kQf nufpg ;lsG5 <
&= sGe\$; n; / sgsç n; alr kf0g]b0çf]f leGgtf n]vgxf] \.

*= Pp6f sGe\$; n;sf]s]b]s/Of b/L @ ;]dsf]5 . n;]b]v # ;]d k/ Pp6f an]sf]d] aQl /flvPsf]5 eg]pSt d]aQlsf cfs[t sxf"aG5, ls/Of /]vflrq sf]] b]vfp .
pSt n;sf];fdYo{/ lj:t[t kQf nufpgxf]\.

(= dfgj cf'vfsf]lrq n]vL lgDglnlvt efux; b]vfp M
-s_ cf0l/; -v_ /]6gf -u_ sf]6gf -3_ l;Ino/L d;n

!)= lb0Psf]lrq c]nfs]g u/L lgDglnlvt k]gx;sf]pQ/ lbgx]\M
-s_ cf'vfsf]sdhf]L sg xf]<
-v_ of]sdhf]L xgfsf]b0cf]sf/Of n]vgxf]\.
-u_ of]sdhf]L x6fpg s]ug]5{<
-3_ of]sdhf]L x6fpg]ljlw lrqaf/f b]vfp]pgxf]\.

!!= dfgj cf'vf / Sofd/falr b0cf]kf/s n]vgxf]\.

!@= sDkfpG8 ;]dbz\$ oGqsf];kf / gdf^ast ls/Ofsf]/]vflrq lvRgxf]\.

!#= sDkfpG8 ;]dbz\$ oGqsf]j:tut n; / b]i6 n;]n]agfpg]cfs[talr Pp6f kf/s n]vgxf]\.

!\$= b/bz\$ oGqsf]j:tut n;sf]s]b]s/Of b/L sDkfpG8 ;]dbz\$ oGqsf]j:tut n;sf]s]b]s/Of b/L 7hf]/ kf/flsnf]xG5, lsg <

!%= sDkfpG8 ;]dbz\$ oGq / b/bz\$ oGqalr b0cf]f leGgtfx; n]vgxf]\.

-r_lzlfnsnf0{yk hfgsf/L

- afSnf]n;sf]s]b]s/Of b/L sd / kftnf]n;sf]s]b]s/Of b/L nfdf]xG5 .
- k]sfzsf];dfgfGt/ ls/Ofx; Pp6}]jGbaf6 kf]nP/ cfPsf]b]vg]xbf sGs] n;nf0{ 8f0elh^ n; elgG5 .

sGe\$;	sGs]
-s_ s]b]lo efu afSnf]/ 5]plt/ kftnf]xG5 .	-s_ s]b]lo efu kftnf]/ 5]plt/ afSnf] xG5 .
-v_ o;n]k]sfzsf];dfgfGt/ ls/Ofnf0{ s]b]t u5{.	-v_ o;n]k]sfzsf];dfgfGt/ ls/Ofnf0{ lj s]b]t u5{.
-u_ o;n]jft:tljs / p]N6Psf]cfs[t agfp5 .	-u_ o;n]c]f:tljs / ;]N6Psf]cfs[t agfp5 .

- $P = \frac{1}{f}$ ($f = \text{Sf}[b]s/Of\ b/L\ ld6/df\ gflkPsf]$
- $M = \frac{v}{u}$ ($v = \text{cfs}[tsf]b/L \div u = j:t\text{sf}]b/L$
- $u, v / f\ \text{sf}] ; \text{DaGw}$
- $\text{SGe\$} ; n] ; \text{sf}] ; \text{fdYo}\{\text{wgftds (+ve)} / \text{SGSp}\ n] ; \text{sf}] ; \text{fdYo}\{\text{CoffTds (-ve)}\} \times G5$.
- $:j:y\ \text{cfVfaf6}\ 25\ \text{cm}\ \text{sf}]b/Lnf0\{\text{cfVfsf]glhssf]ljGb'\}\ \text{elgG5}$.
- $k\text{pfzsf]pkl:ylt\text{df} /f ; \text{folgs}\ k[tlj]o\text{fdf}\ xg]kbfy\text{f}]n]kg\ u/\text{sf]l/agnf0}\{\text{lkNd}\ \text{elgG5}$.
- $\text{lkNdnf0}\{\text{kpf]vg}\ u/7\ \text{To} ; \text{af6}\ \text{lgsfn}\text{sf}] : \text{yfol}\ \text{cfs}[tnf0\{\text{gl}]6e\ \text{elgG5}$.
- $\text{cfVfsf]n] ; \text{sf}] ; \text{fdYo}\{\text{kl/j}\ t\text{GzLn}\ \times G5\ .\ n] ; n] j:t\text{sf}]b/Lcg' ; f/ /6gf\ \text{cfs}[t\ \text{agfp5} / \text{l\text{bdfun}}] ; \text{lw}\}k95$.
- $\text{dfgj}\ \text{cfVfsf]/6g\text{fdf}\ k\text{pfzkl}t\ ;\ j\text{hgZLn}\ w/7\}\text{sf]fx}\ \times G5g\backslash$.
- $;\text{fdbz\$}\ oGqsf]lj:t[t = \frac{;\text{fdbz\$}\ oGqn]agfpg]cl\text{Gtd}\ \text{cfs}[tsf]n\text{Daf0}}{;\text{fdbz\$}ljgfsf]j:t\text{sf}]n\text{Daf0}} = \frac{1}{0}$
- $b/bz\$}\ oGqsf]lj:t[t = \frac{j:tut\ n] ; \text{sf}]s\text{f}[b]s/Of\ b/L}{b[6ut\ n] ; \text{sf}]s\text{f}[b]s/Of\ b/L} = \frac{F}{f}$

Psf0 ^ IjBt\wf/f / rDasTj (Electric Current & Magnetism)

cgdfllgt 3G6L M !!

-s_ IjIzi6 p2Ioxç

o; Psf0sf]cGtodf IjBfylç IgDglnlvt sfoç ug{; lfd xg]5g\

!= IjBt\sf c;/xç kþzç / JofVof ug{.

@= IjBt\rDaslo pkkfbg; DaGwl kmf/f8}sf lgodxç jOfç ug{.

#= IjBt\ dfç/, 6ç; knd{ / hç]ç/sf]sfo{l; 4fçt lrq; lxt jOfç ug{.

\$= hçgs hljgdf kþç xg]IjBt\rDaslo / IjBtlo pks/Ofxçsf pkof]utf jOfç ug{.

%= ufxçy IjBt\sf/Ofnf0{pbfx/Of; lxt JofVof ug{-jll ds / ;dfgçt/ ;lsçxç / Çohsf]kþç_ .

^= IjBt\kþç ubf{ckgfpkgç; /lffsf pkfoxç jOfç ug{.

&= IjBt\lan lgwfçOf; DaGwl ;/n ;d:ofxç xn ug{.

-v_ kl/ro

o; Psf0sf]c\wofkgaf6 IjBfylçnf0{; dfgçt/ / >çfl jld h8fgsf]kl/ro lbg, dxçj atfpg / kþç ug{; dy{agfpgkgç5 . 3/df xg]IjBt\h8fg sfoç Ijlxç atfpg, 3/df ;knf0 ul/g]IjBt\sf]Ijzçttf atfpg ;Sg]5g\ . IjBt\kl/kysf dxçjkOfçefu (Component) Çohsf]pkof]utf atfpg / pkoSt lfdtfsf]Çohsf]kþç ;dç ug{ ;Sg]5g\ . cfçç}3/df p7ç]IjBt\sf]lan 7ls 5÷5ç lx;fa ug{klg ; lfd xgkgç5 . ;fwf/Of IjBt\pks/Ofxç dfç/, 6ç; knd{, hç]ç/ cflbsf]sfo{l; 4fçt / agfç JofVof ug{;Sg]xgkbç5 . cGtodf ;/lft tj/n]IjBt\sf]pkofç ug{; lfd xgkgç5 .

-u_ zç]fs ;fdul

IjBt\; ç #, aNj #, ! ld6/ tf/, eflç6ld6/ jf eIN6ld6/, Ijs/, k/Llfof gnl @, sfaç/8 jf Pnldlgod Onç6ç, tfdfsf]kftf, kñfdfs]lsnf, lgnf]tyfç Ogfdç vñ ePsf]tf/ ! ld6/, ækñfdfs]lsnf, rDaslo sDkf;, 6ç; knd{ -220 v jf6 çvbg] / Pp6f sfd 98gnfug]6ç; knd{ .

-3_ Izlf0f l;sf0 ljl0fsnfk

ljBt\kl/ky

- ljBfylsf]cgejnf0{;d] kltt ugxf nflu ;?df ljBfylxznf0{;ljlo agfpg ljeGg ljl0fsnfkxč ugxf]\.
- ljBt\kl/kysf]lrq lvRgxf]\. o;sf dVo c^auxč sš]xb\ atfpgxf]\.
- Pp6f ljBt\;h / ;fgf]aNanf0{tf/n]hfB] ljBt\kl/ky tof/ u/L kpoz ugxf]\. vhf / aGb kl/kysf]cj:yf kpoz ugxf]\.

ljBt\nfBsf]h8fg

- ljl0fsnfk 6.1 -kf7bk'ts kh₆₁ u/] b]vpfgxf]\.
- afBdf lrq n]v] ;dfgfGt/ h8fgsf]kl/ro lbgxf]\.
- ;dfgfGt/ h8fgaf6 xg]krf0bfxč kpoz / JofVof ugxf]\.

>0fl jld h8fg

- tlgcFf aNaxč Pp6f ;h;ü >0fl jld h8fg u/] kpoz ugxf]\.
- b0cfFf aNaxč ;h;ü hfB] kpoz ugxf]\.
- kn/ Pp6f dfq aNa ;h;ü hfB] kpoz ugxf]\.
- Pp6f, b0cfFf jf tlgcFf aNaxč Pp6};h;ü >0fl jld h8fg ubf{sš]kl/s b]vof] ljBfylxznf0{eGg nufpgxf]\ / o;sf sf/of JofVof ugxf]\.
- >0fl jld h8fgsf]j0f ugxf]\ / o;sf]pkof]utfaf/]5nkin ugxf]\.

;hxčsf] ;fdXls/of

- >0fl jld / ;dfgfGt/ ;fdXls/ofsf]lrq n]v] j0f ugxf]\.
- tlgcFf ;hnf0{;dfgfGt/ ;fdXls/of u/L ef]6h gfk] b]vpfgxf]\.
- ;dfgfGt/ ;fdXls/of u/] aNa afnl b]vpfgxf]\.
- tlgcFf ;hxč >0fl jld ;fdXls/of u/] ef]6h gfk] b]vpfgxf]\.
- b0cfFf ;hxč >0fl jld ;fdXls/of u/L aNa afn] kpoz ugxf]\.
- kpfu u/L lgDglnlvt tflnsf afBdf eg] kpoz ugxf]\

;fdXLS/Of	eŋ6ld6/ c ^a s			aŋasf]pHofnf]
	1 ;]hdf	2 ;]hdf	3 ;]hdf	
;dfgŋt/				oyfj t ⁴ a9b}uof]
>ŋfl j]d				oyfj t ⁴ a9b}uof]

- >ŋfl j]d ;fdXLS/Ofdf eŋ6ld6, ljbT\wf/f / ;fdYo{s;/L a95 eGgaf/]lx;fa u/] b]fpgxf] \.
- dflysflj]lofsnfksf]lgisif{ljbT\k²nf0{eGg nufpgxf] \.

ufx{y ljbT\LS/Of

- ufx{y ljbT\LS/Ofsf ;DaGwdf kZgfQ/ u/L o;sf]kl/ro lbgxf] \.
- ufx{y ljbT\LS/Ofdf ;Knf0 ul/g]ljbT\sf ljbT\k²nf0{eGg nufpgxf] \.
- ljbT\pTkfbg u⁴kaf6 pTkfbg ul/Psf] ljbT\ufp⁴;x/;Dd s;/L cf0kU5 j0fŋ ugxf] \.
- ufx{y ljbT\kl/kysf]lrq n]y] j0fŋ ugxf] \.
- l8l:6⁴o;g afB{ nf0e, G6b⁴ / cly⁴ tf/af/]kl/ro lbgxf] \.
- P;/L / l8;l⁴rsf leGgtfx⁴af/]5nk⁴n ugxf] \.
- ljbT\h8fg sfo{ubf{sbsg /^asf tf/x⁴ sbsg nf0gdf kpf] ul/G5 atfpgxf] \.
- ufx{y ljbT\LS/Of ubf{Wofg lbgkg]s/fx⁴ atfpgxf] \.

ljbT\vkt

- ljbT\k²nf0{cfCgf]3/df ljbT\sf]kpf] u/]afkt ljbT\klws/Ofnf0{slt dx;h ltg] u/]sf 5g\eGg nufpgxf] \.
- dflysfl5nk⁴nsf cfwf/df ljbT\vkt sf ;DaGwdf :ki6 kfgxf] \.
- ljbT\vkt sf ;ŋ / Psf0 atf0lbgxf] \.
- ljbT\vkt sf]lx;fa ug]tl/sf l;sf0lbgxf] \.
- gdgf kZg / pbfx/Ofx⁴ /flvlp/ ljbT\k²nf0{lx;fa ug{nufpgxf] \.
- ljbT\vkt ;DaGwL yk cEof;x⁴ u/fpgxf] \.

Çoh

- Çohsf]kl/efiff / kl/ro lbgxf] \.
- Çoh tf/sf]agf] / kpf] ljlw atfpgxf] \.
- Çohsf]dx[af/]ljBfylçnf0{eGg nufpgxf] \.
- sg}kl/kydf kpf] ug{cfjZos kg[Çohsf]lfdtf lx;fa ug{l;sfpgxf] \.
- gdbg kZgxç lbP/ Çohsf]lfdtf lx;fa ug[cEof; u/fpgxf] \.

ljBtlo wf/fsf]c; /

- ljBtlo wf/fsf]c;/af/]5nkın ugxf] \.
- ljBt\c;/ slt kpf/sf 5g\< ljBfylçnf0{eGg nufpgxf] \.

tfksf]c; /

- sg}klg j:thf0{tfk lbPdf ;f]j:tdf sş]c;/ b\yf kg{;S5 < kZg u/L ljBfylçnf0{tfksf]c;/af/]eGg nufpgxf] \.
- dflysf]5nkınsf cfwf/df tfksf]c;/af/]kl/ro lbgxf] \.
- tfksf]c;/af6 ;~rfng ul/g]pks/Ofxçsf]gfd ljBfylç;ü ;f\] afBdf gfb ugxf] \.
- lj\ofsnfk 2 kl5 cfjZos k/]lzlfsn]yk36 ugxf] \.
- lxl6^a Onp]6 / gf0j]f]sf]kl/ro lbgxf] \.
- **df0j]f]sf]ljz]tf** atfpgxf] \.

kşfzsf]c; /

- kşfzsf]c;/af/]kl/ro lbgxf] \.
- 6^au:6p wftsf]ljz]tf atfpgxf] \.
- lkııfd]6 lrdsf]agf] lrq;xt jOfg ugxf] \.
- lkııfd]6 lrdn]s;/L kşfz lb65, atfpgxf] \.
- lkııfd]6 lrdleq s]x65† Uof;; xjff jf zGo < sf/Of;xt atfpgxf] \.

- lknfdl6 lrdslrlrq ljbflf0{nlg lbp/ gfdS/Of u/fpgxf}\.
- Cnf7;16 aQlsf]lrq nly o;sf]agf6 j0f6 ugxf}\.
- Cnf7;16 aQln]kbfz pTkGg ugIj]of j0f6 ugxf}\.
- Cnf7;16 aQlsf]ljz]ttf atfpgxf}\.
- Cnf7;16 aQl lknfdl6e6bf a9l pko]ul xgfsf]sf/Of JofVof ugxf}\.

/f;folgs c; /

kfglsf]ljBt\ljR5]g

- On\$6bf06, On\$6bf0l;;, efl6fld6/, On\$6B, PgfB cflbsf]kl/ro lbgxf}\.
- lj]ofsnfk 6.2 -kf7bk'ts kh 70) kpz6 ugxf}\.
- kfglsf]ljBt\ljR5]g s;/L xG5 ;dls/Of;ixt JofVof ugxf}\.
- ljBt\ljR5]gsgf]lrq ljbflf0{nlg lbgxf}\ / ljleGg efux2sf]gfdS/Of lbgxf}\.
- ljBt\ljR5]g ubf{tfdsf]On\$6B kpfu ug{gxb]sf/Of atfpgxf}\.

ljBt\nkg

- kf7bk'ts kh 71 sf]ljBt\nkg lj]ofsnfk 6.3 kpz6 ugxf}\.
- ljBt\nkg s;/L xG5 ;dls/Of;ixt JofVof ugxf}\.
- ljBt\nkg ubf{PgfB, SofgfB / On\$6bf06 sgsg kpfu ul/G5, sf/Of;ixt JofVof ugxf}\.
- ljBt\nkgsf]pkof]utf atfpgxf}\.
- ljbflf0{nlg{ljBt\nkgsf];kff lrq nlyf0{gfdS/Of ug{lbgxf}\.

rDaslo c; /

- kf7bk'tssf]lj]ofsnfk 6.4 -kh 72) u/] blyfpgxf}\.
- rDaslo c;/sf]kl/ro lbgxf}\.
- ljBt\k]flxt ePsf]tf/sf]jl/kl/ rDaslo lf] xG5 eGg]s'f ;lrq JofVof ugxf}\.

- IjBt kjflxt ePsf] tf/sf] jl/kl/ /xg] rDaslo an /yfsf] lbzf ;lrq JofVof ugxf] \.

IjBt\rDas

- kf7ok:tssf]kh 72 sf]lj|ofsnfk 6.6 kpxg ugxf] \.
- lrq g^{6.14} IjBfylxnf0{cEof; kl:tsfdf ptf{g{nufpgxf] \.
- IjBt\rDas s;/l aG5, JofVof ugxf] \.
- ;fh]jf08sf]kl/ro lbgxf] \.
- IjBt\rDassf]lfdtf a9fpg]pkfoxz atfpgxf] \.
- IjBt\rDassf]pkof]utf atfpgxf] \.
- IjBt\rDas agfpg gfauf]tf/ kpf] gul/gfsf]sf/Of JofVof ugxf] \.
- IjBt\rDasdf pQ/ / blifof wf] lgwf]Of ug]ljw atfpgxf] \.

IjBt\3G6L

- IjBt\3G6Lsf]agf] lrq afBdf n]y] IjBfylxnf0{sfklfd lrq ptf{g{nufpgxf] \.
- IjBt\3G6Ldf IjBt\kl/ky s;/l k/f xG5 / 3G6L s;/l aH5 jofg ugxf] \.
- IjBt\3G6Ldf c:yfol rDas kpf] ug]sf/Of atfpgxf] \.

IjBt\rDaslo pTkfbg

- lrq 6.16 afBdf n]vgxf] \.
- ;rfs tf/ AB nf0{tndfly rnfpbf xg]klj|of JofVof ugxf] \.
- UofNefgf]ld6/sf]kl/ro lbgxf] \.
- IjBt\rDaslo pTkfbgaf/]JofVof ugxf] \.
- krf/f8sf]IjBt\rDaslo lgodx z j|d}u JofVof ugxf] \.

Çn]d^asf]bfof"xfts]lgod

- kf7ok:tssf]kh 74 df /xsf]lj|ofsnfk 6.7 u/] b]ypgxf] \.
- IjBfylxnf0{pSt lj|ofsnfkdf h:t}bfof"xfts c]fx z ldnfpg nufpgxf] \.
- a9L c]hf, dfeL c]hf / rf] c]hfn]s}s/s/f b]yp5g\ ;lgxf] \.

- IjBfyl{xnf0{IjBt\DaGwL sg}}lrq pQ/ kl:tsfdf ptfg{nufpgxf}\.
- Çn]d^asf]bfof“xftsf]lgod atfpgxf}\.
- Ij]ofsnfk 6.8 -k^h 75_ k^hz^g ugxf}\.
- k'tsdf lb0Psf]Ij rf/Oflo kZgx^zdf 5nkⁿ u/fpgxf}\.

h^g]f/ jf 8f0gfd]

- af0;f0sn 8f0gdf]sf]lrq n^yl o;sf]agf / sfo{j0f^g ugxf}\.
- 8f0gdf]pknAw ePdf Ij]ofsnfk 6.9 k^hz^g ugxf}\.
- h^g]f/sf]kl/ro lb0{o;af6 pTkfbg xg]IjBt'sf]dfqf a9fpg]Ij]wx^z atfpgxf}\.

df/sf]c;/

- kf7ok'tssf]df/sf]c;/ IjBfyl{xnf0{k9^g nufpgxf}\ To;af6 s]ale⁰⁵ kZg ugxf}\.
- df/sf]c;/sf]kl/efiff atfpgxf}\.
- df/sf]c;/sf]pkof]utf atfpgxf}\.
- IjBt\df/sf]kl/ro / pkof]utf atfpgxf}\.

6^k;kⁿd{

- Pp6f 6^k;kⁿd{sf]dbtn]^{220v} sf]nf0gaf6 ;fgf]aNa (3v) afn[]] b^yfpgxf}\.
- 6^k;kⁿd{sf]kl/efiff lbgxf}\.
- 6^k;kⁿd{sf]agf lrq;ixt j0f^g ugxf}\.
- lau[]]sf] 6^k;kⁿd{ v^h] kf0d/L Sj^{f0n}, ;[]]8/L Sj^{f0n} / n[]]dg⁰⁰ sf] k^hz^g ugxf}\.
- 6^k;kⁿd{sf]k^{sf}/ -:6^k ck / :6^k 8fpg_ af/]kl/ro lbgxf}\.
- 6^k;kⁿd{df kf0d/L ef[]]6^h / ;[]]8/L ef[]]6^hsf];DaGw JofVof ugxf}\.

$$\frac{kf0d/L\ ef\]6^h}{;\]8/L\ ef\]6^h} = \frac{kf0d/L\ knGsf}{;\]8/L\ knGsf}$$

- 6&;kmd{;ü ;DalGwt ljeGg ul0ftLo ;d:ofx¿ lbP/ k{0d/L ef{6h, ;s}8/L ef{6h, k{0d/L k{Gsf / ;s}8/L k{Gsf sf]lx;fa lj Bfy{¿nf0{ug{nufpgxf} \.

-a_ d{of^sg

!= ufx{y ljB{ts/Ofdf n{Bx¿ ;dfgfGt/ h8fg ug\$ f tlgc{f sf/Ofx¿ atfpgxf} \.

@= >{f,ljld ;fdXls/Of eg{s}f]s]xf]< ;{x¿sf]>{f,ljld ;fdXls/Ofaf6 xg]b0{f k{fObfx¿ n{ygxf} \.

P;l / l8;lalr tlgc{f leGgtfx¿ atfpgxf} \.

\$= ufx{y ljB{ts/Ofdf ;knf0 ul/g]ljB{tsf tlgc{f ljz{ftfx¿sf]n{ygxf} \.

%= 40 jf6sf]5 cf{f b0anf0{lbgsf]4 3G6f afNbf k{tdlxgf ljB{t\vkt slt xG5 <

^= Çoh eg{s}f]s]xf]< Çohsf]Pp6f dx{ej n{ygxf} \. 1000 w sf]lx6/ 220v sf]nf0gdf afNg slt PIDko/sf]Çoh cfjZos kb5 <

sf/Of atfpgxf} \||

-s_ k{oll lxl6^ On{p}6 gf0j{f{af6 g}agf0G5 .

-v_ aQlsf]lk{nfdf}6 6^:6]g wftaf6}agf0Psf]xG5 .

-u_ lk{nfdf}6 lrdleq gf0G6}g el/Psf]xG5 .

-3_ Çnf{]}6 aQln]a9l pHofnf]lbG5 .

&= kfglsf]ljB{t\ljR5}g lj{ofsf];k{f lrq lvRgxf} \. o;df tfdfsf]On{s6B lsg k{bf} ul/b} <

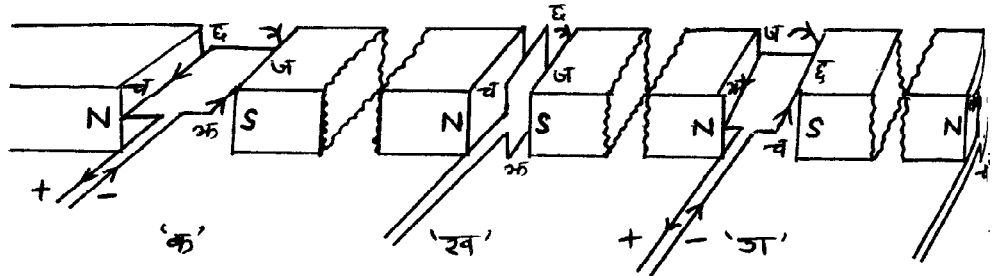
*= df0sn k{f/f8{s}ljB{t\rdaslo pTkfbgsf lgodx¿ n{ygxf} \.

(= 6&;kmd{sf k{pV c^ux¿sf gfd n{ygxf} \. k{of{s}f]Pp6fPp6f sfo{klg n{ygxf} \.

!)= :6k ck / :6k 8fpg 6&;kmd{alrsf b0{leGgtf n{ygxf} \.

-r_lzlfnsnf0{yk hfgsf/L

P;l (A.C) lJBt\sf;/L pTkfbg xG5 eGg]s/f tn lb0Psf]lrqaf6 k]6 xG5 .



lrqdf rDaslo w]xG alrdf tf/sf Sjfon 3dfPsf]b]f0Psf]5 . pSt tf/sf]Sjfonst
ljegG l:yltxG 's', 'v', 'u' / '3' df pTkfbg xg]lJBt\sf]dfqf / lJBt\axg]lbzfaf/
ljrf/ u/f]. Sjfondf pTkfbg xg]lJBt\sf]lbzsf]s/f ubf{Cn]d^sf]bfof"xftsf]lgodnf0{
/fd/L ;Deigk5{.

lrq 's' / 'u' df tf/sf]Sjfon t]f]cyf{\rDaslo w]xG hfBb]/yf-clf_ ;u ;dfgfGt/
l:yltdf 5 . 's' l:yltdf Sjfonst]r, 5' efu bfof"-pQ/L w]_lt/ / 'h, ei' eg]afofft/
5, t/ 'u' l:yltdf Sjfonst]r' 5 v08 afof"-blif0f w]_lt/ / 'h, ei' v08 bfof"-pQ/
w]_lt/ /x]sf]5 . ca Cn]d^sf]bfof"xftsf]lgodcg;/ To; Sjfondf pTkfbg xg]lJBt\
lrq 's' df 'ei' af6 'h' lt/ / '5' af6 'r' lt/ axG5 . cyf{\pQ/L w]_lt/ /x]sf]Sjfonaf6
afix/L kl/kylt/ / blif0f w]_lt/ /x]sf]Sjfondf Sjfonst]leqit/ lJBt\axG5 . 's'
l:yltdf axg]lJBt\sf]lbzf / 'u' l:yltdf axg]lJBt\sf]lbzf 7ls ljk/Lt 5 . cyf{\s'
l:yltdf 'r' 5p Cofftds / 'ei' 5p wgfTds t/ 'u' l:yltdf 'r' 5p wgfTds / 'ei' 5p
Cofftds w]_lt/ aG5 . o;/L Sjfon 7ls () 3ld;Sbf pTkfbg xg]lJBt\sf]w]_lt]lbzf pN6Psf]
5 . k]l/ Sjfonst]'s' / 'u' l:yltdf rDaslo an /yfxG clwstd dfqdf sf6g]xbf lJBt\
pTkfbg klG clwstd xG5 .

ca lrq 'v' / '3' clwoog u/f]. ol l:yltxGdf tf/sf]Sjfonst]rfn an /yf;u ;dfgfGt/
xg]xbf an /yfxGnf0{sf6b] . To;Sjfondf lJBt\pTkfbg lJBt\Nsh}xb] .

ca lrq 's' b]v 'a' ;Dd k]bf tf/sf]Sjfonst]#^)^ -Ps k]Gsf_ k/f u/]sf]xG5 . 'a' l:ylt
/ 's' l:ylt p:t}xf]. tf/sf]Sjfon 3Db}()^ k/f ubf{'v' l:ylt cfp5 . o;sf/0f 's' b]v
'v' ;Dd pTkfbt lJBt\sf]dfqf j]dz 36b}u0{zGo l:yltdf k]5 . To;kl5 'v' af6
Sjfon 3Db}()^ k/f ubf{'u' l:yltdf k]5 . 'v' kl5 pTkfbg xg]lJBt\sf]dfqf j]dz a9]
'u' df k]bf clwstd xG5 t/ lJBt\axg]lbzf 's' l:yltsf]eGbf pN6f]xG5 . k]l/ 'u'
l:yltdf k]5 . 'v' kl5 pTkfbg xg]lJBt\sf]dfqf j]dz a9] 'u' df k]bf clwstd xG5

t/ lJbT\axg]lbzf 's' l:yltsf]pN6f]xG5 . k]/ 'u' af6 Sjf0n 3Db}()° k/f xbf '3' l:yltdf kU5 . o; j]hf Sjf0ndf pTkfbg xg]lJbT\jldz 36b}hfG5 / zG0 cj:yfdf kU5 '3' af6 kg 3Dbf 'a' l:yltdf kU5 . pTkfbg xg]lJbT\la9b}uP/ clwstd eO{'s' l:yltdf h:t}lbzflt/ axG5 . 's' af6 'a' df kUbf Ps ; f0sn k/f ePsf]xG5 . Ps ; f0sn k/f xbf lJbT\pTkfbg bO{k6s clwstd / bO{k6s zG0 l:yltdf kU5 eg]lJbT\sf w]xG klg abn]sf]xG5 . ca xfd]b]zdf lJt/Of ul/g]lJbT\sf]lk]Sj];L %) ; f0sn k]t; 38 cyf{\k]of ; 38df %) ; f0sn pTkIQ ePsf xG5g\ / %) r]6 g}w] kl/jtG xG5 . To; h]P; ldf sg w] Cof]fids / sg w] wgf]ds eG]s/f 56b} / P; lJbT\sf]w] xbf . pko\$ Irqcg; / tf/sf] Sjf0nsf]hg; s}Ps 5p / cly ul/Psf] G06naf6 kl/ky k/f ug{; lG5 . o; h]h]6/af6 lg:sg]b]}tf/n]k]h -lJbT\epsf]tf/_ sf]sf u5{ of]klg Pp6f k]f0bf x]. lsgls o; n]ubf{lJbT\sf]; fdYo{a95 . lsg ; fdYo{a95 eG]s/f yxf kfpG ce]hl6n 5 . clxn]sf]:t/ -slff !)_ nfO{of]yxf kfpG' kg] cfjZostf 5g .

lJbT\; jxG k]0d/L, 8f; h, k]f]h nB, Pl; 8 ; h cflbdf lJbT\Ps}lbzflt/ dfq axG5 . h:t]8f; hdf sfag /8 ; w]wgf]ds w] eP h:tfsf]ef8f]; w]Cof]fids w] xG5 To; h]h:tfsf]ef8faf6 aflx/L kl/ky eO{On]6f]xG sfag /8lt/ axG5 . lJbT\k]fxsf] k/Dk/fcg; / lbzf sfag]sf]/8af6 aflx/L kl/kydf h:tfsf]kftflt/ xG5 . k]/ ; hdf pTkfbg xg]lJbT\sf dfqf 36a9 eO{xbf a? Psgf; sf]kl/df0fdf lJbT\pTkfbg xG5 .

; jxGsf]; fdXls/Ofdf ; dfgfGt/ h8fg ubf{lJbT\sf]dfqf a95 cyf{\Jof6k]lbg ; Sg] -supply ug{; Sg] lJbT\sf]dfqf (Quantity) a95 .

; jxGsf]j]lds h8fg ubf{lJbT\sf]dfqf a9b} t/ lJbT\rfk eg]a95 . lJbT\rfk / lJbT\sf]dfqf b]}a9fpg' k/]f ldl>t h8fg -; dfgfGt/ / j]lds_ ug{k5{. nB Pl; 8 Jof6k]f ldl>t h8fg ul/Psf]xG5 . o; h]dfgf]ls nB Pl; 8 Jof6k]12V / 75 A lfdtfsf] lJbT\lbg ; S5 . o; df Pp6}; hdf kn]xG ; dfgfGt/ /flvPsf xG5g\eg]Pp6f ; h / csf] ; h j]lds h8fg ul/Psf xG5g\.

tf/sf]; f0h

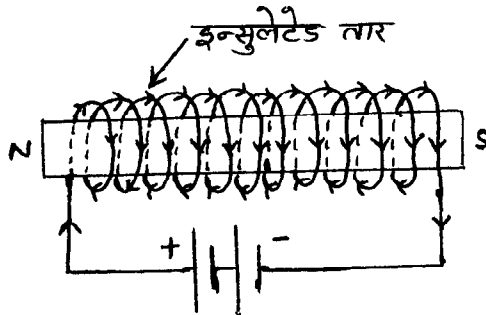
kf7bk':tsdf bO{y/L ; f0hxG (7/22 / 3/22) ePsf]tf/ pNn]v ePsf 5g\ . jfol/a ug{k]f] ul/g]knfl:6s sf6B tf/leq tfdfsf tf/xG /x]sf xG5g\ . tl tf/sf]df]f0 @@ u]h xG5 . @@ u]hsf]tfdfsf]tf/sf]lfdtf !% PIDko/ xG5 . 7/22 eGgfn]@@ u]h ePsf 7 c]f] tfdfsf tf/xG ePsf]tf/ / 3/22 eGgfn]22 u]h ePsf tlgc]f] tf/xG ; ldeigk5{.

l j B t \ e i 8 s f s ; / L n f U 5 <

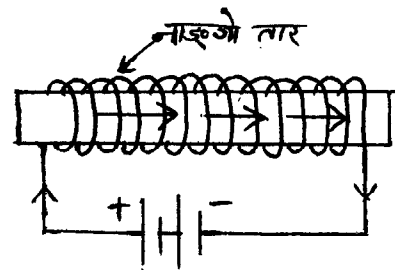
x f d f] z / / a f 6 l j B t \ k j x g e P s f] c j : y f d f d f q x f d l n f 0 { l j B t \ e i 8 s f n f U 5 . G o 6 a t f / d f l j B t \ x b b . T o ; n f 0 { 5 f p d f k l g l j B t \ e i 8 s f n f U b b . k i h t f / 5 b f l j B t \ e i 8 s f n f U g ; S 5 . g f a u f] v 6 6 f n] 6 s s f] j j h f k i h t f / 5 f p d f k i h t f / a f 6 x f d f] z / / e P / h l d g l t / l j B t \ a x G 5 . o ; / L k l / k y k / f x g u 0 { x f d l n f 0 { l j B t \ e i 8 s f n f U 5 t / / a / s f] t n j f - ; f i _ e P s f] h Q f n u f P s f] 5 / z / / s f] c G o s b } e f u n] e 0 ; l e Q f j f G o 6 a j f c l y e t f / 5 f p s f] 5 b e g] x f d f] z / / a f 6 l j B t \ k j x g x g] 7 f p " x b b . o : t f] c j : y f d f k i h t f / 5 f p k l g k l / k y k / f x b b / x f d l n f 0 { l j B t \ e i 8 s f n f U b b . n 7 Y f d f / x s f] l j B t \ a x g] g f a u f] t f / d f r / f x c a : b f k l g t l r / f x c s f] z / / e P / l j B t \ k j x g x g] 7 f p " 5 b . T o ; h] r / f x c n f 0 { l j B t \ e i 8 s f n f U b b .

l j B t \ r D a s

l j B t \ r D a s a g f p b f g f a u f] t f / k b f u u g { x b b . r D a s l o j : t ' c S ; / l j B t s f] ; r f n s x G 5 . g f a u f] t f / n] a b f { t f / a f 6 l j B t s f] ; 6 6 f r D a s l o j : t a f 6 l j B t \ a x G 5 . d f g f] s r D a s l o j : t h f 0 { s b } s ' r f n s - h : t f s l s f u h _ n] a 7] g f a u f] t f / s f] ; f i j j f 0 8 a g f 0 P s f] v 0 8 d f k l g ; f i j j f 0 8 s f] t f / a f 6 l j B t \ a x g s f] ; 6 6 f t f / s f k i G s f x c P p 6 } I 9 S s f e P s f] x b f ; l w } l j B t \ a x G 5 . d f l y s f ; a } c j : y f x c d f l j B t \ r D a s a G b b a ? ; 6 { ; l s 6 e 0 { v t / f p T k G g x G 5 . l j B t \ r D a s a g f p g t f / s f k i G s f h : t } l j B t \ k l g 3 d] a x g k 5 { .



l j B t \ r D a s n] s f d u / s f] c j : y f



; 6 { ; l s 6 e P s f] c j : y f

Psf0 & tEjxčsfjjulš/Of (Classification of Elements)

cgdfigt 3G6L M %

-s_ljizi6 p27oxč

o; Psf0sf]cGtodf ljBfylčč lgDglnlvt sfočč ug{; lfd xg]5g\

!= kl/of]8s lgodsf]JofVof ug{.

@= cfwlgs kl/of]8s tflnsf] j0f6 u/L tEjxčsf] kf/df0f]s /rgf / kl/of]8s
tflnsdf Itgsf]l:ylt j0f6 ug{.

-v_kl/ro

of] Psf0af6 ljBfylččdf kl/of]8s tflnsf] wf/Offaf/] :ki6 xg, kl/of]8s 6ānsf]
cWoog ljZn]of u/L tEjxčsf]l:ylt kQf nufpg / tl tEjxčsf];dX kQf nufpgsf ;fy}
lb0Psf tEjxčsf]On\$6q ljGof; rf6{tof/ u/L k|tt ug{;Sg]lfdtfsf]lj sf; ugdf hfB
lb0Psf]5 .

-u_lzlf0f ;fduł

tEjxčsfjjulš/Of / k/fgr]kl/of]8s 6ān

-3_lzlf0f l;sf0 lj]ofsnfk

lgDglnlvt kZgxč ljBfylčč;ũ 5nkñn ug[/ 5nkñnsf cfwf/df periodic table Sf]
wf/Off, cfjZostf / kl/of]8s 6ānsf]lj sf; ug{ljleGg j]flgsxčsf kpf;xčaf/] :ki6
kfgčf] \

➤ tEjxčsfjjulš/Of ug{lsq cfjZos 5 <

➤ Periodic Table shf0{elg65 <

➤ Periodic Table sf]lj sf;df sgsb j]flgsxčn]s;/L of]ubfg k#ofPsf 5g\<

➤ d]8lnesf] k/fgr]kl/of]8s tflnsf] rf6{k|tt ug{f] \ / lgDglnlvt kZgxčdf
kZgfQ/ ug{f] \

* d]8lnen]kl/of]8s tflnsdf tEjxčnf0{sg j]ddf /fv}sf 5g\<

- * $k\ell/of\beta s$ $tflnsfsj$ $sg\}$ $Pp6f$ $ukdf$ $tndfly$ $ubf\{ / k\ell/of\beta sf\}$ $bfof\alpha fof''$ $ubf\{$ $tEjx\zeta sf\}$; $f0h / ;lj\{otfdf s\}c;/ x\zeta 5 <$
- * $tEjx\zeta nf0\{;dx / k\ell/of\beta df s;/l 56\bf0Psf\}5 <$
- * $d\beta lnesf\}k\ell/of\beta s$ $tflnsfsf$ $ql6x\zeta s\beta\}$ $xg\backslash <$
- * ; Dej eP $dflysf$ $k\zeta gx\zeta sf\}$ $pQ/$; $DaGwdf$ $sg\}$ gof'' $tYox\zeta$ kQf $nufpg$ $k':tsfno / 0G6/g\beta sf\}k\beta f\}$ $ug\{nufpgxf\}\backslash$.

cfwlgs $k\ell/of\beta s$ $tflnsf$

- cfwlgs $k\ell/of\beta s$ $tflnsf / k\ell/fgf\}k\ell/of\beta ssf\}$ $tflnsf$ $k\ell tt$ u/L $thgf$ $ug\{nufpgxf\}\backslash$ / tl $alrdf s\}c\zeta t/ 5$ $5nk\kappa n$ $ug\{xf\}\backslash$.
- cfwlgs $k\ell/of\beta s$ $tflnsfdf$ $tEjx\zeta nf0\{s\beta f$ $cfwf/df$ $j\ell da4$ $ul/Psf\}5 <$ $k\zeta g\ell Q/$ u/L $cfwlgs$ $k\ell/of\beta s$ $tflnsfsf\}$ $lgod$: $ki6$ $kfg\{xf\}\backslash$.
- cfwlgs $k\ell/of\beta s$ $tflnsfdf$'s', 'p', 'd' / 'r' Ans $On\beta\beta 6 / 6\beta\beta h$; g tEj , $nf\zeta yfgf08\}$ / $PLS6gf06\}$ $cjnf\beta sg$ $ug\{nufpgxf\}\backslash / k\ell o\beta\}$ $nf0\{Pp6f$ $Pp6f$ $cfk\kappa h\}$ kQf $nufPsf$ $ljz\}$ $ttfx\zeta$ eGg $nufpgxf\}\backslash$.
- $c\zeta Todf$ $ljz\}$ ttf $p\kappa n\ell vt$ $rf6\{k\ell tt$ u/L : $ki6$ $kfg\{xf\}\backslash$.

$pk;\beta / On\beta\beta 6\beta$ $ljGof$;

- $k/df0f'sf\}$ $agfj6af/ \}$ $5\beta\beta f\}$ $5nk\kappa n$ $ug\{xf\}\backslash$.
- $s\beta\ell$ $tEjx\zeta$, $h:t\}$ H , He , C , O / Na $cflbsf\}$ $On\beta\beta 6\beta$ $ljGof$; $sf\}$ $gdbf$ jf $rf6\{k\ell tt$ $ug\{xf\}\backslash / ltg\}$ $x\zeta sf\}$ uk tyf $k\ell/of\beta$ $c\ell woog$ $ug\{nufpgxf\}\backslash$.
- $rf6\beta f$ $cfwf/df$; β (Shell) / ; $\beta x\zeta sf\}$ $gfd s/0faf/ \}$ $5nk\kappa n$ $ug\{xf\}\backslash$.
- $k\ell o\beta\}$; βhdf $ePsf$ $On\beta\beta 6\beta$ $x\zeta sf\}$ / $yfsf$ $cfwf/df$ $2n^2(n=1, \dots)$, $8\kappa n\beta$ (Duplet) / $cS6\beta$ (Octet) sf ; $DaGwdf$ $5nk\kappa n$ $ug\{xf\}\backslash$.
- $2n^2$ sf $cfwf/df$ $k\ell\beta fl$; od (K) $sf\}$ $On\beta\beta 6\beta$ $ljGof$; $agfpg$ $nufpgxf\}$ V o ; $sf\}$ $On\beta\beta 6\beta$ $ljGof$; $rf6\{k\beta z\beta$ u/L $thgf$ $ug\{nufpgxf\}\backslash$.
- $2n^2$ sf $cfwf/df$ $t\}$; β (M) df ; $a\}$ / $xgkg\ell$ $rf\}$; βhdf $On\beta\beta 6\beta$ $s;/l$ / xg $uof\}$ egl $5nk\kappa n$ $ug\{xf\}\backslash$. $5nk\kappa nsf$ $cfwf/df$'s', 'p', 'd' / 'r' $pk;\beta$ hsf $af/ \}$: $ki6$ $kfg\{xf\}\backslash$.

- Aufbau principle $cg';f/ \text{ tEjx\textsubscript{Z}sfjOn\$6\textsubscript{K}g} \text{ lJGof; } s;/L \text{ ul/G5 } < :ki6 \text{ kfg\textsubscript{K}fj} \backslash.$

- $k'.tsdf \text{ lbOPsfjOn\$6\textsubscript{K}g} \text{ lJGof; sfj c\textsubscript{W}oog} \text{ ug\{nufpgxfj} \backslash.$

$kj/ofj8s \text{ tflnsfdf tEjx\textsubscript{Z}sfj}l:ylt$

- $wft'; cwft'; cw\textsubscript{W}ft' / \text{ lgl:j\textsubscript{I}o} \text{ Uof; x\textsubscript{Z}sf } ; Da\textsubscript{C}wdf \text{ Brain Storming } u/fpgxfj \backslash.$
- $cfwlgs \text{ kj/ofj8s} \text{ tflnsf } k\textsubscript{P}z\textsubscript{G} \text{ u/L } tl \text{ tEjx\textsubscript{Z} } s\textsubscript{G}sg :yfgdf /flvPsfj5 \text{ kZgfQ/} \text{ ug\textsubscript{K}fj} \backslash.$
- $cNsfnl. d\textsubscript{G}n, cNsfnf0g \text{ cy\{d\textsubscript{G}n} / x\textsubscript{H}hg x\textsubscript{Z}sf \text{ af/}\textsubscript{H}f :ki6 \text{ kfg\textsubscript{K}fj} \backslash.$
- $cfwlgS \text{ kj/ofj8s} \text{ tflnsfdf } xf08\textsubscript{H}g \text{ Uof; , n\textsubscript{I}yfgf08\textsubscript{K} } / \text{ PIS6gf08\textsubscript{K} sfj} :yfgaf/] \text{ 5nk\textsubscript{I}n} \text{ u/L } k\textsubscript{I}6 \text{ kfg\textsubscript{K}fj} \backslash.$
- $cfu\textsubscript{G}, k\textsubscript{I}f\textsubscript{I};od \text{ cf\textsubscript{I}bsfj} :yfg \text{ cfwlgs } \text{ kj/ofj8s} \text{ tflnsfdf } s;/L ; Rrf0ofj5nk\textsubscript{I}n \text{ ug\textsubscript{K}fj} \backslash.$

$oHotf ; 's \text{ On\$6\textsubscript{K}g} x\textsubscript{Z} / \text{ tEjx\textsubscript{Z}sfj} ; oHotf \text{ tyf } ; l\textsubscript{I}j\textsubscript{I}otf$

- $l\textsubscript{J}Bf\textsubscript{Y}x\textsubscript{Z}nf0\textsubscript{K} ; d\textsubscript{X}df \text{ l\textsubscript{J}efhg} \text{ ug\textsubscript{K}fj} \backslash. k\textsubscript{I}o\textsubscript{S} ; d\textsubscript{X}nf0\textsubscript{K}\{!-\textsubscript{Q}\} \text{ cf\textsubscript{I}f } \text{ tEjx\textsubscript{Z}d\textsubscript{W}o\textsubscript{K}} \% \div \% \text{ cf\textsubscript{I}f } \text{ tEjx\textsubscript{Z} } - \text{ kj/ofj8s} \text{ tflnsfdf } /flvPsfj \text{ j\textsubscript{I}dcg';f/_ } \text{ sfjOn\$6\textsubscript{K}g} \text{ lJGof; } agfpg \text{ nufpgxfj} \backslash.$
- $lgDglnlvt \text{ tflnsf } af/\textsubscript{H}f \text{ 6f'gxfj} \backslash. k\textsubscript{I}o\textsubscript{S} ; d\textsubscript{X}nf0\textsubscript{K}\{cf\textsubscript{G}gf\} ; d\textsubscript{X}df \text{ k/\textsubscript{S}f } \text{ tEjx\textsubscript{Z}s\textsubscript{I}gfd} / \text{ Itglx\textsubscript{Z}n\textsubscript{I}cl\textsubscript{G}td } ; \textsubscript{H}df \text{ ePsfjOn\$6\textsubscript{K}g} \text{ sfj} ; ^\textsubscript{a}Vof \text{ tflnsf } agf0\textsubscript{K}\{l6\textsubscript{K}g \text{ nufpgxfj} \backslash$

$tEjx\textsubscript{Z}sfj$ gfd					
$cl\textsubscript{G}td$; $\textsubscript{H}df$ $ePsfj$ $On\$6\textsubscript{K}g$; $^\textsubscript{a}Vof$					

- $pSt \text{ tflnsfdf } cfw\textsubscript{I}/df \text{ Valence electron, valency } / \text{ tEjx\textsubscript{Z}sfj} ; l\textsubscript{I}j\textsubscript{I}otf\textsubscript{S}f\textsubscript{I}/\textsubscript{K}ZgfQ/ \text{ u/L } :ki6 \text{ kfg\textsubscript{K}fj} \backslash.$

-a_dNof^asg

!= k/fgf/ cfwlgs k/of⁸s tflnsfsf lgod s⁵]xg\<

@= k/of⁸s tflnsfdf k/of⁸ / uk eg⁵]s]x⁷<

#= cfwlgs k/of⁸s tflnsfsf ljz⁷ftfx² s⁵]xg\<

\$= 8^xn⁵ / cS6⁵ lgod s⁷hf0{elg⁵ <

%= kf/df0fljs ;^avof ^, *, !@, !# / !& ePsf tEjx²sf] 's', 'p', 'd' / 'r' pk;hsf
cfwf/df On⁵6⁵ ljGof; agfpg nuf0{tl tEjx²sf]valency electronic / /f;folgs
;lj⁷lotfaf/⁷k⁷g⁷f⁷/ ug⁵]x⁷\.

^= k/of⁸s tflnsfsf];d^x hgfp⁷]Çnf;sf8{af⁵6⁵f 6f⁵gxf]⁷/ ljleGg tEjx²sf]sf8{
ljBfyl⁷nf0{lb0{;f]tEjx² sg ;d^xdf k5⁵};d^x n⁷]vPsf]sf8{6⁵g nuf0{ljBfyl⁷sf]
dNof^asg ug⁵]x⁷\.

&= cNsfnl d⁵n, cNsnf0g cy{d⁵n / lgl:j|o Uof;sf];d^xdf kg⁷]ljleGg tEjx²sf]
gfd ljBfyl⁷nf0{ljt/of u/L Itglx²nf0{dfly plNnlvt ;d^xdf 56⁵fp⁷g nufpgxf]⁷\.

gf⁵ || kf7⁵bk⁵:tsdf lb0Psf k⁷g⁷x² xn ug{nufpg gla;⁵xf]⁷\.

-r_lzlfnsnf0{yk hfgsf/L

■ tEjx²sf]u0fnf0{c⁷woog ug{;lhnf]xf]⁷\eGg]clek⁷on]u0fsf cfwf/df tEjx²nf0{
ljleGg ;d^xdf ljeflht u/L Pp6f tflnsf lgdf⁷ ul/of]h;nf0{k/of⁸s tflnsf
elg⁵ .

■ ;g\!*@(df h⁷8An' 8⁵el/g/n]tlgcf⁵ tEjx²nf0{;d^xdf /fvbf al⁷rsf]tEj]sf]
kf/df0fljs ef/ / u0f klg 5⁷plt/sf tEjx²sf]al⁷rdf kg{hf⁵ . ol tlg tEjx²sf]
;d^xnf0{pgn]6⁵8 (Traid) eGg]gfd lbP . ha tlgcf⁵ tEjx²nf0{kf/df0fljs ef/
a9⁵b⁷hfg]j|ddf /fvb⁷hfbf al⁷rsf]tEj]sf]kf/df0fljs ef/ cGob0{tEjx²sf]kf/df0fljs
ef/sf]sh hf⁵sf]cfwf x⁵ . h:t⁷||

Inlyod (Li) ;f⁷8od (Na) kf⁵fl;od (K)

kf=ef= & @# #(
$$\frac{\& \pm \#(}{@} = \frac{\$^}{@} = @\#$$

- ;g\!*^ (df d₁₈nen]GohfoG8sf]wf/0ffnf0{;wf/ u/L pgn];dfg /f;folgs u0f ePsf tEjx₂nf0{kf/df0flj s ef/ a9b}hfg]j]dddf ldnfP/ /fv]h;nf0{d₁₈nesf] kl/of₁₈s lgod elgG5 .
- d₁₈nesf]sfndf sl/a ^# cf₆f dfq tEjx₂ kQf nuf0;s₅f lyP . gfa₁n Uof; / cGo wftx₂ kQf nufPsf lyPgg\ . pgn]cf₆gf]tflnsfdf kl5 kQf nuf0g]tEjx₂sf nflu s₁l :yfg 5f₈] . tl tEjx₂ kQf nuf0;s₁kl5 tEjx₂sf]u0f kl₅ ldn₅g uof] .
- d₁₈nesf]kl/of₁₈s tflnsfdf klxnf]kl/of₈df b0cf₆f tEjx₂ /flvPsf 5g\ . o;nf0{ Hofb}5f₆f]kl/of₈ (Very short period) elgG5 . bf] ₁/ t₁]kl/of₈df cf7cf₆f tEjx₂ 5g\ . o;nf0{5f₆f]kl/of₈ (Short period) elgG5 . rfyf]/ kf₁r₁f]kl/of₈df !* cf₆f tEjx₂ 5g\ . o;nf0{nfd₁]kl/of₈ (Long period) elgG5 . 5₁f₁f]kl/of₈df #@ cf₆f tEjx₂ 5g\ . o;nf0{Hofb}nfd₁]kl/of₈ (very long period) elgG5 . To; kl/of₈df !\$ cf₆f tEjx₂nf0{566}:yfgdf /flvPsf 5g\ . o;nf0{nf₆ygf08\ (lanthanides) elgG5 . ;ft₁f]kl/of₈ cw/f]kl/of₈ xf] . o;df o₁/fl₅god tEj /flvPsf]5 .
- d₁₈nesf]kl/of₁₈s tflnsfdf cf7cf₆f ukx₂ 5g\ . o;nf0{/f₁dg ;^aVofdf b₁lv₁ VIII ;Dd / clGtd uknf0{'0' dflgPsf]5 . kl5 ₁b₁lv₁ VII ;Ddsf]tEjnf0{pk;d₁X₁'A' / 'B' df lje₁fhg ul/of] . pk;d₁X₁'B' df kg₁]tEjx₂nf0{6₁h;g On₁d₁6 (transition element) elgG5 .
- d₁₈ne kl/of₁₈s tflnsf l₁jz₁ftfx₂
 - d₁₈nen]cf₆gf]tflnsfdf ;dfg u0f ePsf tEjx₂nf0{Pp6};d₁X₁df kl₅ l/Styfgx₂ 5f8₅f lyP .
 - d₁₈nesf cg';f/ kl/of₈ \$, %, ^, & df ;ftcf₆fefGbf a9L tEjx₂ xg]5g\ . o;nf0{ldnf₆bf pgn]b0cf₆f v08 A / B u/L /fv] .
 - cfwlgs kl/of₁₈s lgodsf cfwf/df lgnaf₁/ (Niel Bohr) n]kl/of₁₈s tflnsf ;wf/ u/] . o;nf0{n^a k₁nd{ck₁ kl/of₁₈s tflnsf elgG5 . o;df ;ftcf₆f kl/of₈nf0{;f₁cf₆f ukx₂df ;dfj₁z ul/Psf 5g\ . ₁₁ b₁lv₁ VII uknf0{pkuk₁ A / B df lje₁fhg ul/Psf]5 eg]VII ukdf tl₁gcf₆f sf₁hdx₂ ;dfj₁z 5g\ .
 - On₁6₁g l₁jGof;sf cfwf/df tEjx₂sf]k₁pf/
 - k₁pf/ ! ₁ tEjx₂sf]k/df0fx₂sf]clGtd ;h k0f{ePsf]xG5 . o;cGtu₁ lgl₁j₁lo Uof; h:t₁}₁ l₁lnod, lgo₁f₁, cfu₁g, l₁j₁k6g, h₁gg / /B₁g k5₁g\ .

- kʃf/ @ M cGtd ;h k0f{ePsf tEjxčsf]k/df0fafx} cč ;Dk0f{tEjxč
cGtu{ M

(i) 's' Ans On 116 (Additional or differentiating On 166) s- orbital df k l j z x g] ; d x
IA / ; d x IIA sf t (j x c k 56) h: t} ||

s1- Li, Na, K, Rb, Cs / Fr

s2- Be, Mg, Ca, Sr, Ba / Ra

(ii) 'p' Ans On 116 (Additional On 167) p-orbital df k l j x g l m ; d x l i a b l v v i i a ; D d s f t e j x c k 5 g l.

IIIA	IVA	VA	VIA	VIIA
P1	P2	P3	P4	P5
B	C	N	O	F
A1	Sil	P	S	Cl

- **kpf/** # **M** tE]x₂sf] k/df0' h;sf] clGtd b0Cf₂ ;hx₂ cw/f xG5g₁
logX₂nf0{6kh;g On₂d₁6 elG5 . logX₂nf0{_{d'} Ans On₂d₁6x₂ klG
elG5 . (d-orbital df additional electron enter xg]

III _B	IV _B	V _B	VI _B	VII _B	VIII			IB	IIB
d ¹	d ²	d ³	d ⁴	d ⁵	d ⁶	d ⁷	d ⁸	d ⁹	d ¹⁰
Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn

- **kpf/ \$** **ll** t[e]x[2sf] k/df0f' h;sf] clGtd tlgcf[6f s1fx[2 ck0f{xG5g\.
loglx[2nf0{r Ans Ond]6 elgG5 . o;nf0{k]/of]8s tflnsfsf] 566}:yfg
lb0Psf] 5 . (f-orbital df aditional electron enter xg]

- IgDg zISt z^{PVnf} || k/df0fdf /x\$^f k^fo^s On\$6^fx₂ cfk^udf Igxlt zIStcg^u/f/ GolSno; sf j^l/k^l/ l^jleGg IgIZrt zISt z^{PVnfdf} 3ld/x\$^f x^{G5}g^l. o;/L On\$6^fx₂ Igxlt zIStcg^u/f/ 3ld/xg^ll^jleGg zISt z^{PVnf}x₂d^{llo}]hg zISt z^{PVnf} GolSno; sf] ;a^eGbf glhs x^{G5}, To;nf0{IgDg zISt z^{PVnf} elg^{G5} .
- pRr zISt z^{PVnf} || hg zISt z^{PVnf} GolSno;e^{Gbf} 6f9f /x\$^f]x^{G5} To;nf0{pRr zISt z^{PVnf} elg^{G5} .

- $\frac{1}{2} \hbar \omega$

s, p, d / f subshells

s = sharp

p = principal

d = diffused

f = fundamental

Principal quantum number (energy level)

$s < p < d < f$

Principal quantum number	Subshells	Number of subshells	Subshells	Number of orbitals
1 (K)	s	s=1	1s	s = 2
2 (L)	s, p	p=3	4s, p	p = 6
3 (M)	s, p, d	d=5	9s, p, d	d = 10
4 (N)	s, p, d, f	f=7	16s, p, d, f	f = 14

Aufbau's principle:

1s

2s 2p

3s 3p 3d

4s 4p 4d 4f

5s 5p 5d

6s 6p

7s

Subshells / f subshells

of orbitals

K - 1s²

L - 2s² 2p³

of orbitals

K - 1s²

L - 2s² 2p⁶

M - 3s¹

Eofn]; On\$6q

- k/df0fs] ;aCbf afx/L ;hdf /x\$ On\$6q xZ sf] ;aVofnf0{Eofn]; On\$6q elgG5 . h:t}M Inlyod ;f8od / kffl;od wftsf k/df0fxZ sf]clGtd ;hdf Pp6f dfq On\$6q xG5 . ToxL On\$6q g}Eofn]; On\$6q xf].
- ;ljlo wft'M Inlyod (Li) ;f8od (Na) / kffl;od (K), tEjxZ sf]k/df0fs]clGtd ;hdf Pp6f dfq On\$6q ePsf] / /f;folgs kltljlofdf efu Inbf cfkM;ü ePsf] On\$6q ;lhn}ü 5f8 /f;folgs kltljlofdf ;ljlo xG5 . o;sf/0f loglxZnf0{ On\$6q 8fj/ klg elgG5 .
- ;ljlo cwt'M SnfI/g (Cl), aIdg (B) / cf0f8g (I) tEjxZ sf]k/df0fs]clGtd ;hdf ;ftcf On\$6q ePsf] / /f;folgs kltljlofdf efu Inbf loglxZn]cZaf6 Pp6f On\$6q kft u/L /f;folgs kltljlofdf ;ljlo u0f kPzG ub5 . o;sf/0f loglxZnf0{ On\$6q P;I6/ klg elgG5 .
- Iglijlo Uof; M lxl nod (He), Igofj (Ne) / cfuG tEjxZ sf]k/df0fs]clGtd ;hdf @ jf * cf On\$6q xZ /XL ;h k0f{ePsf]xG5 / /f;folgs kltljlofdf ;ljlo xbg .

Ijlofsnfk

- æljBfyl{Znf0{kI/of8s tflnsfdf tEjxZ sf]jld ldnfpg]v}h v}hpg] ;do M @) IdgG ;yfg M slff÷sf]f ;fduI M tEjxZ sf]gfd nIvPsf]sf8{tyf sf8af8{-rf6{kK/_

Ijlw

- lbOPsf tEjxZ sf]gfd nIvPsf sf8{Znf0{kI/of8s tflnsfdf h:t}u/L kf/df0fljs ;aVofsf cfwf/df jld ldnfpg nufpg].
- jld ldnfpg]sfo{hg ljBfyl} ;jkyd k'f ub5 . To; ljBfylf0{kixnf 3fj0ff uL k/:sf/ kPfg ug].

Psf0 *

/f;folgs k|tlj|of (Chemical Reaction)

cgdf|gt 3G6L M %

-s_lj|zi6 p2|ox

o; Psf0sf]cGtodf ljBfylx lgDglnlvt sfok ug{; lfd xg]5g\

! = ljleGg ksf/sf /f;folgs k|tlj|ofx j ul\$ /of ug{.

@ = /f;folgs kl/jtgnf0{/f;folgs ;dls/ofsf] zkdf nyl /f;folgs k|tlj|ofdf xg] km/s b/sf]k|p|z ug{.

-v_kl/ro

o; Psf0df ljBfylxnf0{/f;folgs k|tlj|ofsf]7f] wf/Off lbg / /f;folgs k|tlj|of;ü ;DalGwt ljleGg terms X;ü kl/lrt u/fpgkb5 . o; sf ;fy}/f;folgs kbfx;alr xg] /f;folgs k|tlj|ofsf]k|p|zcg;/ ljleGg ;dxd lfefhg ug{ /f;folgs k|tlj|ofnf0{zAb ;dls/of / ;q ;dls/ofdf ;GtInt zkdf nylg / JofVof ug{pSt k|tlj|ofnf0{k|fj kfg] ljleGg tEjx;sf (factor) ;DaGwdf k|p|u u/L xg{/ k|p|z ug{;Sg]lfdtfsf]lj sf; ugdf ljz]f hfB lbOPsf]5 .

-u_z]lfs ;fdulx

- 6]66b] , las/ , 8k/ , k|f|l; od Snf]5 , xf08\$nf] /s Pl;8 , Pdf]god xf08\$;f08 , DofUgl; od l/ag , ;f]8od yfof] Nkm]5 , xf08\$ng k]f]S;f8 , kmfdfs] lsnf , aQL , ;nf0\$]sf6L , Çnf; sf8{.

-3_lzlfof l;sf0 lj|ofsnfk

/f;folgs k|tlj|of

- ljleGg lsl;dsf pbfx/of lbP/ kbfxdf xg]e]ts / /f;folgs kl/jtgnaf/]5nk|n ug{x] \. h:t} b0\$]sf sfuhsf]kGg lnP/ Pp6fnf0{Roft} ; -;fgf 6]f kfg{x] \ / csf]nf0{afn] b]fpgxf] \. ol b0\$]sf k|p|udf b]fVpsf kl/jtgnx;af/]5nk|n u/L /f;folgs kl/jtgn tyf /f;folgs k|tlj|of :ki6 kfg{x] \.
- dfly sfuh afNbf xg] /f;folgs kl/jtgn k|tlj|of/t kbfx; / k|tlj|ofaf6 pTkflbt kbfx;sf ;DaGwdf klxn]JolStut zkdf ;f]g / nylg lbgxf] \. To;kl5 hfB.hfBdf cfk|h]n]f]sf s/fx; 5nk|n u/L eGg nufpgxf] \.

- k|tlj|of/t kbfxč, jf0f lřĀg / pTkflbt kbfxč n|vPsf Ćnf;sf8{lgDgfg';f/afBdf 6f'gxf}\

k|tlj|of/t kbfxč → pTkflbt kbfxč

pSt sf8sf cfwf/df /f;folgs k|tlj|ofnf0{cleJoSt ug{;dls/0fdf n|bf efu lng] kbfxč / pTkflbt kbfxč s;/L / sxf'n|vg]:ki6 kfgxf}\.

;GtInt /f;folgs ;dls/0f

- ljleGg tEj tyf of|usxčsf]pbfx/0f lb0{c0f' ;ĥaf/]k|6 kfgxf}\.
- Pp6f DofUg];od l/agsf]6j]fnf0{xfjfdf afn] k|pzĥ ugxf}\.
- pSt k|f|udf xg]/f;folgs k|tlj|ofnf0{zAb / ;ĥ ;dls/0f n|vg k|];flxt ugxf}\.
- ljleGg ;GtInt / c;GtInt /f;folgs ;dls/0fsf]pbfx/0f k|tt u/L ;GtInt ;dls/0fsf]cy{]f kl/efiff :k:6 kfgxf}\.
- ;GtInt /f;folgs ;dls/0f n|vg]tl/sfaf/]pbfx/0f;lxt 5nkın ugxf}\.
- lx6 PG8 6ĥon (hit and trial) tl/sfaf6 /f;folgs ;dls/0f ;Gthg ugxf]/ljleGg pbfx/0f;lxt :ki6 kfgxf}\.
- /f;folgs ;dls/0f n|bf k|f|u xg];a's]xč pbfx/0f;lxt k|6;ĥ atf0lbgxf}\.

/f;folgs k|tlj|ofsf sf/s tEjxč

- /f;folgs k|tlj|ofsf sf/s tEjxč egšf]s]xf< tl sf/s tEjxč sš]xg ;S5g\h:tf k|zgxč u/L Brainstorming u/fpgxf}\.
- k|oš sf/s tEjxčsf ;DaGwdf pbfx/0f k|pzĥ ub]5nkın ugxf}\. -;Dej eP k|f|u u/] b|fpgxf}\.
- ljleGg pbfx/0f k|tt u/L pTk]ssf]kl/efiff eGg nufpgxf}\. -;Dej eP ljBfyłčnf0{ % ;dxdf ljefhg u/L k|oš ;dXnf0{PsPscf]pTk]ssf ;DaGwdf kf7bk'ts c|woog u/L k|tt ug{nufpgxf}\.

/f;folgs k|tlj|ofsf lsl;dxč

- ljBfyłčnf0{/f;folgs k|tlj|ofsf lsl;dxčsf];'tl agfpg nufpgxf}\.
- Ps 6j]f DofUg];odnf0{afnl k|pzĥ ugxf}\. pSt /f;folgs k|tlj|ofsf cfwf/df ;efhg k|tlj|ofaf/]5nkın ugxf}\.

- xf08\$ng k|f;S;f08df Doflugh 8f0cS;f08 ld;fpbf xg]/f;folgs k|tlj|of c|nf\$g u/fpgxf];\. ;f\$ cfwf/df ljR5hg k|tlj|ofaf/]:ki6 kfgxf];\.
- xf08\$nf]/s cDn of lh^as wftsf alr xg]/f;folgs k|tlj|ofsf]kpf] c|nf\$g u/f0{lj:yfkg k|tlj|ofaf/]5nknn u/fpgxf];\.
- Pp6f k/Llf0f gnldf 8k/sf];xfotfaf6 ln0Psf] xf08\$nf]/s cDndf ;f]8od xf08\$;f08sf] skl yf]kf ld;fpbf xg] k|tlj|ofsf] c|nf\$g u/f0{cDn / lff/ /f;folgs k|tlj|ofaf/]5nknn ugxf];\.-olb ;Dej eP workstation activity af6 dflysf] lj|ofsnfk u/fpgxf];\.

tfkbfos / tfkzff]s k|tlj|of

- tfkbfos / tfkzff]s k|tlj|ofsf kf7 skl ;do k9hg nufpgxf];\.
- tfkbfos / tfkbfos k|tlj|of shf0{elgG5 < k|tt u/L lh^askk/ /fv] lj|ofsnfk u/fpgxf];\ /ljleGg pbfx/0faf/f k|6 kfgxf];\.
- /f;folgs ;dls/0faf6 k|kt ug{;lsg]hfgsf/LxZ / o;sf];ldttfaf/];dX sfo{ u/fpgxf];\.
- k|of\$;dXnf0{lgisif{eGg nufpgxf];\ . csf];dXnf0{/rgfids ;e]f] lbg nufpgxf];\.
- cGTodf 5nknnaf6 cfPsf abfxZsf cfwf/df :ki6 kfgxf];\.

/f;folgs k|tlj|of b/

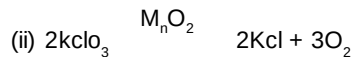
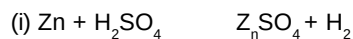
- k:tssf]lj|ofsnfk 8.1 u/fpgxf];\.
- kpf]usf]glthfsf cfwf/df /f;folgs k|tlj|of b/af/]k|6 kfgxf];\.

-a_dNof^asg

!= Inlvt tyf df]vs kZgfD/ ugxf];\.

h:t}||

- /f;folgs k|tlj|of shf0{elgG5 <
- ;GtInt /f;folgs ;dls/0f s;/L n]vG5 <
- tn lb0Psf ;dls/0f c|nf\$g u/L sg kpf/sf]/f;folgs k|tlj|of xf] 56bpgxf];\



@= kþrjufds ljlofsnfk ug{nufP/ dNof^asg ugxfj\.

#= DofUg];odsflkntfnf0{xfjfdf afNg nufpgxfj\ / ;f]kltljlofdf xg];dls/Of ;GtInt
 ˆkdf nvg nufpgxfj\.

\$= ;dxut sfoˆˆdf ljBfylˆˆsf];xeflutfsf cfwf/df dNof^asg ugxfj\.

%= kf7bk'tsdf lbOPsf cEof;xˆ u/fpgxfj\.

-r_lzlfnsnf0{yk hfgsf/L

- eflts kl/jtˆ, /f;folgs kl/jtˆ / /f;folgs kltljlof
 - hg kl/jtˆdf kbfsf c0fxˆsf]agfj6 tyf u0fdf kl/jtˆ xˆ To;kþf/sf] kl/jtˆnf0{eflts kl/jtˆ elgˆ5 . h:t} kglaf6 a/km agg'. of]kl/jtˆ c:yfol xˆ5 .
 - hg kl/jtˆdf kbfsf c0fxˆsf]agfj6 tyf u0fdf k0f{ˆkn]kl/jtˆ xˆ5 eg] To;kþf/sf]kl/jtˆnf0{/f;folgs kl/jtˆ elgˆ5 . h:t} lrglnf0{ttfpg'. of] kl/jtˆ :yfol xˆ5 .
 - Uof;nf0{cf0fljs ˆkdf n]vˆ5, h;nf0{8foP6lds elgˆ5 . h:t} N₂, O₂ cflb .
- kþ[tdf w]]sl;dsf /f;folgs kl/jtˆ e0/xˆ5g\ . /f;folgs kl/jtˆnf0{ubf{gof'kbfsfˆ agˆ5g\ . /f;folgs kl/jtˆ kþfz, tfk, ljBt\jf cDnsf]c;/af6 xg] ;S5 . /f;folgs kl/jtˆnf0{g}/f;folgs kltljlof (chemical reaction) elgˆ5 .
- ;GtInt /f;folgs ;dls/Of
 - /f;folgs kltljlofdf efu lng]tEj jf of]usxˆ / kltljlofkl5 agþf gof'tEjxˆ jf of]usxˆnf0{klg ;^as} / c0f' ;qnhgfpq]ljwnf0{/f;folgs ;dls/Of elgˆ5 .
- c0fxˆnf0{;l'r t ug] k/df0fxˆsf] ;^as} ;dxnf0{c0f' ;q elgˆ5 . ;GtInt /f;folgs ;dls/Of nvg]tl/sf

- /f;folgs k|t|j|p|f|d|f efu lng] tEj jf of|usnf0{reactant elgG5, h;nfo{zAb ;d|s/0fn]n|vG5 .

- /f;folgs k|t|j|p|f|k|5 ag]sf kb|fy{x;nfo{products elgG5 . reactants / products alr jf IrÅg = /flvG5 .

- t|fk lbPsfnf0{Δ IrÅgn]hgfp5g\.

xfjfeGbf xn]sf]Uof;nfo{ IrÅgn]/ lyluPsf]c3hg j:thf0{ IrÅgn]hgfpG5 .

- 7f], t/n, Uof; / kfgldf ag]sf]3fnf0{j|dz|| (s), (l), (g) / (aq) n|vG5 .

- lbOPsf]zAb ;d|s/0fnf0{;q ;d|s/0fdf kl/jtq u/L o;/L k|kt ;d|s/0fnf0{ :s|n6g OSj]g (skeleton equation) elgG5 .

- bfof"/ afoflt/sf tEj sf k/df0fx;nfo{a/fa/ ugkb5, h:t}||

-S_ KClO_3 $\text{KCl} + \text{O}_2$ (skeleton equation)

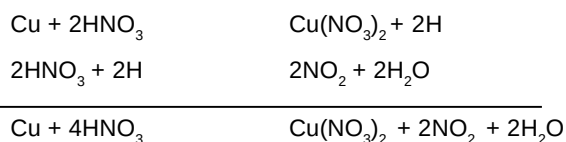
-V_ KClO_3 $\text{KCl} + 3\text{O}_2$ (atomic equation)

-U_ 2KClO_3 $\text{KCl} + \text{O}_2$ (skeleton equation)

-3_ 2KClO_3 $2\text{KCl} + 3\text{O}_2$ (molecular equation)

- Uof;x;nfo{;d|s/0fdf k/df0fs}xkdf /fvL ;Gthg ul/G5 . o;nfo{P6f]ds OSj]g elgG5 .

► /f;folgs ;d|s/0fnf0{lx6 PG8 6fön ljlwafx}sf kfl;Pn ljlwaf6 klG ;Gthg ug{ ;lsG5 . o:tfl]ljlw hl6n /f;folgs ;d|s/0fnf0{;Gthg ug{kpfu ul/G5 . o; ljlwdf /f;folgs ;d|s/0fnf0{b0{jf b0fGbf a9L cj:yfdf n|vl cfjZos ;^Vofn] u0fg u/L ;Gthg ul/G5 . h:t}||



/f;folgs k|t|j|p|f|sf sf/s tEjx; / p|k|s

► /f;folgs k|t|j|p|f|sf sf/s tEjx;d|w|sDkg klG Ps xfl. Pl;l6lng 6lj|Pk|5 sfaG / xf08f]gsf ;fy}7hf]cfjfh lg:sG5 .

➔ ahnc ; (Berzelius) n ; $\text{g}\backslash!^*\#\%$ df / f ; folgs $\text{k}\{\text{tlj}\}\text{ofs}\{\text{j}\}$ u $\text{af}\text{x}/\text{l}$ $\text{kb}\text{f}\text{y}\{\text{s}\}\text{pkl}:\text{y}\text{lt}\text{n}$
 $\text{ubf}\{\text{a95}\}\text{e}\text{g}\{\text{s}\}/\text{f}$ $\text{k}\{\text{t}\}\text{t}$ u/l pst $\text{kb}\text{f}\text{y}\{\text{f}\}\text{o}\{\text{p}\text{tk}\}\text{s}$ (catalyst) egl $\text{g}\text{f}\text{ds}/\text{of}$ $\text{u}/$.

➔ $\text{p}\text{tk}\}\text{sx}\text{z}\text{nf}\{\text{rf}/\text{j}\text{u}\text{df}$ $\text{j}\text{ul}\text{f}/\text{of}$ ul/Psf $5\text{g}\backslash\text{M}$

- s_- ; $\text{sf}/\text{f}\text{tds}$ $\text{p}\text{tk}\}\text{s}$ - v_- $\text{gsf}/\text{f}\text{tds}$ $\text{p}\text{tk}\}\text{s}$

- u_- $\text{c6f}\}\text{p}\text{tk}\}\text{s}$ (auto catalyst) - 3_- 0G8h $\text{p}\text{tk}\}\text{s}$ (induced catalyst)

- / f ; folgs $\text{k}\{\text{tlj}\}\text{ofkl5}$ $\text{p}\text{tk}\text{Gg}$ $\text{e}\text{Psf}\}\text{kb}\text{f}\text{y}\{\text{f}\}\text{p}\text{tk}\}\text{ssf}\}\text{sfd}$ $\text{u5}\{\text{eg}\}\text{To}$; $\text{nf}\{\text{c6f}\}\text{p}\text{tk}\}\text{s}$ elgG5 , $\text{h:t}\}\text{M}$



- ha Pp6f $\text{k}\{\text{tlj}\}\text{ofs}\}\text{c}$; / $\text{csf}\}\text{k}\{\text{tlj}\}\text{ofs}\}\text{j}\}\text{udf}$ $\text{k5}\{\text{hg}$; fwf/of $\text{c}\text{j}:\text{y}\text{fdf}$ xbg
 $\text{eg}\}\text{To}$; $\text{k}\text{f}/\text{sf}\}\text{p}\text{tk}\}\text{snf}\{\text{0G8h}$ Sof6fln:6 elgG5 .

/ f ; folgs $\text{k}\{\text{tlj}\}\text{ofs}\}\text{Isl}$; dxz

➔ hg $\text{k}\{\text{tlj}\}\text{ofdf}$ $\text{k}/\text{df}\text{of}\text{x}\text{z}\text{n}\}\text{On}\}\text{6f}\text{g}$ $5\text{f}\text{B5g}\backslash$ To ; $\text{nf}\{\text{clS};8\}\text{g}$ $\text{k}\{\text{tlj}\}\text{of}$ elgG5
 $\text{t}/$ hg $\text{k}\{\text{tlj}\}\text{ofdf}$ $\text{k}/\text{df}\text{of}\text{x}\text{z}\text{n}\}\text{On}\}\text{6f}\text{g}$ nfe ub5 $\text{eg}\}\text{To}$; $\text{k}\text{f}/\text{sf}\}\text{k}\{\text{tlj}\}\text{ofnf}\{\text{0}$
 $\text{l}/8\text{S};\text{g}$ $\text{k}\{\text{tlj}\}\text{of}$ elgG5 . $\text{h:t}\}\text{M}$



2.8.2 2,8

$\text{pko}\}\text{t}$ pbfx/ofdf $\text{DofUg}\}\text{od}$ / $\text{clS};\text{hg}\text{sf}\}\text{k}\{\text{tlj}\}\text{ofs}\}\text{kin}:\text{j}\text{z}\text{k}$ $\text{DofUg}\}\text{od}$ $\text{cS};\text{f08}$
 aGbf $\text{DofUg}\}\text{odn}\}\text{b0cf}\}\text{On}\}\text{6f}\text{g}$ $5\text{f}\text{B5}$ / $\text{clS};\text{hgn}\}\text{b0cf}\}\text{On}\}\text{6f}\text{g}$ nfe $\text{u5}\{\text{o};\text{h}\}\text{DofUg}\}\text{od}$ $\text{clS};8\}\text{g}$ / $\text{clS};\text{hgdf}$ $\text{l}/8\text{S};\text{g}$ $\text{k}\{\text{tlj}\}\text{of}$ $\text{e}\text{Psf}\}\text{xf}\}\text{.}$

➤ tfkbfos / $\text{tfkz}\}\text{f}\text{fs}$ $\text{k}\{\text{tlj}\}\text{of}$ / / f ; folgs ; $\text{d}\text{ls}/\text{ofaf6}$ $\text{k}\{\text{t}$ $\text{hfgsf}/\text{lx}\text{z}\div\text{cf0fl}\text{j}\text{s}$
 $\text{ef}/$ / dfh (mele) .

➤ hg ; $\text{d}\text{ls}/\text{ofn}\}\text{tfk}$ $\text{lb}\text{g}\}\text{/}$ $\text{lng}\}\text{/f}$; folgs $\text{k}\{\text{tlj}\}\text{ofs}\}\text{;}\text{a}\text{s}\}\text{ub5}$ $\text{eg}\}\text{To}$; $\text{nf}\{\text{ydf}\}\text{dsn}$; $\text{d}\text{ls}/\text{of}$ elgG5 .



➔ tfkbfos $\text{k}\{\text{tlj}\}\text{ofnf}\{\text{0}\text{wg}\text{f}\text{tds}$ $\text{lr}\text{Ågn}\}\text{;}\text{a}\text{s}\}\text{ub5}$.

→ tfkzifjs kltljpfnf0{CoffTds lrañn]; a s} ub5 .

- Perfuf8\$]lj rf/cg';f/ tfkjld / rfk ;dfg ePsf]cj:yfdf a/fa/ cfotg ePsf ;a]Uof;x¿df ;dfg ; aVofdf c0fx¿ xG5g\ Ps dñ Uof;df xg]gDa/nf0{Perfuf8\$] gDa/ elG5 .

)=#&&\$ ufd l;Ne/ gf06\$]3fñdf cTolws dfqfdf xf08\$ñ/s Pl;8 ld;fpbf slt tñ a/fa/sf]l;Ne/ Snf]f08 kkt xG5 <

{kf=ef= H= ! / Cl= #%=%, Ag = !)* N= !\$ / O= !^}

AgNO₃ + HCl

AgCl + HNO₃

-!)* + !\$ + # x !^_

-!)* + #%=%_

= !&) ufd

= !\$#=% ufd

!&) ufd l;Ne/ gf06\$ñ]!\$#=% ufd l;Ne/ Snf]f08 lbG5 .

)=#&&\$ ufd l;Ne/ gf06\$ñ] =
$$\frac{!$#=% ufd \times)=#&&$ ufd}{!&) ufd}$$

=)=#!*^ ufd l;Ne/ Snf]f08

- /f;folgs ;dls/0fsf];ltdttf tyf /f;folgs kltljpfnsf]b/

- ;fwf/0f /f;folgs ;dls/0fdf reactant / product x¿sf]eñts cj:yfx¿af/]; a s} u/]sf]xbñ . of];ltdttfnf0{lg/fs/0f ug{eñts cj:yfdf (s), (l) / (g) clf/ /flvG5 . h:t}||

2H₂ (g) + O₂ (g)

2H₂O(l)

Ij]pfnsnfk

/f;folgs kltljpfnsf]b/df pTk]s c;/ .

;fdu|

- sf]gsn Çnf:s, l;l/~h, xf08ñg k/]f;f08 / DoflUgh 8f0cS;f08 .

ljlw

InOPsf b0Cf sf lgsn ÇnfS; xç dWo]Pp6f sf lgsn Çnf:sdf sxl Dofulgh 8f0cS; f08
Ing]. To; kl5 b'j}sf lgsn Çnf:sdf l/~hsf]; xfotfn]xf08hg k]f; f08 ld; fP/ j Bfyççnf0{
c jnfsg u/fpg].

ljZnlf

sg sf lgsn Çnf:saf6 a9l Uof; lg:sG5 eGg]s/f c jnfsg u/f0{pTk]ss]eltdsfaf/]
5nkin ug].

REFERENCE BOOKS

1. SEDU Manual
2. A Text Book of Inorganic Chemistr-by L. Mitra
3. Intermediate Inorganic Chemistry-by G.D. Tuli & B.H. Bahl
4. Language of Chemistry - A.K. Ghoss
5. Co-ordinate Science- Mary Jones, Geoff Jones & David Acabler.

Psf0 (cDn, lff/ / nj0f (Acid, Base & Salt)

cgdfigt 366L M %

-s_ljzi6 p2ox

o; Psf0sf]cGtodf ljBfylx lgDglnlvt sfox ug{; lfd xg]5g\

!= cDn, lff/ / nj0fsf]kl/efiff lbg .

@= cDn, lff/ / nj0fxzsf];fdfGo u0fxz j0fg ug{.

lff/ / cNsfndf k/s 56bpg .

\$= bgs hljgdf cDn, lff/ / nj0fxzsf]pkofuaf/]j0fg ug{.

-v_kl/ro

cDn, lff/ / nj0f j]flgs kpf]uzfnfdf lg/Gt/ z kdf kpf]udf cf0/xg]/f;folgs kbfxz xg\ . To: t/L dfgj hljgsf]bgs kpf]udf klg ol / ;fogxz plQs}dxEjk0f{5g\ . To; h] of]Psf0df ljBfylxnf0{ol / ;fogxzsf af/]df cfwf/et 1fg lbg, ltglxzsf]klxrfg ug{ / kpf]udf Nofpg ;Sg]lfdtfsf]lj sf; ug{df hf8 lbgkg]5 . ;fy}b^{PH} dfgsf]cfwf/df df6f]sf] k/Lf0f ug{;Sg]Jofjxf]/s ;ksf]lj sf;df klg plQs}Wofg lbgkg]5 .

-u_z]lfs ;fdulx

6]66ba, 8k/, xf08\$nf]/s cDn, ;Ncol/s cDn, gf06s cDn, ;f]8od xf08\$;f08, ;f]8od Snf]f08, Pdf]god xf08\$;f08, sfutl, leg]uf/, ln6d;kj/ -/ftf] lgnf] ldyf0n cf]h, k]h]Cylng, olge;f] 0lG8s] / ^{PH} :sh, Pl;l6s cDn, Dof]ug];od l/ag, lkmN6/ kj/, v/fgl .

-3_lzlf0f l;sf0 lj]ofsnfk

- cDn, lff/ / nj0fxzaf/]ljBfylx; u kZgfD/ u/L hfgsf/L lbgxf]\.
- sfutl, leg]uf/, r/lcldnf] xf08\$nf]/s cDn, ;Ncol/s cDn, gf0l6s cDn, Pl;l6s cDnxz k]z] u/L ljleGg cDnxz lrgfpgxf]\.
- tl cDnxznf0{s8f, g/d, kf^aufl/s cDn, ckf^aufl/s cDndf 56bpg nufpgxf]\ / ltglxzsf af/]df :ki6 kfgxf]\.
- dfgj z/l/sf]cdf;odf pTkfbg xg]cDnsf af/]df 5nkin ugxf]\.

- dflý kþlzf j:txçnf0{lsg cDn elgPsf]xf] < s] ; a}cDnxç cldnf xG5g\h:tf kZg u/L Brainstorming u/fpgxf] \ / cDnsf]kl/efiff pbfx/0f; lxt k|t't ugxf] \.
- s8f / g/d cDn 56bpg ljlöfsnfk 9.1 u/fpgxf] \.
- cDnsf u0fxçsf] lzlf0f ug{work station ljlöfsnfk u/fpgxf] \.
- 4 cDf work station lgwf0f ugxf] \.
- Pp6fdf lgnf]ln6d; k|k/, ldyf0n cDn, kDnCyflng / s]L cDnxç k/Llf0f gnldf /fvGxf] \. o; u/L jldzD DofUg] ; od l/ag / cDnxç ; f]8od sf0f / ; f]8od xf08fS; f08 / Pl; 8xç k/Llf0f gnldf /fvGxf] \.
- k|0f work station df ljbflç a/fa/ xg]u/L /fvGxf] \.
- k|0f ; dXnf0{cfçg] Station df o; sf / ; fogxçalr kþu u/L c]nf]sg / lgisif l6kg nufpgxf] \. olb ; do ePdf k|0f ; dXnf0{k|0f work station df uP/ ljlöfsnfk ug{nufpgxf] \. ; do sd ePdf ; dX sf0f]çkdf ljlöfsnfk cufl8 a9fpgxf] \.
- dflýsf]ljlöfsnfksf cfwf/df cDnsf u0fxç k|6 kfgxf] \.
- sg-sg cDn sf nflu kþu ul/G5 < 5nkñn ugxf] \.

Iff/xç

- s]L Iff/xç, h:t}D ; f]8od xf08fS; f08, kDf] ; od xf08fS; f08 cflb b]vpgxf] \.
- Pdf]8od xf08fS; f08, v/fgl, s]L wftsf cS; f08 kþç u/L Iff/xç lrgfpgxf] \.
- Iff / lksf ; Nçol/s cDnalr /f; folgs k|tlj]0f u/fP/ c]nf]sg ug{nuf0{ Iff/sf]kl/efiff eGg nufpgxf] \.
- Iff/xçnf0{kfgldf 3hf0{kfgldf 3Ng]/ g3Ng]Iff/ 56bpg nufpgxf] \ / kfgldf 3Ng] Iff/xçnf0{cNsfnl elgG5 egl :ki6 kfgxf] \.
- ljlöfsnfk 9.2 u/fpgxf] \ / kþusf]lgisifaf/]5nkñn ugxf] \.
- Iff/sf u0fxçaf/] ; dX sf0f]ç work station ljlöfsnfk u/L k|6 kfgxf] \.
- sg Iff/ s]sfdsf nflu kþu ul/G5 kZgD/ u/L Iff/sf]kþuaf/]atf0lbgxf] \.

nj0fxç / olge; f] ; 's kbfy{

- l]leGg kþf/sf nj0fxç, h:t}D NaCl, KHCO₃, CaSO₄, 2nSO₄ cflbnf0{kþç u/L lrgfpgxf] \.

- njOf s;/L aG5 < h:tf kZg u/L 5nkIn u/fpgxfj/V lJ BfylxZaf6 njOfsfjkl/efiff eGg kTj;flxt ugxfj\.
- Acid radical / Basic radical pbfx/Ofaf/f kJ6 kfgxfj\.
- :jfb, /^a, ln6d; kK/;tsfjkltljlof, 3hgZlntf, s8f, g/d h:tf njOfsf uOfxZsfj k/Llfof u/L cJnfsg ug{nufpgxfj}\. kpfjlsfjglthfsf cfwf/df njOfsf uOfxZsfj ;'rL agfpg nufpgxfj\.
- njOf aGg]kljlofxfZsf lJleGg pbfx/Of k|tt u/L 5nkIn ugxfj\.
- sg njOf s]sfdsf nflu kpfj ul/G5 < 5nkIn ugxfj\.
- lJleGg OlG8sD/xZ, h:t}ll ln6d;kK/, ldyfOn cfjJh, kpfjCyflng cflbnfO{cDn, lff/ / njOfdf 8afO{ltgXZn]b]fpg]/^a cJnfsg ug{nufpgxfj}\. lJleGg dflloddf OlG8sD/xZn]b]fPsfj/^asfj rf6{agfpg nufpgxfj}\.
- tl OlG8sD/xZn]cDn jf lff/ slt s8f jf g/d 5 56bfpG ;SgJ-g;SgJf/]5nkIn u/L olge;fj ;'rs kbfsf af/Jdf :ki6 kfgxfj\.
- pH Scale sfj rf6{k|tt u/L olge;fj OlG8sD/n]s;/L cDn jf lff/sfjs8fkg gfk5, kPZG u/J b]fpgxfj\.
- k'tsdf lbOPsfjceof; u/J xJl l;Sgxfj\. lJlofsnfk u/fO{df6fPsfjP^H dfg / lJleGg vfb j:txZdf xg]P^H kQf nufpg nufpgxfj\.

-^a dNof^asg

lJleGg dfjvs tyf lnltv kZgxZ ugxfj\ h:t}ll

!= cDn, lff/ / njOf shfO{elgG5 <

@= cDnsf uOfxZ sD]xg\<

#= xfdjcf;kf;df kfOg]s]l cDnxZsfjgfd eGgxfj\.

\$= cNsfnl shfO{elgG5 <

%= lg/fs/Of k|tljlof egPsf]s]xfj<

^= lJleGg cDn, lff/ / njOfxfZsfjgfkfsfjCnf; sf8{b]fO{cDn, lff/ jf njOf s]xfj< lrgg nufpgxfj\.

&= 0lG8sP/x¿n]b]vpg]/^asf cfwf/df cDn, lff/ jf njOf 56bpg nufpgxf] \.

*= df6f]sf]cDnlokgf a9]sf]b]vPdf To;nf0{sd ug{S]ugk5{h:tf Jofjxfl/s kZgx¿
ugxf] \. Jofjxfl/s ;lkx¿sf]dNof^asg ugxf] \.

(= kf7bk'tsdf lb0Psf cEof;x¿ xn ug{nufpgxf] \.

-r_lzlf snf0{yk hfgsf/L

cDn

- kfgldf 3Nbf xf08k]g cfog (H⁺) lbg]kbfy{cDn xf].
- ljleGg vfB j:t' df kf0g]cDnx¿

vfB j:t'	kf0g]cDn
r/l cldnf]	cshflns Pl;8
legu/	Pl;l6s Pl;8
sfutl÷uf]heP	;f0l6s Pl;8
efu6]	6f6f/s Pl;8
cdnf	P:sla\$ Pl;8
bxl÷lau]sf] bW	NoflS6s Pl;8
;P kfgl	sfaflgs Pl;8

- sfaflS;n ;dX (COOH) ePsf]cDnnf0{kf^aufl/s cDn elgG5, h:t} kld\$ Pl;8
(HCOOH), Pl;l6s Pl;8 (CH₃COOH) .
- sfafl -c^aufl/_ gePsf cDnnf0{ckf^aufl/s cDn elgG5, h:t} ;Nkml/s Pl;8
(H₂SO₄), gf0l6s Pl;8 (HNO₃) .
- cDnsf]kbfu || sk8f /^aufpg, wftx¿ ;kf ug{cf]w agfpg, /f;folgs dn agfpg
cflb .

lff/

- kfgldf 3Nbf xf08k]g;n cfog (OH) lbg]kbfy{nf0{lff/ elgG5 .
- cDn / lff/alr xg]k|tlj|ofnf0{lg/fs/of k|tlj|of jf t6:y/s/of k|tlj|of elgG5 .

- kfgldf 3hgzn lff/nf0{cnsfnl elgG5 .
- lff/sf]kpfu || /;fogsf ħkdf /f;folgs dn agfpg, ;fab agfpg tyf cfw.sf] ħkdf kpfu ug{.

nj0f

- nj0f Pp6f o:tf]ofus xf] hg cDndf ePsf]xf08hgnf0{wft' jf On\$6kfh6e /]8snn]k0f{jf cflzs ħkdf lj:yfkg u/l agsf]xG5 .



- ;f]8od Snf]f08, Dofug];od ;Nk0f cflb kfgldf 3hgzn xg]nj0fxħ xg\.
- n8 ;Nk0f, sk/ ;Nk0f cflb nj0fxħ kfgldf c3hgzn nj0fxħ xg\.
- nj0fsf]3fh]n]sg}klg 0lG8s8/dfly kltlj]of b]yfpb8 .
- gbsf]kpfu || vfgsf nflu (NaCl), ls6gfzs cfw (CuSO₄), cfw.sf]ħkdf (MgSO₄) tyf ljleGg kpf/sf /^axħ pTkfbg ug{.

- pH :sf]hsf]kpfu

- cDn / lff/ lrGgsf lgldt kpfu ul/g]kbfyhf0{0lG8s8/ elgG5 .
- ;fwf/0f 0lG8s8/xħsf]ld>0fnf0{olge;f 0lG8s8/ elgG5 .
- pH eGgfn]cDn jf lff/sf]zlst gfk]olge;f 0lG8s8/ xf]. cDn / lff/sf] zlst gfk] pH :sf]hsf]kpfu ul/G5 .

df6f]	la?jfxħ
cDnlo	u/f“, x+/fh, Phfhf
cNsnf0g	k8,wkl, cd]f, ef]hkq
t6:y	ds} ;'t{ pv', skll, aGbsf]el, ufh/

Psf0 !) SXL Uof;Xz (Some Gasses)

cgdfllgt 366L M ^ 366L

-s_ ljlzi6 p2loxz

o; Psf0sf]cGtodf lJBfylxz sfa68f0cS;f08 / Pdfllgof Uof;sf]lgdf0f, u0fxz /
pkofllutf j0f6 ug{; lfd xg]5g\

-v_ kl/ro

o; Psf0af6 lJBfylxz df sfa68f0cS;f08 Uof; / Pdfllgof Uof; pTkfbg ug]/f;folgs
kbfylxz klxrfg ug]/ kpfuzfnfdf tl Uof;xz tof/ u/L b]vpg ;Sg]lfdtfs]lj sf;
ugdf hfB lb0Psf]5 . o; sf ;fy}tl Uof;xz sf]ef]ts / /f;folgs u0fxz;ü kl/lrt xg
/ cBflus :t/df pTkfbg ug]tl/sfsf] ;fdfGo hfgsf/L lbg ;Sg]lfdtfs]lj sf;
lJBfylxz df ugdf hfB lb0Psf]5 .

-u_ z]lfs ;fdulxz

rg 9^auf, xf08Snf/s cDn, Pdfllgod sfa68f0cS;f08, Pdfllgod Snf/f08, ;f]8od xf08cS;f08,
ly;nkrg, pNkrafn, 8]ne/L 6b], Uof; hf/, xf8{Unf; 6]66b], ag{, :6bf08 .

-3_ lzlfof l;sf0 ljlpsnfk

sfa68f0cS;f08

- sfa68f0cS;f08 Uof;sf af/]df kl/roffds 5nkin ugxf]\.
- kpfuzfnfdf sfa68f0cS;f08 Uof; s;/L agf0G5 k6z6 u/L b]vpgxf]\. pSt of;
pTkGg xbf xg]/f;folgs k]tljlof ;DaGwdf :ki6 kfgxf]\.
- lJBfylxz nf0{ sfa68f0cS;f08 Uof; agfpg] tl/sfsf]lrq agf0{n]ln^a ug{
nufpgxf]\.
- sfa68f0cS;f08 Uof;sf]pTkfbg ug]cGo tl/sfxzaf/]pbfx/0f;ixt k]6 kfgxf]\.
- sfa68f0cS;f08sf]cBflus pTkfbg kf7 k9g nufpgxf]\ / sfa68f0cS;f08sf]
pTkfbgaf/]kZgf0/ u/L k]6 kfgxf]\.
- Quick lime, Slaked lime / Line water ;DaGwdf Brain storming u/L k]6 kfgxf]\.

sfa08f0cS;f08sf u0fxč tyf pkofutf

- sfa08f0cS;f08sf u0fxč kf7 k9g nufpgxf;\.
- o;sf efts u0fxč s]xb\< JolStut čkdf sb}PsPscf afBdf nvg nufpgxf;\.
- /f;folgs u0fxčsf ;DaGwdf kpfu u/L b]vfP/ 5nkın ugxf;\.
- sfa08f0cS;f08 Uof; s]sfddf kpfu ul/G5 egl kZg ugxf;\ / lglZrt ;do lbP/ k[o]nf0{cfÇgf]sfkldf nvg nufpgxf;\.
- b0f0{ jf tlgltg hgfsf] ;dXdf cf-cfkłh] n]vf s'fxč Psfsf0f 5nkın ug{ nufpgxf;\.
- ;dXsf]lgisif{eGg nufpgxf;\.
- u/L, x]L l;Sgxf;\ / l]pfsnfk klg ug{nufpgxf;\.

Pdf]gof

- Pdf]gof Uof;sf af/]f kl/rofTds 5nkın ugxf;\.
- kpfuzfnfdf Pdf]gof Uof; s;/L agf0G5, kZg u/L b]vfpgxf;\. pSt Uof; pTkGg xbf xb]/f;folgs k[t]j]of ;DaGwdf :ki6 kfgxf;\.
- l]BfyŁčnf0{Pdf]gof Uof; agfpg]tl/sfsf]lrq agf0{n]ln^a ug{nufpgxf;\.
- Pdf]gof Uof;sf]pTkfbg ug[cGo tl/sfxčaf/]pbfx/0f;lxt k]6 kfgxf;\.

Pdf]gofsf u0fxč tyf pkofutf

- Pdf]gofsf u0fxč kf7 k9g nufpgxf;\.
- o;sf efts u0fxč s]xb\< JolStut čkdf sb}PsPscf afBdf nvg nufpgxf;\.
- /f;folgs u0fxčsf ;DaGwdf pbfx/0f;lxt k]6 kfgxf;\. ;Dej eP kpfu u/] b]vf0{ 5nkın ugxf;\.
- Pdf]gofsf Uof; s]sfddf kpfu ul/G5 egl kZg ugxf;\ / lglZrt ;do lbP/ k[o]nf0{cfÇgf]sfkldf nvg nufpgxf;\.
- b0f0{ jf tlgltg hgfsf] ;dXdf cf-cfkłh] n]vf s'fxč Psfsf0f 5nkın ug{ nufpgxf;\.
- ;dXsf]lgisif{eGg nufpgxf;\.

- u/l, x/l l; Sgxf; \ / l j l ofsnfk klg ug{nufpgxf; \.

-a_ d\of^a\sg

tn lbOPsf dfjvs tyf lnltv klgx; ug{/ eGg nuf0{d\of^a\sg ugxf; \

- sfaG8f0cS; f08 Uof; kpfuzfnfdf s; /l tof/ ul/G5 <
- Pdfjgofsf Uof; kpfuzfnfdf s; /l tof/ ul/G5 <
- rgkfgl sfjfo{elG5 < of]s; /l tof/ ul/G5 <
- Pdfjgofsf Uof; sf]kpfux; atfpg nufpgxf; \.
- Pdfjgofsf / cGo /; fogx; ; u xg] kltljlofx; sf] /f; folgs ; dls/of nvg nufpgxf; \.
- kf7ok'tsdf lbOPsf cEof; x; ug{nufpgxf; \.

-r_ lzlfsnf0{hfgsf/L

sfaG8f0cS; f08

- klxnfk6s co₂ agfpg] j] flgs Eofg xhdG6 xf].
- OGwg afNbf, Zjf; kZjf; tyf Hjfnfdvl lj: kntf xbf co₂ pTkGg xG5 .
- sfaG8f0cS; f08sf]cf0fljs ; q co₂ xf] / o; sf]dfnSoh/ j\$ - \$\$ xG5 .
- kpfuzfnfdf co₂ tof/ ug{lkfSsf ; Ncol/s Pl; 8 kpfu ul/bj Isgegl CaCO₃ / dil.H₂SO₄ alr kltljlof e0{c3hgzln Sofnl; od ; Nkntf pTkGg xG5, h; n] CaCO₃ nf0{9fS5 / co₂ pTkGg xg lbj .
- (% kltzt cIS; hg / % kltzt co₂ ld>0nf0{sfafhg elG5 . of]cfjw.sf] ; kdf -lgdfjgof, l jiffn' kbfy{x6fpg_ kpfu ul/G5 .
- cfuf]lgefpg]oGq NaHCO₃ / H₂SO₄ sf]ld>0f /flvPsf]xG5 .

$$\text{NaHCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O} + 2\text{CO}_2$$
- sfaG8f0cS; f08nf0{- &*°c ; Dd lr: ofpbf aGg] ; Vvf a/knf0{8f0cf0; elG5 .

Pdfjgof

- ; g\!&&% df lk|6n;f/f ; jkyd nf0d Ca(OH)₂ / ; fnPdfjgs (NH₄Cl) af6 Pdfjgof lgdfjgof ul/Psf]lyof].

- kpfjuzfnfdf ;Vvf Pdfjgof kft ug{f0{8k0a6fj/df Sjlsnf0dsf]kpfj ul/G5 .
- cfjpus:t/df Pdfjgof Uof; pTkfbg ug{! efu gf06fng / # efu xf08fngsf] cfjZostf kb5 .

Ijzjf Wofg lbgkgIs'fxz

Pl;8 / Iff/xz (Acids and Bases)

- xf08fng/s Pl;8, ;Ncol/s Pl;8 tyf gf0l6s Pl;8 h:tf s8f Pl;8xz a9l vt/fk0f{ePsf]xbfn]lknSsf Pl;8xzdfq kpfjufd Nofpbf ;/lft xG5g\.
- s8f Pl;8nf0{lknSsf ubf{yf}]Pl;8nf0{kfgldf la:tf/}vGofpgkb5 t/ Pl;8df kfgl vGofpg'xbg .
- ;f8od xf08f;f08 / kf5f;od xf08f;f08 s8f Iff/xz xg\ ol Iff/xz 5fnfdf k'of]eg]hng xg]ePsf]lknSsf Iff/xz dfq kpfjufd Nofpgkb5 .
- s8f Pl;8 tyf Iff/xz 5fnfdf k/pf ; jkyd To; efunf0{kz:t kfgln]kvfNgkb5 .
- s8f Pl;8 tyf s8f Iff/xz lzlfsn]dfq rnfpngkb5 .

sfa68f0cS;f08

- pks/0fxz h8fg ubf{xfjf gk:g]xgkb5 .
- ly:6n kng]hsf]tNnf]efu Pl;8df 8a5f]xgkb5 .
- Uof; ;a'sng ubf{Uof; hf/af6 xfjf ;a}lg:s]k5 ugkb5 .

gf06fng

- ;a}pks/0fxz xfjf gk:g]u/l hf3gkb5 .
- ly:6n kng]hsf]tNnf]efu ld>0fdf 8a5f]xgkb5 .
- Çnf:snf0{la:tf/}ttfpgkb5 .

Pdfjgof

- ;a}pks/0fxz xfjf gl5g]u/l aGb ugkb5 .
- s8f k/Llf0f gnlnf0{la:tf/}ttfpgkb5 .
- kpfjuzfnfdf Pdfjgof Uof; tof/ ubf{b0{efu Pdfjgod Snf]f08 / Ps efu Sofln;od xf08f;f08 lngkb5 .

Psf0 !!

wftxč (Metals)

cgdfłgt 366L M ^ 366L

-s_ljłzi6 p2łoxč

o; Psf0sf]cGtddf ljBfylč lgDglnlvt sfoč ug{; lfd xg]5g\\M

!= kš[taf6 křt xg]dxčjkQf{wftxč -křnfd, cřNdlgod, tfdf, rřł / ;g_ sf];^as] jOfč ug{.

@= pSt wftxčsf]efłts tyf /f;folgs uOfxč klxrfg u/L jOfč ug{.

#= błgs hl.jgdf tl wftxčsf]pkofłutf jOfč ug{.

-v_kl/ro

o; Psf0df kš[taf6 křt xg]sł dxčjkQf{wftxč křnfd, cřNdlgod, tfdf, rřł / ;gsf] /f;folgs kl/ro tyf tl wftxčsf wřpxč, wřpaf6 křřvg u/L wřt' lgsřNg] tl/sfxčsf af/řf hřgsř/L lb0g]5 . o;sf ;fy}ol wftxčsf]efłts tyf /f;folgs uOfxčsf]r rř{ul/g]5 . xdf]błgs hl.jgdf tl wftxčsf]pkofłutfaf/]cłoog ul/g]5 .

-u_złfs ;fdul

lkl/ofłs tflnsf, křnfd, cřNdlgod, tfdf, rřłsf 6řřfxč, Steel wool, test tube, beaker, rřč, křnfd (Iron) .

-3_lzłf0f l;sf0 ljłofsnfk

- ljBfylčnf0błgs hl.jgdf křř xg];fdřxč tyf ;fwgxčsf]gfd eGg nufpgřf] \ / gfd afřč l6Kgxř] \ . lzłfsn] křnfd, cřNdlgod, tfdf, rřł / ;řaf6 aGg] ;fdřxč tyf ;fwgxčsf]yk gfd pNřv ugřf] \ . tl j:txčdło]wřt' / cřft'sš] xg]56břpg nufpgřf] \ . wřtsf uOfsf] slř gřřf cłoog u/řř] kř/fjnrřsg u/fpgřf] \ . křnfd, cřNdlgod, tfdf, rřł / ;g sxf"kf0G5 / logłxčsf]dxčřaf/]5nkřn u/fpgřf] \ .
- ;dxdf lkl/ofłs tflnsf cłoog ug{nufP/ křnfdsf];^as], kř/dř0fłjs ;^aVof / ef/, ;eřtf tyf On\$6błgs ljGof; kQf nufpg nufpgřf] \ . lzłfsn]kQf nufpg ;dx sfořř]cgłdg u/L ;xofř ugřf] \ . ljBfylč]kQf nufPsf tYoxč afřč nřvg nufpgřf] \ .

- kinfdsf kplv wfp_xsf]gfd / c0f' ; q n]vPsf rf6{b]vpgxf] \. o; sf af/uf r rf{ ub{x]f6f06 kplv wfp ePsf]hfgsf/l lbgxf] \.
 - x]f6f06 wfpaf6 kinfd k_pvg ul/g]klj]of flow chart af6 b]vP/ j0f_g ugxf] \. d_gfnhl{(Metallurgy) sf]kl/ro lbgxf] \. wfp_x (ores) af6 wft' lgsfng]klj]ofnf0{ d_gfnhl{elg5 .
 - kinfdsf 6j]f b]vP/ o; sf u0fx_z atfpg nufpgxf] \ / kinfdsf] e]ts u0fx_z n]vPsf] rf6{b]vP/ atfpgxf] \.
 - kinfdsf /f; folgs u0fx_z ; dls/0faf/]k_pg_g/ ub]af_g n]v j0f_g ugxf] \.
 - kinfddf s:tf]cj:yfdf lvof nf05 < lvofsf]/f; folgs gfd s]xf] < k_pg ugxf] \. af_g l_gd_gnlvt /f; folgs ; dls/0f b]vpgxf] \. -3/dfklg kplu u/] x_g{nufpgxf] \.
- $$4\text{Fe} + 3\text{O}_2 \qquad 2\text{Fe}_2\text{O}_3$$
- kinfd s_psf nflu kplu ul/05 < ; u]a; sf b0{hgf l]Bfyl_z alr 5nk_n u/] n]vg nufpgxf] \. l]Bfyl_znf0{; n]v af_g kinfdsf]pkof]utfsf] ; 't_l agfpgxf] \.
 - l]Bfyl_znf0{ kf7bk'tssf] k_h g# !#! u/] u/] x]l l; Sgxf] \ eGg] l]jofsnfk gDa/ ! u/fpgxf] \.

-a_d\of^sg

- != kinfdsf tlg kplv wfp_s]gfd / ; q s_p]xb\<
- @= kinfdsf e]ts u0fx_z s_p]xb\<
- #= kinfddf lvof s; /l nf05 <
- \$= kinfdn]lk_ssf / uf9f tftf] ; N_gol/s cDn; u] ug[k]t]j]of /f; folgs ; dls/0faf6 b]vpgxf] \.
- %= kinfdsf sg}rf/ pkof]utf atfpgxf] \.

cfndf]god (Aluminium)

- cfndf]god 6j]f b]vP/ lrgg nufpgxf] \. ; dXdf lkl/of]8s tflnsf c\oog ug{ nufP/ cfndf]godsf] ; ^s] , kf/df0f]js ; ^vof / ef/ ; eHotf tyf On\$6_gs l]Gof; kQf nufpg nufpgxf] \. lzlfsn] ; dX sfo\$]cgldg u/l kQf nufpg ; xof] ugxf] \. l]Bfyl_h]kQf nufPsf tYox_z af_g n]vg nufpgxf] \.

- cfndf]godsf kplv wfp_xsf]gfd / c0f' ;đ n]vPsf rf6{b]vpgxf] \. aS;f06 kplv wfp ePsf]hfgsf/L lbgxf] \.
- aS;f06 wfpaf6 cfndf]god kplvg ul/g]klj]lofsf] flow chart b]vpgxf] V l]Bfyl_xnf0{ j0f6 ug{nufpgxf] \.
- cfndf]god / kinfdsf]/^a, l]lzi6 3gTj, kUng]/ pDng]tfkj]d tyf tfk / l]Bt'sf] ;'rfnssf cwf/df thgf u/] hfgsf/L lbgxf] \.
- cfndf]godsf /f;folgs u0fx_x ;dls/0faf/] kZgfD/ ub]afBdf n]v] j0f6 ugxf] \.
- cfndf]godsf pkof]utf cwoog ug{nufpgxf] \. l]Bfyl_xnf0{kZgfD/ ub]afBdf ;'l agfpgxf] \.

dNof^asg

- != cfndf]godsf tlg kplv wfp_s]gfd / ;đ s_s]xg\<
- @= cfndf]godsf e]ts u0fx_x s_s]xg\<
- #= cfndf]god / x]h]hg k]tlj]lof ubf{s]a65 <
- \$= cfndf]godn] lkt'ssf / uf9f tftf] ;Ncol/s cDn;ũ ug]k]tlj]lof /f;folgs ;dls/0faf6 b]vpgxf] \.
- %= cfndf]godsf sg}rf/ pkof]utf atfpgxf] \.

tfd (Copper)

- ;dXdf lkl/of]8s tflnsf cwoog ug{nufP/ tfdfs] ;^as], kf/df0fl]s ;^avof / ef/, ;eHotf tyf On\$6]gs l]Gof; kQf nufpg nufpgxf] \. lzIfsn]kQf nufpg ;dX sfo_s]cgludg u/L ;xof] ugxf] \. l]Bfyl]kQf nufPsf tYox_x afBdf n]v nufpgxf] \.
- tfdf kf0g]cj:yfsf] hfgsf/L lbgxf] \. tfdfs kplv wfp_xsf]gfd / c0f' ;đ n]vPsf rf6{b]vpgxf] \. sk/ kf0/f06 kplv wfp ePsf]hfgsf/L lbgxf] \.
- sk/ kf0/f06 wfpaf6 tfdf kplvg ul/g]klj]lof flow chart af6 b]vP/ j0f6 ugxf] \.
- tfdfs]/^a, l]lzi6 3gTj, kUng]/ pDng]tfkj]d tyf tfk / l]Bt'sf] kl]fxaf/] atfpgxf] \. Cu, Ag, / Au nf0{Sj f0gf0h d6n (coinage metal) elg65 egl hfgsf/L lbgxf] \.

■ tdfdsf]/f;folgs u0fx¿ ;dls/0faf/]kZgfQ/ ubIafBdf nV/ j0fg ugxf] \.

■ IjBfyl¿nf0{kZgfQ/ ubItfdfsf]pkof]utfsf];'rl agfpgxf] \.

dNof^asg

!= tdfdsf kplv wfpsf]gfd / ;q s]xb\<

@= tdfdsf kUng]/ pDng]tfkj]d sltslt xf]<

tdfdinf0{ ttfpbf klxn] /ftf] / kl5 snf] x65 . o;sf] /f;folgs k[tlij]ofnf0{
;dls/0fdf b]vpgxf] \.

rffl / ;q (Silver and Gold)

■ kf/df0f]js ;^aVof -\$& / kf/df0f]js ;^aVof_ &(ePsf] tEjsf] gfd, ;^as],
kf/df0f]js ef/, ;^aHotf tyf On\$6fgs IjGof; lkl/of]8s tflnsf x]] kQf nufpg
nufpgxf] \. Izlfsn]kQf nufpg ;dX sfo\$]cgludg u/L ;xof]u ugxf] \. IjBfyl]k
kQf nufPsf tYox¿ afBdf nVg nufpgxf] \.

■ rffl / ;q kf0g]cj:yfsf]hfgsf/L lbgxf] \. rfflsf kplv wfpX¿sf]gfd / c0f" ;q
n]vPsf rf6{b]vpgxf] \t/ ;q gbln]aufPsf]anf6]df6f]/ r66fgsf]dfendf kf0g]
hfgsf/L lbgxf] \. rfflsf kplv wfp ch76f06 ePsf]atf0lbgxf] \.

■ ch76f06 wfpaf6 rffl kZf]vg ul/g] / ;goSt anf6]df6faf6 ;q kZf]vg ul/g]
klj]of flow chart af6 b]vfp/ j0fg ugxf] \.

■ rffl / ;gsf]/^a, IjIzi6 3gTj, kUng]/ pDng]tfkj]d tyf tfk / IjBt'sf]k]fxaf]/
thgfTds rf6{k|tt u/] eflts u0fx¿ atfpgxf] \.

■ rffl / ;gsf /f;folgs u0fx¿ IdNbf]f thgfTds tl/sfaf6 b]vpgxf] \ h:t}M
xh]hg;ü k[tlij]of, cDn;ü k[tlij]of . cGo 566f566]/f;folgs ;dls/0faf/]kZgfQ/
ubIafBdf nV/ j0fg ugxf] \.

■ IjBfyl¿nf0{kZgfQ/ ubI rffl / ;gsf]pkof]utfsf];'rl agfpgxf] \.

dNof^asg

!= rfflsf]kf/df0f]js ;^aVof slt xf]<

@= rfflsf]kplv wfpsf]gfd / ;q s]xb\<

;gsf]kUng]/ pDng]tfkj]d slt slt xf]<

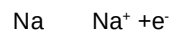
\$= rfbLn]uf9f gf0l6s cDn;ü /f;folgs kltljlof u/] sß]aG5 <

%= cSjf/]hof egßf]s]xf]<

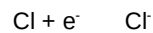
► b]gs hLjgdf wftxçsf]:yfg, wft' / cwftsf ;fdfö u0fxç

➔ cf;gs / PlG6df] h:tf * tEjxçn]wft' / cwft'h:tf]Jo]xf/ ub5g\eg] ltgnf0{cwft' (metalloids) elgG5 .

➔ wftxçn]l/8bl;^a Ph]6 (reducing agent) sf]sfd ub5, h:t}||



t/ cwftxçn]clS;8f0lhg Ph]6sf]sfd ub5, h:t}||



➔ wftxçn]Pnf6k b]fpb]g\t/ cwftxçn]b]fp5g\.

➔ wftxçsf]xf08f08\ :yfloTj t/ cwftxçsf]xf08f08\ :yfloTj xG5, h:t}||
NaH cl:y/ xG5 eg]NH₃l:y/ xG5 .

➔ wftsf k/df0fxç dßfins af]8af6 hf]8Psf xG5g\t/ cwftsf k/df0fxç sf]fn]6 af]8af6 hf]8Psf xG5g\.

➔ s]L dxEjk0f{wftxç .

➔ dßfnhl{ (Metallurgy) : wfp xç (ores) af6 wft' lgsfng] k]j]lofnf0{ dßfnhl{ elgG5 .

➔ wfp (ore) : wfp Pp6f vlgh x]h;af6 wftxçsf]kßf]vg ul/G5 .

➔ l]wft' (gangue) : wfpdf ldl;Psf sd;n kbfxççnf0{l]wft' elgG5 .

➔ PNjfo{ (alloys) : b0{jf b0E6bf a9l wftxç jf cwftxçsf];dfg ld>0fnf0{PNjfo{ elgG5, h:t}|| lkQn -h:tf + tfdf_

► kñfd

➔ kñfdfs wfp xç || cf0/g kf0/f06\ (iron pyrites) FeS, lndf]f06 (limonite) Fe₂O₃, 2H₂O .

kñfdfs]kßf/

➔ 9n]f kñfd (cast iron) || of]kñfd s8f xG5 . o;df @=% b]v \$=% kltzt sfaG xG5 . o;af6 (^ b]v (*=* kltzt kñfd kft ug{;lsG5 . o; kñfdfs]kUng] tfk]jd !@))°C xG5 .

- /6knnfd (wrought iron) || of]knnfd g/d xG5 . o;df !=@ b]v @=% kltzt sfaG xG5 . o;af6 (*=% b]v (*=* kltzt knnf kft ug{;lsG5 . o;sf]kUng] tfkj|d !%)) °C xG5 .
- l:6n (steel) || o;df sfaGsf]dfqf)=% kltztb]v !=^ kltzt xG5 . o;af6 (*=% b]v ((=% kltzt knnf kft ug{;lsG5 . o;sf]kUng]tfkj|d !#)) °C ;Dd xG5 .

■ Pnldlnod

- Pnldlnodsf wfpXZ || j|fc]hf06 (cryolite) Na_3AlF_6 , Pnd:6fG (alumstone) $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3$.
- Pnldlgod Pp6f xnSf tEj xf] . o;n]cZ wftXZ|;t ;lddInt eO{PNjf0 (alloy) agfp5 .
- /f;folgs u0f

$$4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$$

$$2\text{Al} + 6\text{H}_2\text{O} \rightarrow 2\text{Al}(\text{OH})_3 + 3\text{H}_2$$

$$2\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe} \text{ (reducing)}$$
- lkn6s/Lsf] /f;folgs gfd || $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$

■ tfdf

- Cu, Ag / Au nf0{Sj f0gf0h d6n (coinage metal) elgG5 lsgls loglxZ |;Ssf agfpg kpft] ul/G5 .
- tfdfsf wfpXZ || Sok/f06 (cuprite) Cu_2O , dfnfrf06 (malachite) $\text{CuCO}_3 \cdot \text{Cu}(\text{OH})_2$, rfnst]kf0/f06 (Chalcopyrite) CuFeS_2 , sk/UNofG; (Copper glance) Cu_2S .
- lAn:6/ sk/df b0{kltzt hlt Au, Ag, Ni, Zn / Pb h:tf j:txZ ldl;Psf xG5g\.
- tfdf / clS;hgn]sl/a !!)) °C tfkj|ddf kltlj|of ub5 .
- tfdfsf]l/l8ol;^a u0f

$$\text{Fe}_2(\text{SO}_4)_3 + \text{Cu} \rightarrow 2\text{FeSO}_4 + \text{CuSO}_4$$

► rfbL

- ➔ rfbLsf wfp_x ǂ ?lal;Ne/ (ruby silver) $2\text{Ag}_2\text{S} \cdot \text{Sb}_2\text{S}_3$, kǂ;6f06 (pronstite) Ag_3AsS_3 , l;Ne/sk/ Unfǂ; (Silver copper glance) $\text{Ag}_2\text{S} \cdot \text{Cu}_2\text{S}$ xhg{l;Ne/ AgCl.
- ➔ rfbL, kfgl / cNsfnl;ǂ kǂtljǂof ubǂ .
- ➔ rfbL / xf08ǂhg;Nkǂf08alr /f;folgs kǂtljǂof e0{rfbLsf};Nkǂf08 aǂ5 .
- ➔ $2\text{Ag} + \text{H}_2\text{S} \rightarrow \text{Ag}_2\text{S} + \text{H}_2$
- ➔ sfǂf08n rfbL (colloidal silver) cfǂvǂsfǂpkrf/ (ophthalmic treatment) sf nflu kǂfǂ ul/ǂ5 .

► ;ǂ

- ➔ kǂ[tǂdf ;ǂ z4 cǂj:yǂdf kǂP klǂg o;df Kǂnǂ6od, kǂnfd / lǂj:dy h:tf cz4 lǂl;Psf xǂ5g\.
- ➔ ;ǂsf wfp_x ǂ Sǂjǂfhǂf0g (quartz vein)
- ➔ ;ǂ g/d xǂǂsf ;fyǂofǂcNsfnl;ǂ kǂtljǂof xǂǂ .
- ➔ cf0ǂ8s Pl;8 / ;ǂǂǂ8s Pl;8;ǂ ;ǂnǂcnucnu kǂtljǂof ubǂ5 .
- ➔ @@ Sof/ǂ ;ǂ eǂǂǂnǂ;ǂǂdf rfbL jǂ fǂdf lǂl;Psfǂeǂǂaleǂǂ5 .
- ➔ ;ǂǂdf rfbL jǂ fǂdf lǂ;fpǂǂnǂ;ǂ s8f xǂ5 .

Psf0 !@ **xf08\$fağ / o;sf oflusxç** **(Hydrocarbon and its Compounds)**

cgdfłgt 306l M #

-s_ljłzi6 p2łoxç

o; Psf0sf]cGŁdf łjBfylç sł ;fdłCo łsl;dsf xf08\$fağsf çkxç tyf łtgaf6 agłsf oflusxç łdył, kłł, A06ł, cłsfłn, łłn;łłh, 0y/ / łtgłsf pkołłxç j0fł ugł;łfd xğ]5gł.

-v_kł/ro

o; Psf0df sł ;fdłCo łsl;dsf xf08\$fağsf çkxç tyf łtgaf6 agłsf oflusxç cłfłłjs ;ł, sG8ł:8 ;ł / ;łrgłłds ;łsf]hfgsf/ł łbg vłłPsf]5 . xf08\$fağsf łsl;dxç, xf08\$fağnf0{hgfpg] ;ł, IUPAC Name sf af/łł r rf{ul/Psf]5 . ;fy} łtgłxçsf]kłkŁtf / pkołłutfaf/]kłg cłłoog ul/g]5 .

-u_złłfs ;fdul

- łłn;łłh, rf6łç
- xf08\$fağ (Hydrocarbon) .

-3_lzłłf0f ł;sf0 łjłłfsnfk

- sfagłsf]kł/df0łłjs ;aVof / ef/, 0n\$6łłs łjCof;, kłaVłł/s ofłusaf/]kłg u/ł slff (df cłłoog u/łsf]kğ/fjnfłg u/fpgxf]ł.
- łjBfylçnf0{kłaVłł/s ofłussf sł pbfx/0f łbg nufpgxf]ł. łł pbfx/0faf6 xf08\$fağsf]kł/ro łbgxf]ł.
- łdył, 0ył, kłł, 0lyg, 0yf0gsl];łrgłłds ;ł rf6ł kłłt ugxf]ł. ;łrgłłds ;łsf cłwf/df s]kł/s 5 < kQf nufpg nufpgxf]ł. 5nkłnaf6 sfagłsfagłr ePsf]ał8sf cłwf/df ;łłt / c;łłt xf08\$fağxçsf]kł/ro łbgxf]ł. ;łłt / ;łłt xf08\$fağxçsf]gfd (Alkane, Alkene, Alkyne) / cłfłłjs ;ł nłg] łł/słsf] hfgsf/ł łbgxf]ł. łjBfylçnf0{cłfłłjs ;ł nłg]cEof; u/fpgxf]ł.

-a_dNof^sg

!= xf08\$faç s]nf0{elgç5 <

@= ; t{t xf08\$faç / c; t{t xf08\$faç s; /L 56bç0ç5 <

#= ldyç, Oyç, k{kç, Olyç, Oyç0gsf]; ;rgfTds ;ç nVgxf];\.

\$= Aklane, Alkene / Alkyne sf];ç sç]xç\<

ldyç, Oyç, k{kç, A06ç (Methane, Ethane, Propane, Butane)

➤ ; t{t xf08\$façnf0{hgfpç];ç CnH_{2n+2} df n sf]dfç !, @, # / \$ /fv] çf0f]js ;ç nVg nufpgxf];\. Itçlxçsf]gfd ldyç, Oyç, k{kç / A06ç xç]egl atfpçgxf];\.

➤ ldyç, Oyç, k{kçsf]sç8]8 ;ç / ; ;rgfTds ;ç nVg nufpgxf];\.

➤ ldyç, Oyç, k{kçsf]kl/ro / pçkf]utfnf0{tnsf] rf6çdf nV] k|tt ugçf];\M

xf08\$faç	kl/ro	pçkf]utf
ldyç		
Oyç		
k{kç		

➤ A06çsf]kl/ro lbçgxf];\ b0{çfo;çf]xçsf]sç8]8 ;ç / ; ;rgfTds ;çdf leççtf bç]fpçgxf];\. Isomers / Isomerism sf]kl/ro lbçgxf];\.

➤ A06çsf]pçkf]utf atfpçgxf];\.

dNof^sg

!= ldyç, Oyç, k{kç, A06ç sxf"kf0ç5 <

@= ldyç, Oyç, k{kç, A06çsf]pçkf]utf sç]5ç\<

#= n-butane / iso-butane sf]sç8]:8 / ; ;rgfTds ;ç nVgxf];\.

cNsf]çn, lUn;çfç, Oy/ (Alcohol, Glycerol, Ether)

➤ ; ;rgfTds ;çaf6 cNsf]çnsf]kl/ro lbçgxf];\. dçççf0l8ç cNsf]çn, 8f0xf0l8ç cNsf]çn, 6ççxf0l8ç cNsf]çnsf]hçgsf]/L lbçgxf];\.

- b]gs hl]gdf kpf]u xg]cnsf]nsf af/]f hfgsf/L lbgxf] \.
- ldyf0n / 0yf0n cnsf]nsf]pkof]utfaf/] rrf{ugxf] \.
- hf8f]ofddf 5fnf kl6gaf6 arfpg kpf]u ul/g]kbfy{x}sf]gfd eGg nufpgxf] \.
- tldWo]lUn;]fh Ps ePsf]hfgsf/L lbgxf] \.
- lUn;]fh b]fP/ / kfgldf 3fh] e]ts u0fsf ;DaGwdf rRff{ugxf] \.
- lUn;]fh]sf] ;ArgfTds ;q afBdf n]gxf] \. of]sg ;t{t xf08f]sfagaf6 ag]f]/s:tf]lsl;dsf]cnsf]n xf] < 5nkn u/fpgxf] \.
- lUn;]fh]sf]pkof]utf atfpgxf] \.
- 8f0ldyf0n 0y/ / 8f00yf0n 0y/sf]cf0f]js ;q, sG8]:8 ;q / ;ArgfTds ;q rf6df b]fpgxf] \. sG8]:8 ;q / ;ArgfTds ;qsf cfwf/df 0y/ lrgg]cfwf/ s]xf] < ;f]gxf] \. kf^ufl/s of]ussf]c0fdf - o - ;dx /x]sf]hf0{0y/ elgG5 egl atfpgxf] \.
- 0y/sf]kl/ro lbgxf] \.
- 0y/sf]pkof]utf atfpgxf] \.

dNof^sg

!= kf^ufl/s of]usdf sgsg /]8sn ePdf cnsf]n, lUn;]fh, 0y/ elgG5 .

@= ;fwf/Of b]gs hl]gdf kpf]u ul/g]cnsf]nsf] ;ArgfTds ;q s]xf] <

cnsf]n / lUn;]fhdf s]kl/s 5 < cf0f]js ;Argfsf]b[6sf]fn]atfpgxf] \.

-r_lzlfnsnf0{yk hfgsf/L

- ;fwf/Of j:tx}df sfag]sf]pkl:ylt
 - ;^s] c, kf/df0f]js ef/ !@, kf/df0f]js ;^vof ^, klUng]tfkj]d #%%) c / plDng]tfkj]d \$*#) c xG5 .
 - olb sg]Pp6f tE]sf]b0{jf b0Egbf a9L cj:yfx} 5g\eg]cfGgf]cj:yf kl/]jtG gu/L l]leGg e]ts u0f b]fpg]kl]lofnf0{Pnf6k elgG5 .

sfag]sf Pnf6kks cj:yfx}

- ljj:6nf0g (crystalline) : 8f0dG8 / u]kf06
- Pd/knf] (amorphous) : lrgL, sf]nf

- /kmlh/6/ knfG6df tfkjld Gog ug{Oy}sf]kpf] ul/G5 .
- Oy}sf]cf0f]js ef/ #) xG5 .
- Oy} / xfijsf]ld>0fdf cfuf]leNsf k7fof]eg]eofgs 2kn]k8lsG5 .

cNsf]xn

- cNsf]xnsf] ; q $C_nH_{2n+1}OH$
- lo:6sf]sf] pTkGg xg]OG6h OGhf0dn]lrglnf0{Unsf]h / k]S6f]hnf0{cNsf]xndf kl/0ft ub5 .
- lo:6sf]sf]faf6 pTkGg xg]hf0d] OGhf0dn]Unsf]h / k]S6f]hnf0{cNsf]xndf kl/0ft u5{.
- ;Td lhjfofh]ubf{hl6n j:thf0{;/n j:tdf kl/0ft ug[klj]lofnf0{k/d]6}g
(fermentation) elG5 . of]lj]lofdf CO_2 Uof; pTkGg xG5 .
- Unsf]h, kfgl / lo:6sf]ld>0fnf0{@%-#) c tfkjlddf #- \$ lbg;Dd /fVof]eg]Oyf0n cNsf]xn aG5 .

Oy/

- cNsf]xna6 Oy/ agfpg]ePsf]n]o; df ePsf]cNsf]xnsf]dfqfnf0{;f]8od xf08\$;f08 / ;f]8od Snf]f08sf]dbtaf6 56vfpG ;lsG5 .
- kpf]uzfnfdf Oy/ tof/ kfg{a/fa/ cfotgsf]Oyf0n cNsf]xn /; s8f ;NÇol/s Pl;8sf]cfjZostf kb5 .

lUn;]fh

- lUn;]fhnf0{lUnl;l/g klG elG5 .
- ;fab pTkfbg ubf{af0 k]BS6 (by product) sf]2kdf lUn;]fh k]kt ug{;lsG5 .
- s8f gf0l6s Pl;8 / s8f ;NÇol/s Pl;8sf]ld>0fdf dl;gf]wf/faf6 lUn;]fh v;fnbf OG6lUn;l/g aG5 . of]Ps ksf/sf]lj:k]f6s kbty{xf}.

Psf0 !# **bljgs hljgdf kpfu xg]j:tx** **(Materials Used in Daily Life)**

cgdfigt 366L M # 366L

-s_ ljlzi6 p2]ox

o; Psf0sf]cGtodf ljBfylx IgDglnlvt sfox ug{; lfd xg]5g\

!= l;d]6, sffr, kmf0a/, l;/fldS;; Knfl:6s, ;fab, l86/h]6 / sl6gfzs cfwl.sf
 agfj6 / bljgs hljgdf o;sf kpfuxx]af/]jOf6 ug{.

@= gf06]ng, kmf]kmf]; / kpf]odoSt dnx]sf]dx]j / pkof]utf jOf6 ug{.

#= cfGgf];]fk]f]df kpfu ul/g]dnx]af/]atfpg .

\$= s[lfdf sDkf]6 dnsf]eldsf JofVof ug{.

%= slxP/ hfg]/ ghfg]kxf]d]hfsf]leGtf 56bfpq .

^= /f;folgs kplf0fsf sf/Of / /f]syfdfs pkfox] atfpg .

&= ljleGg sl6gfzs, l;Gyl6s bfgf, ;/;kmf0 ug]cfwL, /^a / cGo /f;folgs j:tx]af6
 xg]kplf0fsf]jOf6 ug{.

-v_ kl/ro

o; Psf0df bljgs hljgdf kpfu xg]/f;folgs kbfx] l;d]6, sffr, kmf0a/, l;/fldS;;
 Knfl:6s, sl6gfzs cfwl.sf]agfj6, uOf tyf pkof]utfaf/]r rf{ul/Psf]5 . h]js dn
 / /f;folgs dnsf af/]df hfgsf/L lb0Psf]5 . Itglx]sf]kpfuaf6 xg]kmf0bf / ;dlrt
 tl/sfaf6 kpfu ug]af/]pNny ul/Psf]5 . sl6gfzs cfwl.sf]kl/ro / kpfusf af/]df
 pNny ul/Psf]5 . kmf]d]hfsf]Jo:jyikg ug];lk ljsf; u/fpg v]hPsf]5 . ljZjdf
 lrGtfsf]kdf cfPsf]/f;folgs kplf0fsf sf/Of / /f]syfdfs pkfox]sf]r rf{ul/Psf]
 5 .

-u_ z]hfs ;fdul

l;d]6, s^alj]6, ;]fldS;sf ef8f, ljleGg lsl;dsf sffr sf 6]lfx], skf;, h6, pig, /
]d, gf0ng, kmf]n:6/, sl6gfzs cfwl.x], ol/of, Pdf]god ;Nkm]6, kpf]od Snf]f08,
 ;fab, l86/h]6 .

-3_ Izlfof l;sf0 ljjofsnfk

l;d06 / ;jfldS; (Cement and Ceramics)

- ljbfylx;nf0{xfdln]b]gs kpfu ug[/f;folgs kbfx; s]xg\< kZg ugxf] \ / afBdf ;'tL agfpgxf] \. tl kbfx;dwo]l;d06, sffr, knf0a/, l;/fldS;, knfl:6s, ;fag, l86/h06 / sl6gfzs cfwl kpv ePsf]lgisif]lgsfNgxf] \.
- 3/, ejg, kh cflb agfpg kpfu ul/g]kfp8/h:tf]kbfx;f]gfd s]xf]< o;sf af/df s]yxf 5 < kZg ugxf] \. ljbfylx;nf0 cfpf]hjkndf 5nkn u/fpb}l;d06sf] pko]ut atfpgxf] \. sdbf/n]uf/f / s^lj06 s;/L agfp5g\atfpgxf] \.
- l;d06 pTkfbg ug[tl/sfnf0{flow chart df b]yf0{ljbfylx;nf0{JofVof ug{nufpgxf] \. o;sf]agfj6sf]hfgsf/L lbgxf] \.
- gkndf /x]f]l;d06 pB]usf]hfgsf/L ;^sng ug{nufpgxf] \.
- ljbfylx;nf0{cfCgf]lhNndf l;d06 pB]u :yfgf ug{ ;ls5÷;lsb} 5nkn u/fpgxf] \.
- ;jfldS;sf]ef8f b]fpgxf] \. o;sf]u0f / s] agfpg kpfu ul/05 < 5nkn u/fpgxf] \.
- ;jfldS;sf]ef8f agfpg]tl/sf atfpgxf] \. o;sf]agfj6sf]hfgsf/L lbgxf] \. sfc]ngsf]kl/ro lbgxf] \.

sffr / /]f (Glass and Fibre)

- sffr sf]kl/ro lbgxf] \.
- Sjh{sffr / jf6/ sffr sf]thgf u/L atfpgxf] \. -h:t}ll agfpg]tl/sf, u0f, kpfu cflb_
- ;fwf/0f sffr pTkfbg ug[tl/sf / kpfuaf/]JofVof ugxf] \.
- rf6af6 s8f sffr, af]f]l;lns} sffr / n} ljj:6n sffr s;/L a05 < loglx; s]f nflu kpfu ul/05 < atfpgxf] \.
- ljeGg /^sf sffr agfpg sbgs wftsf cS;f08x; kpfu ul/05 < tflnsdf b]fpgxf] \.
- /]fsf]kl/ro lbgxf] \.

- skf; , h6, p1g, /zd cflb kþz6 ugxf] V 5nk1n u/f0{kfs[ts /] f kkttf / kþf] atfpgxf] \.
- s[qd /] fsf kþf/x6 tof/ ug]tl/sf / kþf]sf] JofVof ugxf] \.

Knfl:6s, ;fab / l86/h]6x6 (Plastics, Soap and Detergents)

- Knfl:6ssf]kl/ro lbgxf] \.
- ydf]nfl:6s / ydf]]6^a Knfl:6ssf leGgtf rf6df b]fpgxf] \.
- Knfl:6ssf u0fx6 / pko]utfaf/]5nk1n u/f0{; 'rl agfpgxf] \.
- ;fab sþf6 s;/l agf0G5, atfpgxf] \. kf7ok'tssf] kþ g= ! \$ ^ sf]lj]ofsnfk !)=! u/fpgxf] \.
- l86/h]6sf]kl/ro lbgxf] \.

sl6gfzs cþfwl (Insecticides)

- 3/ tyf v]af/ldf kf0g]xflgsf/s ls/fx6 sþ]xb\gfd eGg nufpgxf] \.
- tl ls/fx6 dfgsf nflu kþf] ul/g]cþfwl sf]gfd eGg nufpgxf] \.
- tl cþfwlx6sf lsl;dsf]kl/ro lbgxf] \. -sfaf]gs / csfaf]gs_
- sl6gfzs cþfwlx6 s;/l kþf] ug]/ o;n]kfg{;Sg]c;/ s;/l sd ug{;lsG5 < 5nk1n u/fpgxf] \.
- sl6gfzs cþfwlx6sf]knf0bf / aknf0bfaf/]5nk1n u/fpgxf] \.

dn (Fertilizers)

- v]af/ldf dn lsg kþf] ul/G5 < s:tf:s:tf dnx6 kþf] ul/G5 < 5nk1n u/fpgxf] \.
- h]js tyf /f;folgs dnx6sf]kl/ro pbfx/0f;lxk k]6bfpfgxf] \.
- la?jfx6nf0{gf06þg, knf]k1/; / kþf]od tEjx6sf]cfjZostfaf/]atfpgxf] \.
- gf06þg, knf]k1/; / kþf]od tEjoSt /f;folgs dnx6sf]gfd / c0f' ;þ rf6df b]fP/ atfpgxf] \.
- ljBfnosf]xftfdf h]js dn agfpg nufpgxf] \.

/f;folgs kþlf0f (Chemical Pollution)

- ljBfylx6nf0{cfGgf]3/df xg]knf]nf0{slxg]/ gslxg] juls] ug{nufpgxf] \.

- b0{kpf/sf kpf/sf]plr t Joj:yfkg s;/L ug{;lsG5 < 5nkın u/fpgxf] \.
- /f;folgs kpf0sf]kl/efiff lbgxf] \.
- /f;folgs kpf0f xg5f sf/0fx;sf af/0f ;dXdf 5nkın u/fpgxf] \.
- ;dXdf /f;folgs kpf0sf]/f;sydaf/]5nkın u/fpgxf] \.

-a_dNof^asg

!= ;7fldS; ef8fsf]kpfu a9g5f]sf/0f s]xf]f <

@= l;d06nf0{;7lft s;/L /fvG ;lsG5 <

#= /;f s]sfdsf nflu kpfu ul/G5 <

\$= sgsg la?jfaf6 /;f k/t xG5 <

%= kl/efiff lbgxf] \||

-s_ /;f -v_ sfc]ng

^= ;fag5f]/f;folgs gfd s]xf]<

&= l86/h06 eg5f]s]xf]<

*= l86/h06 s]sfdsf nflu kpfu ul/G5 <

(= k]nd/fh]g eg5f]s]xf]<

!)= ydf]nfl:6s / ydf]06^a knfl:6sdf s]leGgtf 5 <

!!= knfl:6s s]sfdsf nflu kpfu ul/G5 <

!@= k]:6;f08 eg5f]s]xf]<

!#= 8l=8l=6l= / al=Pr\;l= sf]k/f ;k s]xf]<

!\$= sl6gfzfs cf]w]sf]pkof]utfx; s5]xg\.

!%= h]js dn eg5f]s]xf]<

!^= la?jfsf nflu gf06h]gsf]cfjZostf lsg kb5 <

!&= Pg\ kl= s] dn eg5f]s]xf]<

!*= cfjZostfeGbf a9l /f;folgs dn kpfu ubf{xg]akf0bfx; s5]xg]<

!(= /f;folgs kpf0f eg5f]s]xf]<

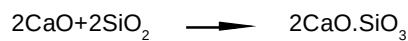
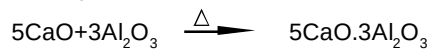
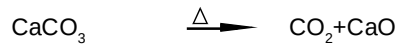
@)= /f;folgs kpf0sf]k/tsh c;/ s5]xg\.

-r_lzlfsnf0{yk hfgsf/L

/f;folgs kbfi{sf]kl/ro tyf l;d]6

➔ l;d]6 lSn^as/ SoflN;od l;lns^b / SoflN;od Pnldg^bsf]hl6n ld>0f xf].

➔ k|tlj|pf



➔ l;d]6 afn'jf, /f^b / kfgl ld;fP/ ag^bsf]ld>0fnf0{s^alj]6 elg⁵.

➔ l;d]6 agfpgsf nflu Ps ltxf0 Sn]/ b0{ltxf0 nf0d:6^bnf0{kfgldf ldnf0{n^bf] agf0⁵.

sf'r

➔ j]lfgsx²n] sf'rnf0{Pp6f cToGt lr;f] kbfi{(super cooled liquid) sf ²kdf j 0f⁵ u/3f 5g\ . sf'r x^bf{s8f lsl;dsf]b]VP tfklg sf'rdf /x^bf c0fx² cToGt dGb ultdf t/n kbfi{e^balu/x^bf x⁵g\.

➔ sf'r Pp6f Pdk^af, kf/bz⁵ jf ckf/bz⁵ wftsf]l;lns^bsf]ld>0f xf].

➔ sf'r pTkfbg ug{lgDglnlvt j:tx² k^bf] ul/⁵ ||

- l;lnsg, k^bf; , ;f^b, ln8 / SoflN;od

- ;⁵Unf; sd tfkj|ddf kUn⁵ / of] ;:tf]x⁵.

- /^aul⁵ sf'r² ;Gb/ j:t' tyf cfsif⁵ 6fon agfpg k^bf] ul/⁵.

/]f skf; -kf0a/_ / ;]fldS;

➔ skf;nf0{0yfof]gs Pl;8;ú ldnfP/ /fv^b s[qd /]f (rayon) a⁵. /^bg kQf nufPsf]s²l ;dokl5 Ps hgf cd]/sl /;fogzf:ql 8An^aP^a Sof/yf] ^b]gf0ng kQf nufP . hg alnof]lsl;dsf]x⁵.

➔ pig / /]d hgfj/x²af6 kf0g]/]fx² xg\ . loglx² tfksf]s'r^ans xgfn]l^bp^b] k^bf]fs agfpg k^bf] ul/⁵.

➔ z4 ;]f]df6^bnf0{sfc^bng elg⁵. o;nf0{/fd^b lsl;dsf ef⁸fs8f tyf sk, kn^b agfpg k^bf] ul/⁵.

knfl:6s

- dflg;n]agfPsf]s[qd kf]nd/nf0{Knfl:6s elgG5 . kf]nd/ b0{kpf/sf xG5g\
- s[qd kf]nd/ M h:t}M Knfl:6s
- k[s[ts kf]nd/ M h:t}M kf]6g, /a/, :6fr{
- Knfl:6s pTkfbg ug{cfjZos kg]dfof/ kpf]nod kbv{h:t}vlgh t]haf6 lgsflnG5 .
To;af6 pTkGg xg]cnsb (alkene) nf0{;fwf/0ftof :6f//f0g (styrene) elgG5 .

ydflknfl:6s

- kf]nlyg M of]0lyng sRrf kbv{af6 pTkfbg ul/G5 . o;af6 Knfl:6ssf]tfp tyf
ef8fs8f agfpg kpf]u ul/G5 .
- kf]nef0gf0n Snf]f08 -lk-le-;L M ef0/f0n Snf]f08 dgf]nf0{kf]nd/f0h;g u/
of]tof/ ul/G5 . of]lahhlsf]tf/sf]crfns j:t' agfpg kpf]u ul/G5 .
- a]hf06 M of]sfa]ns Pl;8 / kndf]ngaf6 agfPsf]xG5 . o;sf]/^a uf9f / v]f]
xg]sf ;fy}s8f / lk6lk6 efl'rg]vfnsf]xG5 .

;fag / l86/h]6

- af]f]jf t]nf0{lff/;t cf;jg ubf{;fag / lunl;/f]n aG5 . o;kpf/sf]P:6/sf]
hns0fnf0{;fag]ls/of elgG5 . ;fagsf]c0fdf nfd]xf08]sfag efu / ;f]8od jf
kf]f]od nj0fsf]sfa]h]6 (carboxylate) ;dX xG5 . xf08]sfag efunf0{kR5/ /
sfa]h]6nf0{lz/ dfGg ;lsG5 . ;fag klxfn]l86/h]6 xf]. xfn l86/h]6df s]L
;uGwx; /flvPsf xG5g\.
- l86/h]6sf c0fx; b0{efuaf6 ag]sf xG5g\ . Itglx;df 6fpsf]/ kR5/ xG5 . kR5/
xf08]k]las xf]. o;nf0{kfglsf c0fx;n]cflslf ub]g\ . 6fpsf]xf08]k]lins xf].
- xf08]k]las M kfgl 3]ff ug] (water hating)
- xf08]k]lins M kfgl dg k/fpg] (water loving)

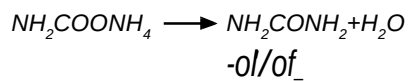
sl6gfzs c]fwl

- bf]f]ljZjo4eGbf cufl8 ;f0gf08 / lgsf]6g h:t/;/fogx; sl6gfzs c]fwl.sf]
;kdf kpf]u ul/GYof]t/ clxn]cfP/ Snf]/g / krf]k/; 0lnd]6 ePsf of]us kpf]udf
cfPsf 5g\.
- dnflyofg / kf/flyg cuf]kf:k/; sl6gfzs c]fwlX; xg\eg]DDT, BHC, 8f0l8g

/ Ingbbj cfufgf] Snf]/goSt sl6gfzs cfjw\; xg\ . xfn cfP/ 8f0IN8g/ kpfj
ul/bj lsgls log\; sf]kpfjn]j CohGt'nfk xg}uP .

dn

- ➔ dn kfgldf 3hgzn xgk5{. dndf ePsf tEjx; la?jfn] ;lhn}ü lng]lsl;dsf] xgk5{. dn :yfloTj (stable) xgk5{.
- ➔ NPK la?jfx;nf0{clt dxEjk0f{dn ePsf]xgfn]o;nf0{k0f{dn (complete fertilizer) elgG5 .
- ➔ ol/of dndf \$^ kl'tzt gf06fng xG5 . of]lj|:6fnf0g t6:y tyf kfgldf a9L 3hgzn xG5 .



/f;folgs kpf0f

- ➔ c;jfwgl, cfn:o / cJojl:yt sf/0fn]jftfj/of kpf] tyf bu{woSt e0/xpf]5 . o;af6 /fjuf ls6f0fx; xfjfaf6, kfglaf6, ls/faf6 xfd] z/L/df kjj u/L jftfj/0fdf dxdf/L kpf5 .

Psf0 ! \$ la?jf / hgfj / sf] jul\$ / Of (Classification of Plant & Animal)

cgdfllgt 3G6L M \$

-s_ ljlzi6 p27oxç

o; Psf0sf]cGtodf ljBfylçç lgDglnlvt s'fdf ; lfd xg]5g\

!= klh kNng]la?jfxçsf]-; al8lehg; Dd_ jul\$ / Of ug{.

@= 9f8 ePsf hgfj / xçsf]-Snf; ; Dd_ jul\$ / Of ug{.

#= klh kNng]la?jfxçsf]nlf0fxç pkoSt pbfx / Of; lxt j0fç ug{.

\$= 9f8 ePsf hgfj / xçsf]-Snf; ; Dd_ pkoSt pbfx / Of; lxt j0fç ug{.

-v_ kl / ro

afçla?jf tyf hgfj / xç nlf0fxçsf cfwf / df Psfsfçl r k / s xç5g\ . oxL k / snf0{
 Jojl:yt çkdf cWooG ug{logLxçsf] jul\$ / Of ul / G5 . o; Psf0df afçla?jfxçsf
 ls^{a8d} , ; jls^{a8d} , l8lehg , ; jls^{a8d} , l8lehg; Dd / hgfj / xçsf ls^{a8d} , krf0nd / Snf; ; Dd
 jul\$ / Of ug{cfwf / xç; DaGWL cWofkg ug{; lhnf]xf] \egl rrf{ul / Psf]5 . o; Psf0
 cWofkg ug{ljBfno / ; dbfodf pknAw afçla?jf tyf hgfj / sf pbfx / Ofxç lbg'pkoSt
 xg]5 . vf; u / L c jnfçg / 5nknnn]ljBfylç 1fg tyf ; lk ljsf; ug{dbt ug]5 .

-u_ lzlf0f ; fduç

afçla?jf jul\$ / Ofsf] rf6{ hgfj / jul\$ / Ofsf] rf6{ afçla?jf tyf hgfj / sf Dolhod
 :k]; dçxç tyf lrqxç , ; Nnfsf]sfç .

-3_ lzlf0f l; sf0 ljjpfsnfk

- jul\$ / Ofsf]kl / eff / dxçjaf / j5nknn ug{ç] \.
- hgfj / / jg:kltsf] jul\$ / Of ubf{ckgf0g]kçffnlsf]hfgsf / L lbg] / rf6{kçzç u / L
 hgfj / / jg:kltsf]jlddf ls^{a8d} , l8lehg , ; jls^{a8d} xç}lhg; / :k]; h; Dd hfg]
 eP klg ; jls^{a8d} , l8lehg; Dd / hgfj / xçsf]ls^{a8d} , krf0nd, Snf; , lhg; / :k]; h; Dd
 hfg]eP klg Snf; ; Dd cWooG ug{S / f atf0lbgxf] \.

- jg:klt hutsf kḡf/xḡsf af/ḡf ljbḡylḡḡsf]k[tlj]of lng]/ jg:kltnf0{kḡh kḡNg] / gkḡNg]u/L b0{pkhutdf afl8Psf]s/f atf0lbgxf]ḡ.
- kḡh kḡNg]la?jfsf efuxḡ sḡ]xbḡeGg]kḡg ;fdlxs ḡkdf ;ḡḡ pQ/xḡ afḡḡf l6Kg]/ h/f, sf08, xfḡf, kft, kḡh / lap xḡ5g\egl atf0lbgxf]ḡ.
- kḡh kḡNg]la?jfsf]l8lehgxḡ atf0lbgxf]ḡ.
- ljbḡylḡḡnf0{kḡ7ḡk'tssf]kḡh gDa/ %# sf]l8lehg lhDgf:kḡḡḡtuḡ kg]la?jfsf uḡxḡ cḡoog ug{nuf0{tlgtlg hgfsf];dḡdf pglxḡn]aḡḡsf s/fxḡ eGg / ;ḡḡ nufpgxf]ḡ.
- ;Nnfsf]sfḡ bḡfḡpḡ}of]lhDgf]kdḡḡtuḡ kg]s/f :ki6 kfl/lbgxf]ḡ.
- ljbḡylḡḡnf0{lhDgf]kdḡḡ kg]la?jfxḡsf]gfd atfḡḡ}c:ki6 ePsf uḡfxḡ eP ;ḡḡ atf0lbgxf]ḡ.
- ljbḡylḡḡnf0{kḡ7ḡk'tssf]kḡh gDa/ %# sf]l8lehg Plḡhof]kdḡḡtuḡ kg]la?jfsf uḡfxḡ cḡoog ug{nufpg]/ tlgtlg hgfsf];dḡ aḡḡ nuf0{cfkḡh]aḡḡsf / gaḡḡsf aḡḡ eGg / ;ḡḡ nufpgxf]ḡ.
- 5nkḡnkḡ5 :ki6 gePsf aḡfxḡ eP ;ḡḡ atf0lbgxf]ḡ.
- ljbḡylḡḡnf0{rf/rf/ hgfsf];dḡdf a:g nufpg] / kḡoḡ ;dḡnf0{ds} e6df; , tḡḡ, sfḡḡsf uḡḡxḡ lbg] / loglxḡnf0{alraf6 b0{kḡSnḡḡf agḡpg nufpgxf]ḡ. sgsgnḡnf0{b0{kḡSnḡḡf agḡpg ;lsof] / sgsgnḡnf0{;lspg < ;ḡḡḡxf]ḡ.
- kḡnḡkḡnḡ];dḡsf pQ/ l6Kb}hfg]/ b0{kḡSnḡḡf ePsfnf0{b0ḡḡnlo / b0{kḡSnḡḡf gePsfnf0{Psbḡnlo la?jḡ egl atf0lbgxf]ḡ.
- :k];dḡ ;dḡdf ljt/0f u/L kft, h/f, sf08sf];dḡ cḡoog ug{nuf0{Ps bḡnlo / b0{ bḡnlo la?jfxḡ 56ḡḡpg / lrḡḡ nufpgxf]ḡ.
- ;f0s; , ;Nnf] ds}wfg, tḡḡ, l;dlnf0{ls^a8d, ;jls^a8d, l8lehg / ;j18lehgdḡ julḡ/0f ug{nufpgxf]ḡ\ / julḡ/0fsf af/ḡf :ki6 kfl/lbgxf]ḡ.
- 9f8 ePsf / 9f8 gePsf b0{pkhutdf hḡt' hutnf0{afl8Psf]atf0{9f8 gePsf hḡfj/xḡsf kḡḡḡndxḡ kg/fj]Q ul/lbgxf]ḡ.
- 9f8 ePsf hḡfj/xḡnf0{kḡḡḡnd s8ḡḡdf /flvPsf] atfḡḡ}o; kḡḡḡḡndḡ kg] hḡfj/xḡsf]nlḡḡ atf0lbg]/ s8ḡḡsf ;jkḡḡḡndxḡ atf0lbgxf]ḡ.
- ;jkḡḡḡnd el6ḡḡḡḡdf kg]hḡfj/xḡsf]nlḡḡ atfḡḡ}o;cḡtuḡ kg]Snḡ;xḡ atf0lbgxf]ḡ.

- lJBfylxnf0{lk;h, PIDknljof, /K6lnof, PE;, dfdlnofsf :k];dg tyf lrxq; c;nfbg ug{nuf0{nlf0fx; atfpgxf}\ / o;cgtuf kgIcGo hgfj/x;sf]pbfx/Of lbgxf}\.
- df5f, Eofut, ;k{k/]f / dflg;nf0{ls^a8d, kmf0nd, ;jkmf0nd, Snf;df jul\$/Of ug{nufpgxf}\.

-a_dNof^asg

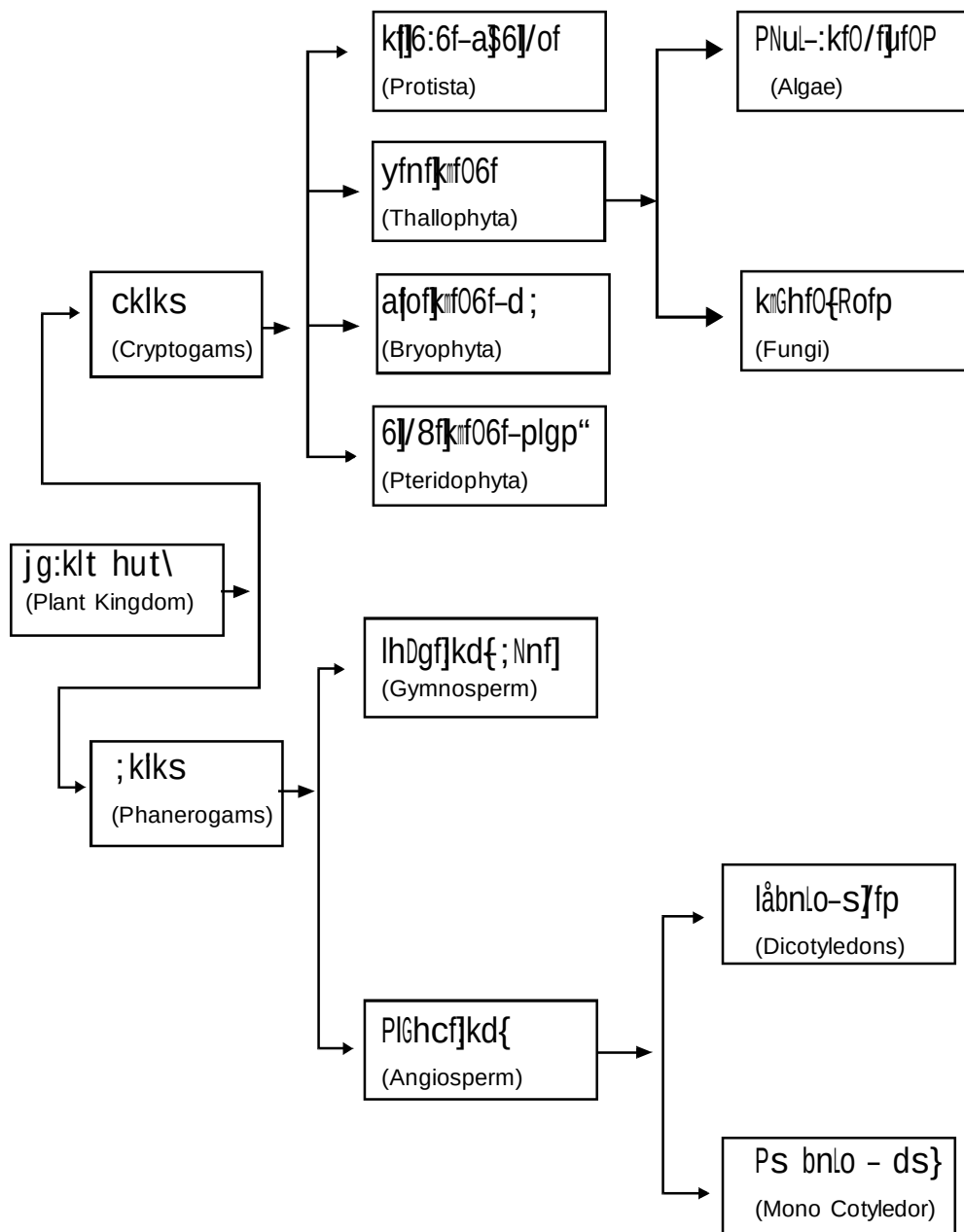
- != klg/fu];sf b0{18lehgx; s}]5g\<
- @= lhdgfkdcgtuf kgIla?jfsf b0cfbf nlf0fx; s}]xb\<
- #= PlGhcfkdcgtuf kgIla?jfsf b0cfbf nlf0fx; s}]xb\<
- \$= Ps bnlo la?jfsf b0cfbf nlf0f / pbfx/Ofx; s}]xb\<
- %= b0{bnlo la?jfsf b0cfbf nlf0f / pbfx/Ofx; s}]xb\<
- ^= kmf0nd s8fbsf sg}b0cfbf u0fx; s}]xb\<
- &= ;jkmf0nd el6f]bsf tlgcfbf dVo u0fx; s}]xb\<
- *= lk;h, PIDknlao, /K6lnof, PE; / dfdlnofsf]Snf;df kgIhgfj/x;sf]PsPscfbf u0f / pbfx/Of s}]xb\<

-r_lzlfsnf0{yk hfgsf/L

- jul\$/Of
;dfg / km/s u0fsf cfwf/df hgt' tyf jg:kltx;nf0{ljleGg ;dXdf ljeFlht ugI kljlpnf0{jul\$/Of elgG5 .
- jul\$/Ofsf]dxEj
 - hl]jt klf0fx;sf]cwoog ug{;lhnf]xG5 .
 - Ps]k6sdf w}]hgt' tyf jg:kltx;sf]cwoog ug{;lsG5 .
 - o;n];/n hl]jaf6 hl6n hl]sf]pTklQ ePsf]eGg]ljifodf kli6 ub5 .
 - af0gfl]don l;:6d ck gfl]Sn]/ l;j8f]sf j]flgs sf/fh; lngj;n]!&%* df ;jkyd ;?cft u/]bf lyP . To;h]pgnf0{kfb/ ck 6bfS;f]dl elgG5 .

- :k];h (Species): hl;xç h;sf]:jefj, u0f / cfsf/ cflbdf ;dfgtf kf0G5 eg] ltglxçnf0{Pp6f ukdf /flvG5 . o:tf] uknf0{:k];h elgG5, h:t}|| Ajf";f] / sS/df ;dfgtf kf0g]ePsf]loglxçnf0{Pp6}:k];hdf /flvPsf]5 .
- lhg; (Genus) : ;DalGwt :k];hxçsf] ;dXnf0{lhg; elgG5, h:t}|| k]]n; (Felis) cGtuç la/fnf] af3, l;× cflb kb5g\.

➤ jg:klt hut\|| !%



- a[fof]kf06fx¿ cf[]nf]hldgdf pd05 t/ khggsf nflu kfgl.sf]cfjZostf kg[]jg:klt ePsf]xbfn]loglx¿nf0{peor/ jg:klt klg elg05 .

- sxl jg:kltx¿sf]jul\$0f

:kf0/f[]f0/f (**Spirogyra**)

Kingdom	Plant
Sub-Kingdom	Cryptogams
Division	Thallophyta
Class	Algae
Order	Zygnematales
Family	Zygonemataceae
Genus	Spirogyra
Species	Zonata

tf]/L (Mustard)

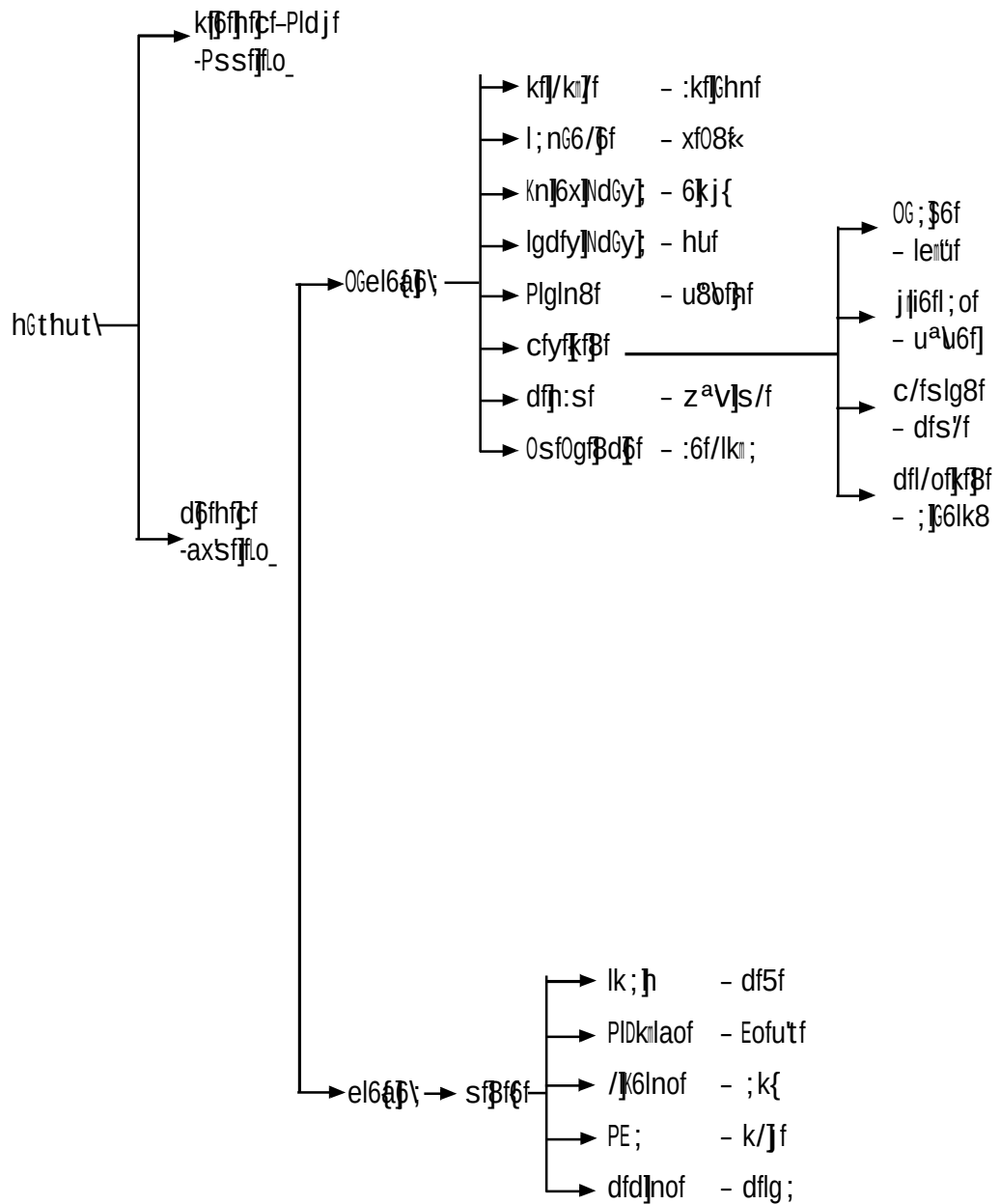
Kingdom	Plant
Sub-Kingdom	Phanerogams
Division	Angeosperm
Class	Dicotyledons
Order	Peroetalas
Family	Cruciferae
Genus	Brassica
Species	Campestris

Wfg (Paddy)

Kingdom	Plant
Sub-Kingdom	Phanerogams
Division	Angiosperm
Class	Mono Cotyledons
Family	Gramineae
Genus	Oryza
Species	Sativa

h6th ut\

h6thut\0{k6fhf / d6fhf u/L b0{efudf lje fhg ul/Psf 5g\



jul§/0f

Pldjf (Amoeba)

Kingdom Animal
Phylum Protozoa
Class Rhizopoda
Order Lobosa
Type Amoeba

	Man	Cat	Dog
Kingdom	Animal	Animal	Animal
Phylum	Chordata	Chordata	Chordata
Class	Mammalia	Mammalia	Mammalia
Order	Primatas	Carnvora	Carnivora
Family	Homonidae	Felidae	Canidae
Genus	Homo	Felis	Canis
Species	Sapiens	Domestica	Familiaris

-gtf M lz lfs lgbIz sdf Order / Family sf af/0f lbP t fklg lj Bf yLx nf0{lbq' cfjZos 5g .

Psf0 !% ef0/; (virus)

cgdfllgt 366L M @

-s_ljIzi6 p2]oxç

o; Psf0sf] cGtodf ljBfylç ef0/;sf :jefj / ;g] tl/sf, o;af6 dflg;df kg] kltsh c;/xç / lgoGqOf ug]pkfoxçsf]j0fç ug{; lfd xg]5g\.

-v_kl/ro

dflg;nufot hgfj/xç / afçla?jfxçnf0{ef0/;n]ubf{/f]usf kçfkxç b]yf k5ç\.
ef0/; ;Td lhj f0f'xf]. gfa]f]cfvfn]b]vg g;lsq]of]lhj f0f'k0fçkn]cç hljdflf cfl>t
xG5g\ . loglxç vf; hljxçdf klg vf; kçf/sf tGtdf hlljt /xG5g\ . cGq lgl:j]o
xG5g\ . dflg;xçdf xg];fwf/Of ?3f, xf8] kfl]nof] /lj h, bfb/f, P8\ çj:yf cflb ef0/;sf
sf/Ofn] xg]ubç . o; Psf0df ef0/;sf] kl/ro, :jefj, nlf0f, c;/ / /fçydfsf
pkfoxçsf af/]f r rf[ul/g]5 . vf;u/L ljBfno txd f c\oog ug]ljBfylçn]ef0/;sf
c;/ / /fçydfsf pkfoxç hfgsf/L klt u/L cfk," cfçgf] kl/jf/ / 5/l5dçdf ;d]
ef0/;hGo ;a]j]d0faf6 aRg]pkfoxç çjnDag ug{;xof]u kUg]ck]ff ul/Psf]5 .

-u_z]lfs ;fdul

ef0/;sf]lrq, ef0/;hGo ;a]j]d0fxçsf];'tl .

-3_lzlf0f l;sf0 lj]pfsnfkxç

- ljBfylçnf0{b0ç0{hgfsf]hfçl aGg nuf0{kf7çk'tssf]kf7 'ef0/;' c\oog ug{
nuf0{'ef0/f]h]l' sf]kl/efiff tof/ kfg{nufpgxf];\ . tl b0{hgfsf]hfçl nf0{glhssf]
csf]hfçl;ç 5nk'n ug{ ef0/f]h]l sf]kl/efiff tof/ kfg{nuf0{rf/ hgfsf];dçsf]
lgisif[k]t't ug{nufpgxf];\.
- ef0/f]h]l sf]kl/efiff atf0lbgxf];\.
- rf/rf/ hgfsf];dç agf0{'lsg ef0/;nf0{clAnuç/L kf/f;f06 elgPsf]xf]'<' sf/Of
kQf nufpg nufpg]/ k]tltS/Ofkl5 lgisif{atf0lbgxf];\.
- ;tçdf nflu]ef0/;sf af/]f atf0lbgxf];\.
- ef0/; lrq b]f]pç}efuxçsf af/]f / cfsf/sf af/]f atfpgxf];\.

- ef0/;sf]agfj6sf af/!f atf0lbgxf] \.
 - kf7k'k'f' hgfsf];d\df a:g / kf7bk't:ssf]ef0/; kf7 c\oog ug{nuf0{lgDglnlvt kZgsf]pQ/ kQf nufpg nufpgxf] \M
 - ef0/;sf nlf0fxč sš]xg\<
 - ef0/;sf ljz]ftfxč sš]xč5g\<
 - ef0/; s;/l ;b5 <
 - ljBfyl{nf0{;d\ut čkdf pQ/xč k|t't ug{nuf0{ef0/;sf nlf0fxč, ljz]ftfxč / ;g[tl/sf atf0lbgxf] \.
 - kf7bk't:ssf]k]h g#;!^! sf]lj]pfsnfk g#!%=! eg{nuf0{5nk\in ugxf] \.
 - ljBfyl{čnf0{^ ;d\df af8g]/ ;d\ut čkdf lgDglnlvt zlif\$ lj t/Of u/L kf7bk'ts c\oog ug{nuf0{lgisif{k|t't ug{nufpgxf] \.
- ;dX ! M ;fwf/Of č3f nfluqsf sf/Of, nlf0f / lgoGq0fsf pkfoxč
- ;dX @ M xf8]/f] nfluqsf sf/Ofxč, nlf0fxč / lgoGq0fsf pkfoxč
- ;dX # M bfb/fsf sf/Ofxč, nlf0fxč / lgoGq0fsf pkfoxč
- ;dX \$ M k]nnofsf sf/Of, nlf0fxč / lgoGq0fsf pkfoxč
- ;dX % M /ljhsf sf/Of, nlf0fxč / lgoGq0fsf pkfoxč
- ;dX ^ M HIV / AIDS sf]kl/ro, ;g[tl/sf / aRg]pkfoxč .
- ;d\ut k|tltkl5 ef0/;hGo ;a]ld0fsf];tL k|t't u/L ;fwf/Of č3f, xf8] bfb/f, k]nnofsf / /ljh xg]sf/Of, nlf0f / lgoGq0fsf pkfoxčsf af/!f atf0lbgxf] \.
 - HIV / AIDS sf]kl/ro, HIV ;a]ld0fsf cj:yfxč, HIV ;g[tl/sfxč, HIV g;g[lojxf/xč, cj;/jfbL ;a]ld0fxč, HIV ;a]ld0af6 aRg]pkfoxč, AIDS sf]pkrf/sf af/!f atf0lbgxf] \.

-a_dNofaSg

!= kf7bk't:ssf kf7xč u/L, x]l l;Sgxf] \ / cEof;cčtu{sf lj]pfsnfk / kZgxč u/fpgxf] \.

@= cj;/jfbL ;a]ld0fxč egšf]s]xf]<

#= HIV ;a]ld0fsf cj:yfxč sš]xg\<

\$= HIV ; a\jd0faf6 aRg]pkfox¿ s]xg\<

%= s]ubf{HIV ; b5 <

^= s]ubf{HIV ; b5 <

-r_lzlfnsnf0{yk hfgsf/L

ef0/;sf]:jefj, ljz]ftf / ;g[tl/sf

- cfh;Dd kQf nuf0; s]f hljx¿dW0]ef0/; Ps k]f/sf]Hofb};'Id tyf k[r]lg hlj xfl. of]JofS6]/ofeCbf klq ;'Id ePsf]xgfn]zlstzfnl ;'Idbz¿ oGqaf6 klq x]b{ufxfl]xG5 .
- ;g\!*^^ df P8fl]k d]b/ (Adolf Mayer) n]ef0/; n]ubf{; tLsf]kftdf nfUg]/fl jOf6 u/]sf lyP .
- ;g\!(#% df Ps hgf cd]/sg df0j]afof]h:6 :6]n)(Stanley) 6f]afsf]df]ofs ef0/; lj]:6nsf]¿kdf 56bfP / o; lj]:6nnf0{kfgLdf 3fl]n0{:j:y ; tLsf]kftdf nufpbf tL kftdf /fl]sf nlf0f b]yf k/].
- ef0/;df Golsno; jf ;f06fl]nfhd xb] .
- ef0/; Psnf]hljg lgjfx ug{c; dy{xg]t/ cfltYo hljdf cfl>t e0{cgsh jftfj/Ofdf o; sf] kOf{ lj sf; xg] ePsf] ef0/;nf0{clAnu]L kf/f;f06 (obligatory parasite) elgG5 .
- ef0/;df cf/XPg\p= jf 8L=Pg\p= h:tf Golsns Pl; 8sf]cfj/Of xG5 . o;nf0{k]6gsf] kftnf]cfj/Ofn]9fs]sf]xG5 . o;n]arfp]sfo{ub5 .
- cfltYo hljsf cfwf/df ef0/;nf0{lgDglnlvt tlg juOf jul\$ /Of ul/Psf]5 ||
 - (i) JofS6]/on ef0/; - o;n]JofS6]/ofs]sf]nf0{cfj]dOf ub5 .
 - (ii) jg:klt ef0/; - o;n]jg:klt sf]nf0{cfj]dOf ub5 .
 - (iii) hGt'ef0/; - o;n]hGt' sf]nf0{cfj]dOf ub5 .
- ef0/;n]ubf{la?jf, hgfj/ tyf dflg;x¿df ljleGg k]f/sf /fl]x¿ nfU5g\.
- ef0/;n]ubf{lak/, 7pnf, kx]hf]Hj/f]tyf SofG;/ h:tf vt/fkOf{/fl] nfUg ;S5g\.
- s]L ef0/;x¿n]AofS6]/ofnf0{cfj]dOf u/L Itglx¿sf]Golsno/ d]b]/on (nuclear material) nf0{gi6 ul/lbG5 eg] tL ef0/;x¿nf0{AofS6]/of]k]h (bacteriophage) elgG5 . ol ef0/;x¿df kR5/ / 6fpsf]xG5 .

;fwf/Of ?3f

- ;fwf/Of ?3f jif\$]b0{lg k6s;Dd klg nfu]g ;S5 .
- /f0grf0/;n];fwf/Of ?3f nfu5 eg]Pl8gr]ef0/;n]ubf{;fwf/Of ?3faf6 6gl;nfu0l6;;
:j/ ;Sg]tyf lgdf]gof /f] nfu]g ;S5 .
- ;fwf/Of ?3f nfu]bf gfs / 3f6L v;v;fpg] cfv] /ftf]/ /l;nfxb]tyf :j/ g;fx₂
(vocal cord) df ;^a]d0f e0{:j/df PSSfl; kl/j t₆ cfp5 .
- y's, vsf/ tyf l;üfg plr t tl/sfn]lj;h₆ ugfb]of]/f]sf]/f]syfd ug{;ls65 .
- tftf]kfglsf]afk₁ lng' ;fwf/Of ?3f lgsf]kfg[kp]v pkfo xf].

xf8]

- of]dVotofll s]fs₆lx₂nf0{nfu]g];?jf /f] xf]. hljgsfndf of]/f] Psk6s dfq
nfu5 tfklg s;₃;nf0{bfx]/Psf]klg kf065 .
- Hj/f]cl:y/ xb';kf/f]6s u₆yl ;lgg'/ bVgSf ;fy}lgNg ufx]x65 t/ of]/f] nfu]sf]
b0{lg lbgkl5 ;lggPsf]kf/f]68 u₆yl la:tf/}sd x65 .
- cf/fd ug{ ;^a]d0f ePsf]efudf tftf]jf a/k₁n];₃g'tyf dV ;w₃;kmf /fVg'o;
/f]sf pkrf/ ljlx₂ xg\.

bfb/f

- of]/f]un]5nfafx₃ cfv], Zjf; k₆]gnL, kmf\$;f]tyf cfGb]df klg c;/ kfb₅ . of]/f]P
PskN6 nfu]kl5 km/ bfx]/P/ cfpb₆ .
- /f]ln]k₁rngdf NofPsf nufkmf6f tyf ef8fs8f cflbaf6 klg of]/f] ;g{;S5 .
- ;?df tlgrrf/ lbg;Dd ?3fsf]nlf0f b]vf kg[/ rfy]lbgkl5 klxnf cgxf/ tyf kl5 z//sf
cGo efux₂df /ftf/ftf dl;gf bfgfx₂ b]vf kb₅g\ . bfgfx₂ \$ b]v ^ lbg;Dd /xl
kl5 la:tf/}x/fP/ hfgSf ;fy}Hj/f]klg lgoGq0f x65 .
- /f]lsf]y's, vsf/ tyf l;üfg plr t tl/sfn]lj;h₆ ugfb₅ .
- /f]lnf0{566}sf]fd cf/fd u/fpbf of]/f]sf]/f]syfd ug{;ls65 .

kf]nof]

- kf]nof] ;fwf/Of tof ; - ;fgf s\$fs\$lnf0{nflUg]Psk\$fsf/ljZjJofkl ;?jf /f] xfl.
- ;?df ;fwf/Of ?3fsf] nlf0f b]yf kg{ jfsjfs nfluG' jfGtf xg' emf8fkvnf jf slAhot xg' cflb nlf0f b]yf k/L /f] lgsf]ePh:tf]xG5 tfklg sbj}jhf xftv66fsf df+kzldf c;/ kg{u0{kIf3ft xg ;S5 .
- kf]nof]af6 aRg aRrf hlgdPsf] ^ xktfb]v Ps jif[eq kf]nof]j?4 vfk - ;fNs EofIS;g jf ;ljg cf]n EofIS;g lbgkb5 . of] vfk klxnf] k6s lbPsf] PsPs dlxgfsf]k/s kf/L tlG k6s lbgkb5 .

/]jh

- axhf sS/ jf axhf hgfj/sf]¥ofndf kf0g]ef0/; hgfj/n]6f\$bf jf 3fp ePsf] 7fpdf rf6bf z/L/leq kl]z u/L sl/a \$ b]v ^ xktfleq /]ahsf nlf0fxz b]yf kb5g\.
- 6fpsf]bVg' Hj/f]cfpg' xNsf jf pHofnf]k\$z ;xg g;Sg' z/L/ sDk xg' tGsg' tyf lgNg ufxf]xg' cflb nlf0fxz b]yf kb5g\ . cGtodf /f]lsf]d[o' ;d] xg ;S5 .
- 5f8f sS/ lgoGqOf ug{ kfNt' hgfj/nf0{/ljhlj?4 vfk nufpgfn]of]/f]usf]/f\$yfd ug{ ;lsG5 .

P8\

- cflhf jf cZaf6 kkt u/]f]klt/lff kpfnl sdhf] jf gfz xg] ;ldd>Of nlf0fxzaf6 klt/lff kpfnl]sdhf]l xgfsf sf/Ofn]ubf{ljleGg /f]usf nlf0fxz Ps}fy b]yf kg{ g}P8\ xfl.
- ;g\ !(*! df dfq yxf ePsf] P8\ /f] xfn ljZjdf sl/a b0{s/f\$eGbf a9L dflg;nf0{nflu;s\$]cgdfg ul/Psf]5 . gkfndf dfq}P8\ ljiff0' ePsf /f]lsf] ;aVof @, @,)) eGbf a9L ePsf]cgdfg ul/Psf]5 .
- z/L/df Hiv kl]z u/]k5 ^ xktfk5 dfq /f]lsf]/ut k/Llf0faf6 P8\ sf ljiff0' b]yf kb5g\.
- z/L/sf]tfh Ps dlxgdf ;fljssf]eGbf b; kltztn]36g' lg/Gt/ Hj/f]cf0/xg' tyf a9L ;do;Dd lb;f nfluG' cflb P8\ sf kDv nlf0fxz xg\.
- v\$sl nfluG' z/L/ lrnfpG' z/L/df vl6/f cfpg' hg /f]usf] ;?jf /f]un]cfjldOf u/]f]xf] ;f]/f]usf nlf0fxz nfd] ;do;Dd /xg' cflb P8\ sf ;fwf/Of nlf0fxz xg\.

- of tyf kpgg :jf:Yo lzlfdf hf lbgf ;fy}hg;dbfodf hgr}gf hufpg]sfo{ld
;~rfng u/uf P8\sf]/syfd ug{;ls5 .

ljlfpsnfk M ef0/; /f]sf]tYof^as ;^asng

p2zo M dflg;nf0{nfUg]s}l ef0/; /f]uxZaf/]kl/lrt u/fpg .

;do M gof“z}fs ;q ;? xgf;fy

:yfg M 3/, ljBfno tyf jl/kl/sf ;dbfo

ljlw M

!= tn lb0Psf tflnsf ljBfyl{Znf0{cf-cfCgf]sfklDf ptfg{nufpgxf}\.

tflnsf

jf;# :yfg	/f]sf]gfd	ef0/;sf]gfd	c;/ kgIefu	;g]dfWod	lgoGq0fsf pkfo

@= slffsf ;Dk0f{ljBfyl{f0{;dXut Zkdf ljeFlht u/l k/sk/s :yfgdf ef0/;hGo
/f]uxZ cWooog ug{nuf0{ltgsf]k0f{lj j/Of cf-cfCgf]sfklsf]tflnsfdf eg{nufpg}.

#= ;dXut Zkdf ;^asInt ef0/;hGo /f]uxZsf]lj j/Of lglZrt cjlwleq k} ug{nufpg}.

\$= ;^asInt ef0/;hGo /f]sf]lj j/Ofaf/]ljBfyl{Zdf ;dXut 5nkIn u/fpg}.

%= lzlfsn]cfjZostfcg;/ ef0/;hGo /f]uxZsf]yk hfgsf/l lbg}.

sfjlf lje fhg (Cell Division)

cgbflgt ;do M & 3G6f

-s_ ljlzi6 p27oxz

o; Psf0sf]cGt0df ljbflxŁ lgDglnlvt sfo{ug{; lfd xg]5g\

!= hljt j:txŁdf xg] ;7fl6s sfj lje fhg (Somatic cell division) lrq; lxt j0f6 ug{.

@= hljt j:txŁdf xg] ldon6s sfj lje fhg (meiotic cell division) lrq; lxt JofVof u/L ;hljsf]dxŁj atfpg .

;7fl6s / ldon6s sfj lje fhgdf leGgtf b7fpg .

-v_ kl/ro

jg:klt / hgfj/xŁsf] z// sfjfxŁaf6 ag7f xG5g\ . ol sfjfxŁsf] lje fhgaf6 g} ;lhjxŁsf] j74, j7f0fut u0fxŁ x:tfGt/Of, dylgs tyf cdylgs khgg ;Dej xg] ub5 . o; Psf0df sfj lje fhgsf k7f/, dxŁj Pjd\leGgtfsf af/7f rrf{ul/g]5 .

-u_ z7fs ;fdulxŁ

df06f] ; / ldon ; ; sfj lje fhgsf] rf6{tyf df7h, :nf08, df0j7f]sfk .

-3_ lzlf0f l;sf0 ljl0fsnfk

- sfjfsf ;DaGwdf ljbflxŁ nf0{cfk7hf07yxf ePsf]s7f eGg nufpgxf] \. ljbflxŁsf] kl7ljl0fsf cfwf/df sfjfsf]yk hfgsf/L lbgxf] \.
- j7f7f]sf]kl/ro / ljeGg jg:klt / hgfj/df o;sf] ;aVof atf0lbgxf] \.
- hlgsf]sfd atf0lbgxf] \.
- sfj lje fhgsf k7f/ atf0{;jfe7js sfj lje fhgsf]kl/ro lbgxf] \.
- df06f] ; ; sfj lje fhgsf cj:yfxŁ / OG6/k7hsf] hfgsf/L lrq tyf df7náf/f lbgxf] \.
- :nf08 / df0j7f]sf]sf]jf rf67f] ;xotfn]df06f] ; ;sf rf/c7f cj:yfxŁ cjnf7sg ug{nuf0{lrq lgdf7f ug{nufpg} / cfjZostfcg';f/ ;xof7u ul/lbgxf] \.
- sfl8of7f0g] ; / ;f06f]sf0g] ; ;af/]5nk7n u/L :ki6 kfl/lbgxf] \.

@= df06f];; sfjf lje fhg eg\$]s]xf]<
 #= 0G6/k]hdf s\$]b]g ;lsG5 <
 \$= df06f];;sf rf/ cj:yfx¿ s\$]5g\<
 %= sf0/f\$foq];; / ;f06f\$foq];;alr s]leGgtf 5 <
 ^= df06f];; sfjf lje fhgsf dx£jx¿ s\$]xb\<
 &= lsg ldo];; sfjf lje fhgnf0{Gog]s/Of lje fhg elgG5 <
 *= k]k]hsf rf/ cj:yfx¿ s\$]xb\<
 (= l;gk];; / j];;acfe/ eg\$]s]xf]<
 != ldc];; bf];]s:tf]k\$]/sf]lje fhg xf]<
 != ldc];; sfjf lje fhgsf dx£jx¿ s\$]xb\<
 !@= l8KNjf08 / xKNjf08 sfjf eg\$]s]xf]<
 !#= kf7bk:tssf cEof;x¿af6 kZgx¿ ;f] klg dNof^asg ugxf]\.

-r_ lzlf snf0{yk hfgsf/L

sfjf tyf sfjf lje fhgsf k\$]/

- z/L/sf]cfwf/e^t Psf0nf0{sfjf elgG5 .
- ahfotsf j]l]gs /a6{x\$]n];g\!^^% df sfjfnf0{;f]sfjf egl gfds/Of u/].
- sfjf kOf£kdf kl/kSj e0{b0{jf b0£bf a9L ;Gtlt sfjfx¿ aGg]klj]ofnf0{sfjf lje fhg elgG5 .
- jzf0f ut uOf k];f/Of ug]Psf0nf0{jzf0^t (gene) elgG5 . of]k]o|| 8LpgPaf6 ag\$]xf] xG5 .

df06f];;

- hdsf hlj j]l]gs jfN6/ Çn]d^a (Walter Flaming) n];g\!*&* df ;jkyd sfjf lje fhgsf]cWooog u/]sf lyP .
- df06f];; sfjf lje fhgdf Pp6f dfp sfjf (parent cell) lje flht e0{b0£bf p:t};Gtlt sfjf aGg]xbfn]o;nf0{;dfg lje fhg klg elgG5 .

- sff lje fhg jf:tjdf rf/cf cf cj:yfdf k/f xG5 .
- t/ OG6/kh sff lje fhg xgeGbf cufl8sf]cj:yf xf].
- Golsno/ dlablv aflx/ ePsf ;fg]cG8sf/ j:thf0{;l6hfd elgG5 t/ ;l6hfd xg]Pp6f jf b0cf ;fg]agfj6 ePsf]j:thf0{;l6cf] ; elgG5 .
- Golsno;sf]ljk/Lt w]lt/ ;l6cf] ;b5 / ;l6cf]sf]rf/Lt/ k]l6gsf /zfx (astral rays) aG5 . ;dli6ut 2kdf ;l6cf] / k]l6gsf /zfx2nf0{P:6/ (aster) elgG5 .
- l:kG8n k]l6gaf6 agsf]xG5 .

df06f] ; sff lje fhgsf]dxEj

- df06f] ; sff lje fhgn]sf]sf]jzf0fut l:y/tf sfod /v5 .
- Pldjf, PNul tyf JofS6]/ofh:tf lgDg:t/sf h.ljx2df df06f] ; sff lje fhgaf6 ;Gtfgf]kfbg xG5 .

ldcf] ; lje fhg

- ldcf] ; sff lje fhgkl5 Pp6f l8KNjf08 sf]faf6 rf/cf cf xfoKNjf08 sff aGg] xgfn]o;kf/sf]lje fhgnf0{Gogls/of lje fhg (reduction division) klG elgG5 .
- xffnf] ; jffnf] M ;dfg hfBl ePsf]jffnf]nf0{xfnf] ; jffnf] elgG5 . dflg;df ;fwf/oftofl @# hfBl xffnf] ; jffnf] xG5 . hg sf]df xffnf] ; jffnf]sf] ; k0f{xG5, To:tf]sf]nf0{l8KNjf08 sf] elgG5 .
- k]ojs Uofdf jffnf]sf] ; aVof cfwf xG5 eg]To;nf0{xfoKNjf08 elgG5 .
- xffnf] ; jffnf]x2 k/:k/ hf]8Psf xG5g\ / hf]8Psf]:ygnf0{gflK ; (synapsis) elgG5 .
- ldcf] ; klxnf]lje fhgdf jffnf]sf] ; aVof cfwf xG5 t/ ldcf] ; bf]]df06f] ; sff lje fhg h:t}xG5 .

ldcf] ; sff lje fhgsf]dxEj

- ldcf] ; sff lje fhgn]jff]l68 d6]/on ;6k] ug{;xof]u k#ofp5 / j]l ; a cf/n] kl/j]Q Nofp5 .

cdylgs / dylgs khgg

(Asexual and Sexual Reproduction)

cgdfllgt 366L M \$

-s_ljizi6 p27oxz

o; Psf0sf]cGtodf ljBfylx la?jf / hgij / df xg]cdylgs khgg ljlof pbfx/Of; lxt
j0f6 ug{; lfd xg]5g\

-v_kl/ro

o; Psf0df khggst b0{isl; dxz dylgs (Sexual) / cdylgs Asexual) sf af/df kl/ro
lbgst ;fy}ol b}k]jlofâf/f hgij/ / la?jfdf xg] khgg ljlofst ;DaGwdf lj:t
hfgst/L lbg vflhPsf]5 . o;cGtuâ la?jfdf xg]cdylgs khgg h:t}lk;g, jl8^a,
kfud6]g, :kf?n]g / e]h6]6d k]kfu]gsf af/df 5f6s/Ldf hfgst/L lb0Psf]5 eg]
dylgstk{k/fu;]g / uef]vfgst af/df JofVof ul/Psf]5 . To;u/L hgij/df xg]
cdylgs khggtk{lk;g, jl8^a / l/hg]g tyf hgij/df xg]dylgs khggst af/df
5f6s/Ldf ;lrq JofVof ul/Psf]5 . of]Psf0sf]lzlfof ubf{lzlfs ;fy|xzn];Dej ePsf]
cj:yfdf k]olf c]nf]sg u/fpg]/ ;f]gePdf rf6{jf lrqst dfWodaf6 lzlfof ug{pkoSt
x65 .

-u_z]lfs ;fdulx

cdylgs khggst rf6x, 6';f lg:s]f]cfn' Kofh, afof]nf0nd -ds/_ uhfj, cb]f, 9';L,
k/fu;]g / uef]vfg b]vg]rf6{cflb .

-3_lzlfof l;sf0 ljlofsnfk

- ljBfylxnf0{dylgs / cdylgs khgg eg]s] s]xf] eGg] ;DaGwdf kl/lrt
u/fpgxf] \. o;f]ubf{ol b06Lr b]vg];dfgtf / leGgtf klg l6k6 u/] b]vfoibgxf] \.
- la?jfxzdf xg]cdylgs khgg ljlofdWo]JofS6]/of, 8f0P6ddf xg]lk;g, 0:6df xg]
jl8^a, :kf0/f]uf0/fdf xg]kfud6]g, DoS/sf]:kf?n]g tyf cfn' cb]f cflbsf
e]h6]6e k]kfu]gsf af/df JofVof u/L ;Dej eP tl la?jfsf]khgg tl/sf b]vfg
;fdul g}Nof0{kpf]u u/L k]olf b]vfgxf] \.

- hgfj/df xg]cdylgs khgg lj|of aefpg cldjfdf xg]jfxg/L lk;g / knfhdf]Boddf xg]dN6kn lk;gsf af/df rf6{b}f0{:ki6 kfgxf}\.
- To;u/L j18^a / l/hg];gsf af/df klq pbfx/Of;xt lraqåf/f :ki6 kfgxf}\.
- o;u/L la?jfxçdf xg]dylgs khggdf k/fu;]rg / uef{fg b}j]lj|of s;/L xG5g\< lraqåf/f :ki6 kfgxf}\. Psl^aul / laln^aul kñhsf af/df pbfx/Of lb0{loglxçdf k/fu;]rg xg]tl/sf atf0lbgxf}\.
- o;u/L hgfj/xçdf xg]dylgs khggsf af/df JofVof ugxf}\. o;f]ubf{afxo uef{fg / leql uef{fgaf/;d} lJBfylçnf0{:ki6 kfl/lbgxf}\.
- cdylgs / dylgs khgg lj|ofsf knf0bf / a]knf0bfxç lJBfylçnf0{g}sñhpg nuf0{s}l yk eP cfkñh]atfP/ :ki6 kfgxf}\.

-a_dNof^aSg

- kf7ok'tssf]u/L, x]l l;Sgxf]\v08sf]g#! / @ lJBfylçnf0{ug{nufpgxf}\.
- Psl^aul / laln^aul kñhxçaf6 s;/L k/fu;]rg e0{uef{fg xG5 < n]gxf}\.
- la?jfdf k/fu;]rg / uef{fg b}fpg]/fd]lraq tof/ ugxf}\.
- dylgs / cdylgs khggaf6 xg]knf0bf / a]knf0bfsf]thgf ugxf]\cflb .

-r_lzlfnsnf0{yk hfgsf/L

- cdylgs khgg
 - sb}klq hljhGth]cfÇgf]jz sfod ug\$fnflu cfkñ'h:t}u0f ePsf];GtfghGdfpg]klj|ofnf0{khgg elgG5 .
 - sb}klq hlj -hGt'tyf jg:kl_t_Ps sf]flo xf]\jf axsf]flo ltglxçdf khggsf]7hf]dxÇj 5 . khgg lj|of ePg eg]cfkñ'h:t};GtfghGdf0{jz k/Dk/f sfod ug{;Sb} .
 - cdylgs khggdf Pp6f dfq dfp sf]f (mother cell) ePsf]xG5 . o;df dh z/l/sf]sb}efu 56l6P/ jf ljsl;t eP/ gof"hlj aG5 . o;df efn]/ kfyL Uofdf]sf]ldng rj|;dfjz xb} . o; cdylgs khggdf ldof]; ; sf]f lje fhg xb} . o;kpf/sf]khgg ;fwf/Of hljxçdf xG5 .
- Pldjfdf xg]khgg
 - Pldjf Pssf]flo hlj ePsf]xbfn]cdylgs khgg af0g/L lk;gaf6 xG5 . cldjfd

kl/kSj ePkI5 uf^hsf/ ٭k In0{GolSno; nIDaP/ al^rsf]efuaf6 lje^hg eP/
b0{^hsf ;Gtlt sf]x٭ (daughter cells) aG5g\.

- yfnf^h06f -Rofp_, afof^h06f -lne/j6{ / 6l/8f^h06f -plgp“ ju^hsf la?jfx٭df :kf^hn]g ljlwaf6 kl^hg khgg xG5 .
- e^hh6]6e kf^hfu]g vf;u/L b0{k^hsf/sf xG5g\
 - (i) k[s[ts e^hh6]6e kf^hfu]g
 - (ii) s[qd e^hh6]6e kf^hfu]g .
- k[s[ts e^hh6]6e kf^hfu]gdf vf;u/L la?jfsf sf08, h/f / kfth:tf efux٭af6 gof“la?jfx٭sf]lj^hsf; xG5 .
- s[qd e^hh6]6e kf^hfu]g ljleGg tl/sfaf6 xG5 . la?jfsf]sg}efu sf6], u^hkl6^a, n^h/^a÷l6:o' sNr/ / Sn^hg^a ljlwaf6 khgg xG5 .
- dylgs khgg
 - efn]/ kf^hl^hsf]khgg c^auaf6 lg:s^hsf]z'j]sl6 / l8Da sf^hsf]ldng e0{;Gtfg pTkGg xg]lj^hofnf0{dylgs khgg elgG5 .
o;df ldo^h]; ; sf^h lje^hhgaf6 Uofd^hsf]lgdf^h xG5 . of]lj^hof ;fwf/Of tyf hl6n hljx٭df xG5 .
 - khgg tEjnf0{Uofd^h elgG5 . efn]/ kf^hl u/L Uofd^h b0{k^hsf/sf xG5g\ . efn] Uofd^hnf0{z'j]sl6 elgG5 hg w^h];fgf t/ lj^hofzln xG5 . loglx٭sf]6f^hpsf] uf^hh]/ kR5/ nfd^h xG5, o;nf0{Cnf^hhd elgG5 t/ kf^hl Uofd^hnf0{l8Da sf^h elgG5 . loglx٭sf]cfsf/ 7hf]r/ crn xG5g\ . loglx٭ uf^hhsf/ jf l8Dafsf/sf xG5g\.
 - sg}Pp6f k^hhsf]k/fus0f lgsfn] ToxL k^hh :qls^hz/ (stigma) ;Dd k^hg]lj^hofnf0{ :jk/fu;]g (self pollination) elgG5 t/ sg}Pp6f la?jfsf k^hhsf]k/fus0f lg:s] ljleGg df^hodaf6 csf]k^hhsf] :qls^hz/ ;Dd k^hg]lj^hofnf0{k/k/fu;]g (cross pollination) elgG5 .

Reference books

1. Co-ordinate Science Biology-Marry Jones & Geoff
2. Modern Biology- James & Albert
3. A Text Book of Botany - A.C. Dutt

Psf0 !() Ijhf0faf6 la?jfsf]kphgg

(Reproduction in Plants through Spores)

cgdfllgt 3G6L M %

-s_ ljlzi6 p2]oxz

o; Psf0sf]cGtodf IjBfylx; plgp“/ Rofpsf]agf6 hljgrj|; lxt j0f6 u/L dflg; sf
nflu logLx;sf]pkof]utf / k|tsh c;/x;sf];*L tof/ ug{; lfd xg]5g\.

-v_ kl/ro

k|h k|Ng]la?jfx;sf]h:t}k|h gk|Ng]la?jfx;df kl; ;Gtfgf]kfbgsf]k|j|of sg}g sg}
;kdf rNgk5{gq logLx;sf]jz k/Dk/f sfod xbg. k|h k|Ng]la?jfx;df k|hdf /xg]
efn]/ k|fL c^usf dfwodn];Gtfgf]kfbg xG5 eg]k|h gk|Ng]jg:kltx;df ;f];Dej
xbg. t;y{logLx;sf];Gtfg pTkfbgsf nflu 566}ljz]f c^u, Ijhf0f'kftsf]leqk6|6
/x;sf xG5g\. log]sf]dfwodaf6 o:tf jg:kltx;n];Gtfgf]kfbg ub5g\. o; kf7df k|h
gk|Ng]la?jfx;dwo]plgp“/ Rofpn]s;/L ;Gtfgf]kfbg u56\eg]b]vfp] logLx;sf]
hljg rj|sf]JoVof ul/Psf]5. o;sf ;fy}ljleGg lsl;dsf plgp“/ Rofpaf6 dflg;nf0{
xg]krf0bf / k|tsh c;/x;sf af/]df kl; IjBfyl6f0{hfgsf/L lbg v]hPsf]5.

-u_ z]lfs ;fdulx;

plgp\$]af6, Rofpsf]af6, plgp\$]hljg rj|b]vfp]rf6{Rofpsf]hljg rj|b]vfp]rf6{
plgp“/ Rofpaf6 xg]krf0bf a]krf0bfsf];*L.

-3_ lzlfof l;sf0 lj]lpsnfk

- k|h k|Ng]la?jfsf]hljg rj|sf]kg/fjnf]sg u/fpb}k|h gk|Ng]la?jfdf s;/L
hljgrj|;~rfng xG5 xfhf egl 5nk|n u/fpgxf];\.
- plgp\$]af6 b]vfo{ljleGg efux; lrgfpgxf];\.
- plgp\$]af6 -jo:s_b]vfp/ kftsf]k5fl8k6|6 ePsf ;f];x; kQf nufpg nufpg]/
log]c^uleq xg]ljhf0faf6 plgp\$]hljg rj|;?jft xG5 egl atf0lbgxf];\.;Dej
eP Ijhf0f'lgfnn] n]; jf ;*dbz6 oGqaf/f b]vfo]lbgxf];\.-lj]lpsnfk 9.1_

- plgpšf]hljg rj]sf]rf6{6f:g]jf afBdf ljBfylhf0{lrq agfpg nufpgxf] \. ca
plgpšf]hljg rj] jldzll la?jfaf6 ljhf0f; ;f]; ; :kf]lchod xb}kf]fn; aGg]/
kf]fn;af6 Pgy]f]j08 / cfed agl sexual reproduction af/f p:kf], Uofdf agl gof"
:kf]lhf06 xb}kgll gof"la?jf aGg]Ddsf]r/of eP/ plgpšf]hljgrj] k/f xG5 egl
:ki6 kfl/lbgxf] \. o;/L oxf"plgpšf]hljgrj]df :kf]lhf06 -cdylgs_ / Uofdf]k]f06
-dylgs_ u/L b0{r/ofdf hljg rj] k/f xg]xbf o;nfo{cN6/g]g ckll hG]g
(Alternation of Generation) elgG5 egl atf0lbgxf] \.
- ljBfylx{nf0{kf7bk't:ssf]lj]lpsnfk g=19.2 ug{nufpgxf] \-slffsf]jf uk'sfošf
čkdf_
- o;u/L Rofpsf]la?jf NofP/ o;sf ljleGg efuxč b]vf0lbg] ;fy;fy}afBdf lrq
lvrr] gfd^asg ul/lbgxf] \. loglxč kf0g]7fp;"agfš cflbaf/]JofVof ugxf] \. Rofpdf
xl/ts0f gxb]xbf of]xl/of]xb} / cfčg]vfgf cfkllagfpg klq ;Sb} . of]d/šf tyf
;8šf j:tččdf pdg]xbf o;nfo{dltf]khljl (saprophyte) elgG5 egl :ki6
kfl/lbgxf] \.
- kf7bk't:ssf]lj]lpsnfk g=19.3 u/f0{Rofpsf]ljhf0f' c]nffsg ug{nufpgxf] \.
- Rofpsf]hljg rj]sf]rf6{6f:g]jf ljBfylx{dWo]lrqfa^asg ;lk /fd]ePsf ljBfylhf0{
afBdf agfpg nuf0{To;s}cfwf/df Rofpsf]hljg rj]sf]JofVof ul/lbgxf] \.
- kf7bk't:ssf]lj]lpsnfk g=19.4 slffsf]jf uk'sfošf čkdf ug{nufpgxf] \.
- plgp"/ Rofpaf6 xfdlnf0{xg]k]f0bfxč / ak]f0bfxč 5nkln ub]afBdf l6kfš
ul/lbgxf] \. o;f]ubf{ljiffn' Rofpn]ubf{dfG5]d/šf 36gfxč ;gfP/ h^aunl Rofp
vfbf xfl;of/ xgkg]s/fklt ;r] u/fpgxf] \.
- 3/df Rofp v]l ug{;lsg] s/f b]vfpq ;Dej eP ljBfnodf g}kf7bk'tsdf
lbOPcg';f/sf ;fdul a6h] pkoSt c]yfl;hGf u/L Rofp pdf/] b]vf0lbgxf] \. ;f]
;Dej geP pglxčn]cgšhtfcg';f/ 3/df Rofp v]l ug]tl/sf :ki6 kfl/lbgxf] \.

-a_ dNof^asg

- != kf7bk't:ssf cEof;df ePsf kZgxč uk'sfošf čkdf ug{nufpgxf] \ / ljBfyl]l
ae]gaeb]f]jf p2Z^o xfl;n eP gePsf]dNof^asg ugxf] \.
- @= slffdf ul/g]lj]lpsnfksf]c]nffsg tyf kZgfQ/af6 dNof^asg ugxf] \.

-r_lzlfssf nflu yk hfgsf/L

- /p]6f (ramenta) - sf08 / lkl6cf]nf0{ v}f] /^as] kqn] 9flsPs] xG5 h; nf0{ rementa elgG5 .
- plgp“cf]; nf]7fpdf, kxf8 tyf t/f0df kf0G5 .
- /;xZ ljsl;t ePkI5 tlleq :kf]xZ aG5g\ / ;Gtfg j[4 sfo{o; }f/f xG5 .
- kf]fn; (Prothallus) g]plgps]ufbfk]f06 (gametophyte) r/of xf]. o; leq efn]Uofdf / kf]l Uofdf aG5g\.
- efn]Uofdf / kf]l Uofdf ;ef] eP/ hf0urf aGg]lj]ofnf0{uef]vg lj]of elgG5 .
- hgtxZdf jf jg:kltxZdf ;Gtfg]kfbg klj]ofdf efn]/ kf]ls]z/L/leq Ps ljz]f Isl;dsf sf]fxZ xG5g\h;nf0{Uofdf (gamete) elgG5 .
- efn]Uofdf / kf]l Uofdf ;ef] (Fusion) eP/ hf0urf (zygote) aG5 .
- hg sf]fdf hf]f j]f]fh]d (2n) xG5 eg]To;nf0{diplid elgG5 .
- cfGy/l8of (antheridia) uf] jf cG8sf/s] xG5, h;leq w}]cfGy6]/Hjf08xZ (antherozoids) xG5g\ . k]o}s db/;]df Pp6f 3ldPs]w}] /fh:tf eKkfxZ ePs cfGy]L Hjf08xZ xG5g\.
- cf]lsG]lgof (archegonia): of] CnfS; (flask) cfsf/s] xG5 . o;s] kn]s] efunf0{ e]6/ (venter) / ;f]l/Ps]efunf0{3f6l (neck) elgG5 .
- Pufl/s; (agaricus) sf];fwf/Of gfd Rofp xf].
- vfg]Rofpsf sl/a @)) hft xG5g\.
- sl/a !@ hfts Rofp ljiffn' xG5g\.
- luN;leq ;fdbz\$ oGqaf6 xf0klxZsf]5p5pdf x]f{xf0dlgod eGg]c^uxZ xG5g\ h;s] 6Kkf]f ljhf0fxZ /x]f xG5g\ . hg ljhf0fxZ kl/kSj cj:yfdf ku]kI5 To;af6 v;] jftfj/ofdf c^s/of eo{kfylds df0;]nod aG5 .
- sf]h]6κ - of]hljgnf0{ge0{gxg]Ps ksf/s]lrklrk];]fkbfy{xf]. of]hg f/ tyf dflg;s]sf]fxZdf kf0G5 . xdf]sn]h]klg sf]h]6κ pTkfbg ub\$. sf]h]6κ af]f / k]Gg ldn] lnk]k]Gg (lipo protein) aG5 . sf]h]6κ /ut eo{/St gnldf k]fx xbf xdf]z/L/sf ljleGg sf]fxZdf k%ofp5 / z/L/sf sf]fn]kp]u ug{yfN5 t/cfjZostfeGb a9l ePdf sf]h]6κ /St gnldf hddf eo{/St ;~rning lj]ofdf cj/fw u5{.

Psf0 @) dfgj z/L/df /St ;~rf/ ljllof

(Blood Circulatory System in Human Body)

cgdfllgt 366L M \$

-s_ ljlzi6 p2lloxz

o; Psf0sf]cGtodf ljBfylx /utsf]agfj6 / sfo{Pjd\ut ;~rfng ljllof lrq; lxt aofg ug{; lfd xg]5g\.

-v_ kl/ro

dfgj z/L/df /ut cToGt dxEjkOf{ j:t'xf]. xfdln]vfPsf vfBj:t'Pjd\Zjf; af6 lnPsf] clS;hg ;dj /utdf kl] dfq z/L/sf x/ps sf]fxzdf kl]fx xG5 . o; u/L /utn]g} sf]faf6 ljsf/ j:txz ; a'sng u/L krf] ; f] d[uf h:tf c'uxz ; Dd k%of0{ z/L/aflx/ k7fpg ; xofu ub5 . o; kf7df /utsf]agfj6, ljleGg lsl;dsf /St sf]zsfxzs] hfgsf/L lbgf ; fy}dfgj z/L/df xg]/St ;~rfng ljllof (Blood circulatory system) Sf] lj:t] JofVof ul/Psf]5 . o; kf7df o;sf cltl/St d6sf]agf / sfo{Pjd\ljleGg lsl;dsf /St gnlxz -lz/f, wdgl / slzsf_ sf]agf Pjd\sf]af/]klg :ki6 kfl/Psf]5 . ljBfylxnf0{of]kf7 lzlf0f ubf{log}fly plNnlvt s'fxznf0{; d6] lzlf0f ug]xG5 .

-u_ z]lfs ;fdulxz

d6sf]rf6{jf dfBn, dfgj /St ;~rf/ kOfnlsf]rf6{/St sf]zsfxz b]vg]rf6{tyf kf7bk'tssf]ljlofsnfk u/fpg cfjZos ;fdulxz .

-3_ lzlf0f l;sf0 ljlofsnfk

- ljBfylxnf0{/utsf]dxEj / agf]sf af/]f ;fdGo hfgsf/L u/f0{kf7bk'tssf]ljlofsnfk g=20.1 u/fpgxf]\.
- /utdf xg]ljleGg lsl;dsf /St sf]fxzsf]agf / Itglxzsf]sfdaf/]atf0lbgxf]\ / /St sf]fxz 56bpg kf7bk'tssf]ljlofsnfk g=20.2 u/fpgxf]\.
- dfgj d6sf]dfBn jf rf6{b]f0{o;sf]agf, ljleGg efuxz lrgfpgxf]\. d6h]s;/L /St ;~rfng ub5 eGg]f/]JofVof u/L :ki6 kfl/lbgxf]\. o;f]ubf{d6sf ljleGg efuxzn]ug]sf / Itgsf]dxEj sf]JofVof ug{g56fpgxf]\.

- d6bf6 z/L/df /ut k%ofpg]/St gnlx₂ / d6bf /ut Nofpg]/St gnlx₂ rf6bf b]f0{ltglx₂n]ug]sfd / agf6af/]atf0lbgxf] \.
- ;Dej eP kf7bk:tssf]lj]ofsnfk g⁺20.3 u/fpgxf] \.
- dfgj z/L/df xb]/St ;~rfng lj]of (blood circulator system) sf ksf/x₂ l;6]ds / kNdf]/Lsf af/]hf hfgsf/L lbgxf] \. ol b0{k0ffnlx₂n] ug] sfdaf/] :ki6 kfl/lbgxf] \.
- d6sf]w8sg / /St rfk (blood pressure) s]xf]< pRr / Gog /Strfk eg]sf]s:tf] cj:yf xf]cflbaf/] :ki6 kfl/lbgxf] \.
- ;Dej eP :jf:Yo :jod\]j sf af]f0{ljBfylx₂sf]/St rfk gfk g nufpgxf] \. geP klg l:kNdf]ofgf]d6/ Nof0{d6sf]w8sg ;b]pg]lj]ofsnfk g⁺20.4 u/fpgxf] \. ljBfylf0{cf0gf]lgb]gdf kf7sf]u/L, x]l l;Sgxf] \eGg]lj]ofsnfk ug{lbgxf] \ / 5nkin ugxf] \.

-a_ dNof^asg

- != kf7bk:tssf]cEof;sf kZgx₂ uk\$fo\$_f ₂kdf ug{nuf0{k/Llf0f ugxf] \.
- @= slffdf ul/g]ljleGg lj]ofsnfkdf ljBfyl\$] ;xflutf, p;n] b]fpg] Jojxf/ / kZgf]/sf cfwf/df ljBfyl]aeb]ab]sf]Plsg ugxf] \.

-r_lzlfsnf0{yk hfgsf/L

- KnfHdfdf /St sf]fx₂ t]/x]sf x05g\.
- z/L/df cfjZostfeGbf sd RBC ePdf Plgldof eGg]/f] nfu5 .
- KnfHdfdf ()=(@ % kfgl, &=(% k]6g,)=(% nj0fx₂, vfB kbfx₂, grflxg] kbfx₂, Uof;, OGhf0dx₂, xdf]x₂, PlG6a8lx₂ tyf PlG66IS;gx₂ kf0G5g\.
- RBC df kf0g]x]f]nflagn]k]f;f]j]foy]l (airsac) af6 O₂ z]f]of ug]sfo{ub5 .
- WBC n]z/L/df k]t/f]v z]St a9f0{ljleGg /f]sf ls6f0fx₂ gi6 ub5 .
- WBC n]ljleGg rf6k6s nfu]sf t0tx₂nf0{x6fpgsf ;fy}3fpx₂ lgsf]kf5{.
- ;fwf/0ftof WBC / RBC sf]dfqf a9l jf sd ePdf /f] nfu5 .
- x]f]nflagn]O₂ ;f]g]/ Co₂ nf0{lgisf;g ug]c^aux₂df k%ofp5 .

- /utdf kf0g]k0f0agf]hg (Fibrinogen), Fibrine / globulin n]z/L/nf0{ ;/lff u5{.
- d6'sfl86fs d;naf6 agsf]x65 .
- dfgj d6' jlf:ynsf]afok66 s/^a alr ;/lft /xsf]x65 .
- nf]g]dflg;df d6sf]tfh \$)) gm / :jf:glcf5df @%) gm hlt x65 .
- d6'sf]f cfsf/sf]x65 .
- dflg;sf]d6' ;fdf6otof Ps ldg]df &@-*) k6s;Dd wl8665 .
- kNdf]L wdgL / c6 ;Dk0f{lz/fdf cz4 (Deoxygenated) /ut au5 .
- lz/fx6 ldn] dxflz/fsf]lgdf0f x65 .

/St rfk

Ps hgf jo:s dflg;df kfo l;:6f]ns (Systolic) 120 mm Hg. / 8fo:6f]ns (Diastolic) 80 mm Hg. x65 hg /St rfk gfk]g]o6qn]gfk] yxf kf065 .

Psf0 @! j zfgj|d (Heredity)

cgdf|gt 3G6L M ^ 3G6L

-s_ l|lzi6 p2|oxz

o; Psf0sf]cGtodf l|BfylxŁ lgDglnlvt sfo{ug{; lfd xg]5g\\
!= d|8nsf lgodxŁ / kpf|xŁ lrq; lxt JofVof ug{.
@= k|n / lgjŁ u0fxŁ (dominant and recessive trails) klxrfg ug{ .
#= j zf0fj|dsf u0fxŁsf]; 'L agf0{j zf0fj|dsf u0fxŁsf]klj|of j0fŁ ug{.
\$= 8LPgP / cf/PgPsf]j0fŁ ug{.
%= l|l|wtf÷kl/j|Q (variation) klj|of JofVof ug{.

-v_ kl/ro

xfdf j/k/ ePsf jg:klt Pjd\ hgfj/xŁ PsfsfŁf k|/sk|/s xŁ5g\ . of] k|/skg
j zf0fh]lgwf{of u5{. j zf0fut u0fxŁ ; Gtfgd ; g|lgodxŁsf]; Gbedf o; Psf0df r rfŁ
ul/g]5 .

-u_ z|f|fs ;fdul|xŁ

d|8nsf]kpf]usf]rf6{ d|8nsf lgodxŁsf]; 'L, 8LPgP / cf/PgP k|/s plNnlvt rf6{
b0Łpf sf'rsf lunf;xŁ, ;]f @% cŁf e6df;, snf @% cŁf e6df;, sf8{afB{ s}L,
:sh, ud cflb .

-3_ lzlf0f l;sf0 l|pfsnfk

- j zf0fut u0f egB]s]x]eGg]kZg slffsf ; a}l|Bfylf0{; f|L kfn]kfn]pQ/ eGg
nufpgxf] \.
- pglxŁnf0{; d|8}j zf0fut u0fsf]kl/ro elglbgxf] \.
- d|8nn]u|B]kpf]usf]rf6{k|t't u/L F1, F2 / F3 j zsf]JofVof ugxf] \.
- l7dfxf (hybrid) sf af/Łf 5nk|n ugxf] \.
- d|8nsf]k|ntsf]lgod rf6{ lxt j0fŁ ugxf] \.
- d|8nsf]n}us z4tsf]lgod rf6{ lxt aofg ugxf] \.

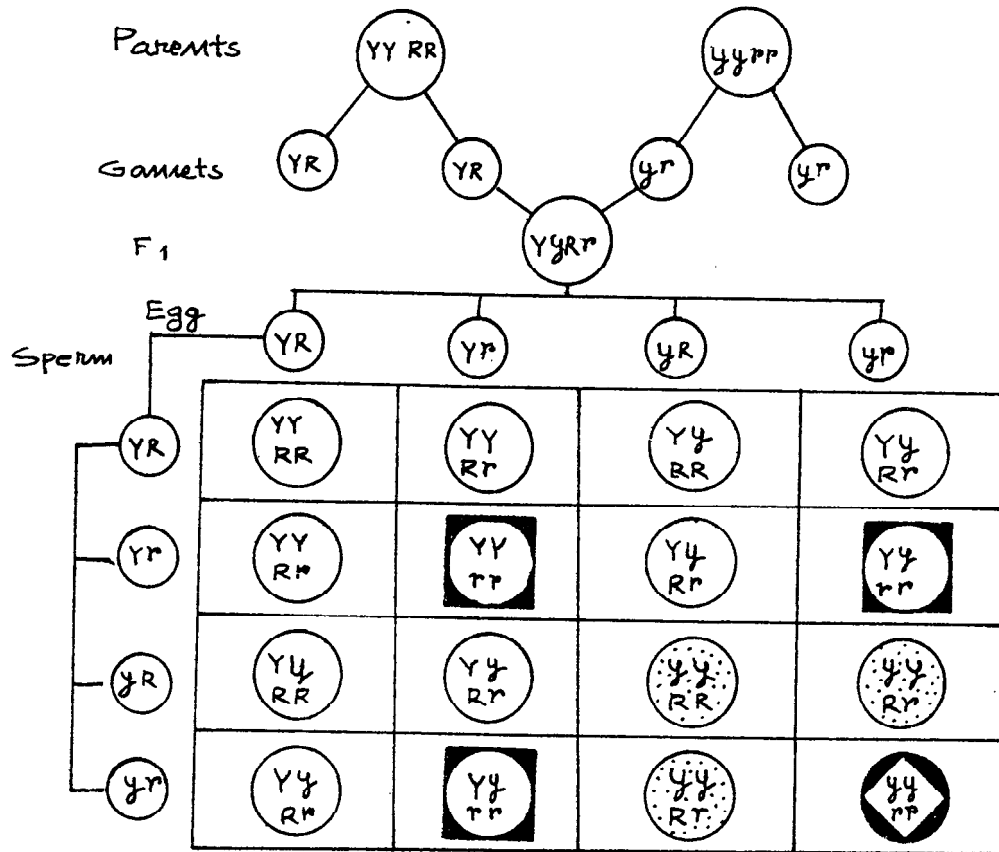
- d) 8nn]cfGgf]kpf]sf nflu s]fp 5fGsf]sf/Of M
 - s]fpdf l]leGg j}nks u0fx\ xG5g\.
 - s]fpdf ;lhn}ü k/fu;]rg ug{;lsG5 .
 - s]fpsf]hljg r j| 5fG]xG5 .
 - s]fp ;lhn}ü pdfg{;lsG5 .
- k]n (dominant) / nkt (recessive) u0f ePsf ;Gtfgx\nf0{l7dxf (hybrid) elgG5 .
- ;dfg jzf0sf]hfBnf0{xpf]hf0u; (homozygous) elgG5, h:t}M RR, rr, TT / tt . pXL
 jzf0sf]hfB jldzM R / r, T / t jzf0sf]xpf]hf0u; xG5 . To:t}kM/s jzf0sf]hfBnf0{xpf]hf0u; (heterozygous) elgG5, h:t}M Rr, Tt
- sb}vf; u0f b]fpg]Ps hfB jzf0f, h:t}M Rr, Tt df R sf]hfB R / T sf]hfB
 t sf]jzf0fhf0{;xjzf0f' (allele) elgG5 .

d) 8nsf]lgod

d) 8nn]kpf]kZrft\k|tkfbg u/]f lgodx\ M

- Psn nlf0sf]lgod
 - k]ntsf]lgod (Law of dominance)
 - ;Gtfgx\sf]z4tsf]lgod (Law of segregation)
 - :jtGqtfsf]5gfGsf]lgod (Law of independent assortment) .
- Psn nlf0sf]lgodcg';f/ ;a}Psn nlf0f jzf0fut nlf0sf]Uofd}df cnucnu
 k|tlglwTj ub5g\ . ol nlf0f Ps lk9laf6 csf]lk9ldf cnucnu hfG5g\ . h:t}M cUnf]
 / xpf]nlf0sf]cnucnu Uofd} xG5 .
 - Pp6fPp6f kM/s u0f ePsf la?jfx\df k/k/fu;]rg (cross pollination) u/fpbf l7dxf
 kkt xG5 h;af6 kkt la?jfx\ cUnf g}xG5g\ . o; l]lofn0{dfpf]j}j|; (Mono
 hybrid cross) elgG5 .
 - dnf]0laß j|;sf]bf]j}j (F2 generation) df lk9f]0lks cgkft #M! /
 lhgf]0lks cgkft !M@M! xG5 .

di8nsf18f0xf0lai18 il: sfl tflnsf



; a s }	
R	uf[hf]
Y	kx[hf]
R	rfpl/Psf]
Y	xl/of]

संकेत	फिनोटाइप	संख्या	जिनोटाइप		अनुपात
	गोली, पहेलो	9	RRYY RRYy RrYY RrYy	1 2 2 4	9
	गोली हरियो	3	RrYy rrYy	1 2	3
	चाउरिस्को, पहेलो	3	rrYY rrYy	1 2	3
	चाउरिस्को हरियो	1	rryy	1	1

kl/jQ / lhg

- Pp6}cfdafafa6 hGd}f ;Gtfgx&df kf0g]leGgtf g}kl/jQ xf].
- slxn}fxl"sg}hfltdf crfgs jf PSSfl; sg}gof"nlf0f b}vf kb5, hg To; hfltsf] k}fha6 cfPsf]xbg . o;kf/sf]kl/jtgnf0{pTkl/jt (mutation) elgG5, h:t}|| sg}dflg;df kfrcf}cf]hsf];66f ^ cf}xb'.

pTkl/jtgsf sf/0fx&

- jftfj/0fsf]kl/jtgn]ubf{
- sfo&sf]kl/jtgn]ubf{
- lhgx&df pTkl/jtgn]ubf{.

GolSno;sf] jftfj}hfltdf kf0g] Pp6f dxEjk0f{ j:t' h;n] cfdafafasf] u0fnf0{ ;Gtfgdf k;f/0f ub5 eg]To;nf0{lhg (gene) elgG5 . lhg DNA / RNA eG]GolSns Pl;8af6 ag}fxG5 . DNA / RNA GolSnof}f08\ (nucleotides) ldn] ag}fxG5 . Pp6f GolSnof}f08\ ;u/, k}f]k}f / gf06lhg a;n]ag}fxG5 . DNA / RNA df ;u/ / gf06lhg a;df s}xl k}/s kf0G5 .

DNA n]RNA âf/f ;'rgf k7fP/ sg}hljsf]:jefjnf0{lgoGq0f ub5 .

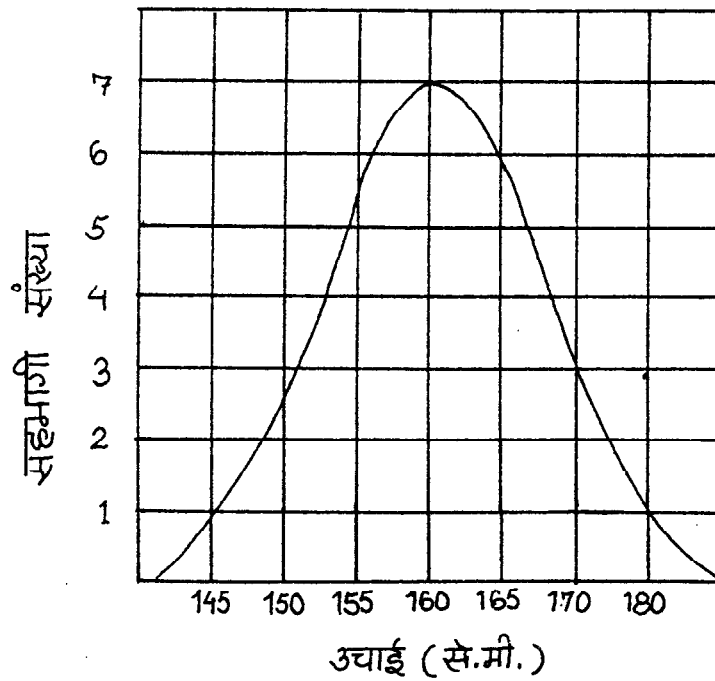
kf7bk'tssf]lj|pfsnfk g#@ lgDgfg';f/ ug{;lsG5 M

;fdu|

■ 6k, ufkkkk/, k|;n, :sh cflb .

lj lw

kf7bk'tsdf pNny ul/Pcg';f/ lj|pfsnfk u/L ljBfyl{xsf]prf0 tyf ;xeful ;^aVofsf cfwf/df dfglrq -ufk_l lvRg]. ufk_l lvRbf x clfdf ;xeful ljBfyl{xsf]prf0 -;|d_y / y clfdf ;xeful ljBfyl{xsf] ;^aVof /fvG]. o ;/L tof/ kfl/Psf]ufk_lsf cfwf/df ljBfyl{xsf] ;^aVofcg';f/sf]prf0nf0{ljZn}f0f u/L kl/j[Qn]ubf{hfltdf k/s cfp5 egl slffsf ljBfyl{xnf0{k|6 kfl/lbg].



Psf0 @@ kfl/l:ylts k4lt (Ecosystem)

cgdfllgt 3G6L M %

-s_ljlzi6 p2]oxç

o; Psf0sf]cGtodf ljBfylç lgDglnlvt sfo{ug{; lfd xg]5g\

!= kfl/L / hldgsf] kfl/l:ylts k4lt df pTkfb, pke\$tf / ljR5]s hljxçalrsf] cGt/; DaGw JofVof ug{.

@= hlj lk08sf]lk/fld8 (pyramid of biomass) lrq;xt j0fç ug{.

#= hlj e"/f;folgs rj| (biogeochemical cycle) sf]JofVof ug{.

-v_kl/ro

jftfj/0fdf ePsf ;hlj / lghlç j:txçalrsf]cGt/; DaGwaf6 kfl/l:ylts k4lt ; ~rfng e0/xç] xG5 . hljhGtsf] jf;:yfgcg';f/ hn / hldgdf kfl/l:ylts k0ffnl rln/xç] xG5 . x/ç kfl/l:ylts k0ffnldf nj0fxçsf] cfbfgkçfg e0/xG5 . o; klj]pfnf0{hlj e"/f;folgs rj| elgG5 .

-u_z]lfs ;fdu|xç

■ hn tyf :yn kfl/l:ylts k0ffnl;ü ; DalGwt cxf/ zP\vnf rf6{ kfl/l:ylts lk/fld8sf]rf6{ hn rj|, clS;hg rj|, sfaç rj| / gf06çhg rj|sf rf6çç .

-3_lzlfof l;sf0 lj]pfsnfk

■ ljBfylççnf0{; dXdf lje fhg ugç] \. k]oç ; dXnf0{ljBfnosf] rf]sf] ljleGg :yfgdf u0{pSt 7fpdf ePsf ;hlj j:txç, lghlç j:txç c]nfçsg u/L l6Kg nufpgxf] \. slff sf]fdf cf0{ltglxçalrsf] ; DaGwdf 5nkln ugç] \.

■ dflysflj]pfsnfksf cfwf/df kfl/l:ylts k4ltsf af/ç :ki6 kfgç] \.

■ hn tyf :yn kfl/l:ylts k4lt df xg]h]s tyf ch]s tçjxçsf]pbfx/0f lbP/ 5nkln ugç] \.

■ kfl/l:ylts k4lt df xg]pTkfb, k]yd pke\$tf, bf]ç] pke\$tf, t]ç] pke\$tf tyf ljR5]ssf af/ç atf0lbgxf] \. ;fy}hn / rf]df xg] kfl/l:ylts k4lt df sg pTkfb, pke\$tf / ljR5]s xg] < loglxçsf sfd s]xg] < jftfj/0f c;Gthg s;/L xG5 eGg]af/ç 5nkln u/L atf0lbgxf] \.

- hn tyf hldgsf]kfl/l:ylts k4ltsf]cxf/ zP\vnf rf6{kþzǫ u/l 5nkᴉn ugxf] \.
cxf/ zP\vnfsf]yk rf6{tof/ kfg{nufpgxf] \.
- kfl/l:ylts lk/fld8sf]pbfx/0f; lxt lsl; d atf0lbgxf] \.
- hnrj]sf] rf6{kþzǫ u/l o; sf]dxEjaf/]5nkᴉn ugxf] \.
- clS;hg rf6{kþzǫ u/l o; sf]dxEjaf/]5nkᴉn ugxf] \.
- sfaǫ rf6{kþzǫ u/l o; sf]dxEjsf ;DaGwdf 5nkᴉn ugxf] \ .
- gf06ǫhg rf6{kþzǫ u/l o; sf]dxEjs]5 < kPgf0/ ugxf] \.
- kf7ǫk:tssf]u/l, x]l l; Sgxf] \zlf{s]sf]sfd u/fpgxf] \ / k[7kf]0f lbgxf] \.

-a_d\ofa\sg

!= hn kfl/l:ylts k4ltdf xg]h]js / ch]js tEjxǫ sþ]5g\<
 @=:yn kfl/l:ylts k4ltdf xg]Pp6f cxf/ zP\vnfsf]gdbf eGgxf] \.
 #= lbgf0l6kᴉs]g egþf]s]xf]<
 \$= kf7ǫk:tssf cEof;af6 kPgxǫ ;f]g].

-r_lzlfnsnf0{yk hfgsf/L

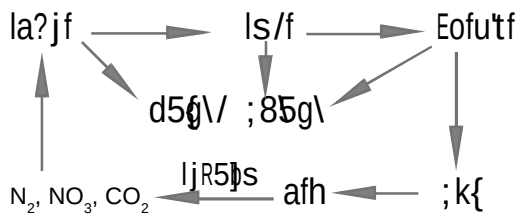
- gf0l6kᴉf0^a AofS6]/of
 - o:t] AofS6]/of h;n] jfod08ndf ePsf]gf06ǫhgnf0{gf06ǫ6 / gf06ǫdf
kl/jtǫ u5{To:t]AofS6]/ofnf0{gf0l6kᴉf0^a JofS6]/of elgG5 .
 - gf06ǫhg lkᴉS;]g
 - ljleGg klj]lofaf6 jfod08ndf ePsf]gf06ǫhg, gf06ǫ6 / gf06ǫdf kl/jtǫ xg]
lj]lofnf0{gf06ǫhg lkᴉS;]g elgG5 .
- gf06ǫhg l:y/Ls/0f tlǫ kþf/af6 xG5g\||
 != eflts l:y/Ls/0f
 @= cþf]us l:y/Ls/0f
 #= afof]h]nsn l:y/Ls/0f

- k/lhjL
 - k/lhjL egšf]cŁ k[0fldf efhg ug[/ cŁ k[0flsf]z / /df a:g]hŁt'xf].
- vfB zPvnf
 - vfgš /fxŁ Ps hlja6 csf]hljdf kŁg] / kgll k[nsŁ]zPvnfnf0{vfB zPvnf elgŁ5 .
- ;dbfo
 - tl k[0flxŁ hf]Psfsf]f lge{ 5g\ / Ps}kšf/sf] ;ferf jftfj /0fdf a:5g\ ltglxŁnf0{ ;dbfo elgŁ5 .
- 0sf] ;:6d (Ecosystem)

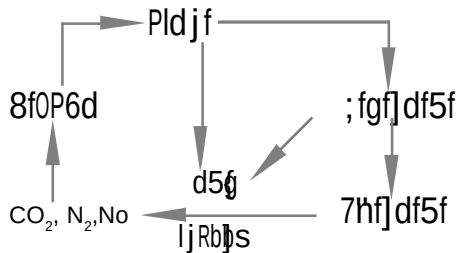
jg:klt, k[0fl / jftfj /0falrsf]cŁt / ;DaGwnf0{0sf] ;:6d elgŁ5 .

pTkfbš (Producer)	–	3f“, kftxŁ
kŁyd pkefštf (Primary Consumer)	–	uf0{ v /fof]
låtlo pkefštf (secondary Consumer)	–	;k{ dflg ;, k /]f, df5f
ljR5šš (Decomposer)	–	JofS6] /of, Rofp .

:yn 0sf] ;:6dsf] /]vflrq



hn 0sf] ;:6dsf] rf6{



0sf];:6dnf0{c;/ kfg[ef]ts kljlofx¿

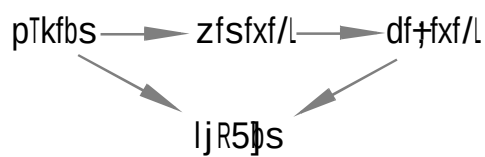
-!_ kfgl -@_ kßfz -#_ pi0ftf cflb .

vfB z[Vnfsf sfo¿¿

-!_ 0sf];:6dsf hlljt j:tx¿sf]agfßaf/]1fg lbG5 .

-@_ o;n]zlst tyf ljleGg kbfyf0{0sf];:6dsf ljleGg txx¿;dlf k%ofp5 .

0sf];:6ddf zlst kl/jt¿sf]af6f]



ljBfyL¿¿nf0{"Web of life" ;DaGWL lgDgfg';f/ vjh vjhpg ;lsG5 M

;do M #)-\$) ldgß

:yfg M slffaflx/

cfjZos ;fdulx¿

!= wfuf]

@= sf8¿¿ -;b{ kfgl, df6f] xfjf, la?jfx¿, hgfh/x¿ 0Toflb_

#= lkg jf lSnk

p2Z0

o; vjh]vjhf8lx¿nf0{ljleGg jftfj/0fdf kf0g]j:tx¿sf]kfl/l:yltslo k4ltsf cGt/
;DaGwaf/]Joj:yf ug{d2t u5{.

ljlofsnfk

!= vjh8lx¿nf0{3]f ldnfP/ a:g nufpg].

@= ;a}vjhf8lx¿nf0{PsPs sf8{af8g]. sf8{af8bf ;b{ df6f] xfjf / kfgl ;dfjZ xg'
k5{.

#= ;a}vjhf8lx¿nf0{cfÇgf]sf8\$]lrq b]vg]u/L lkg nufpg].

\$= kljldf hlljt /xgsf nflu cfjZos zlst ;baf6 wfufßf]ufhf c¿nf0{lbg ;?
ug]. wfufßf]Ps kGsf]cf]hdf ag].

Psf0 @#

k[j]lsf]0ltxf; (History of the Earth)

cgdfllgt 366L M %

-s_ljlzi6 p2]ox;

o; Psf0sf]cGt0df ljBfylx; lgDglnlvt sfo{ug{; lfd xg]5g\

!= r66fg / cjz]faf6 k[j]lsf]0ltxf; JofVof ug{.

@= hljjfz]faf6 k[t kpf0fx;sf cfwf/df hljx;sf]jld ljsf;sf]j0f6 ug{.

#= hljjfz]fsf]klxrfg u/l hljjfz]f / h]js OGwg aGg]klj]ofsf]JofVof ug{.

\$= h]js OGwgsf]dxEj JofVof ug{.

-v_kl/ro

o; Psf0af6 ljBfylx;n];f008nsf]pTklQaf/]ljleGg kl/sNkgfx; atfpg ;Sg]5g\.

k[j]lsf]0ltxf; / hlj ljsf; jld, efyle\$;do, sn cflbsf]j0f6 ug{; lfd xg]5 .

hljjfz]fsf]kl/ro, klxrfg, dxEj, hljjfz]f aGg]klj]of cflbsf]j0f6 ug{;Sg]5g\.

vlgh OGwgx;sf]lgdxf xg]klj]of / dxEj atfpg ;Sg]5g\.

-u_z]lfs ;fdulx;

sf0nf, kpf, d66tj, l8hj, k[j]lsf]pTklQ, hljjfz]f cflbsf]gdgf .

-3_lzlf0f l;sf0 lj]ofsnfk

k[j]lsf]pTklQ tyf efyle\$ ou

► k[j]lsf]pTklQ ;DaGwdf lgDgg';f/ tflnsdf k[t't u/l ljBfylx;nf0{ k9g nufpgxf];\

j]flgssf]gfd	b]z	;fn	kl/sNkgf
hh{jkig	k]fG;	1749	;b{x'u nfdkR5]kf/f 7]sbf pl566P/ k[j]l ag]sf]
sf66	hd6	1755	jfikk0f{ljzfn lk08 ;hfpbf vIDrP/ k[j]l nufot c6o uxx; ag]
lhG; / h]k]	la6j	1917	7hf]tf/f ;b{glhs cfpbf ;bdf Hjf/ pTkGg e0f k[j]l pTklQ ePsf]

- tflnsfdf n\VPsf 5f6s/L kl/sNkgfnf0{lzlfsn]JofVof ugxfj\.
- k\j\laf/]k\kt tYofa\sx; afBdf k|tt u/] lJBfyl\nf0{gf6 ug{nufpgxfj\.

efyle\$;do tflnsf

- 0of6, dxfsNk, sfn, ou cflbsf]kl/ro lbgxfj\.
- ljleGg dxfsNkx; h:t}M cfB k'fhlj, d\ohlj / gjhlj dxfsNksf]cjlw, k\bef] ePsf k\pv hljx; k\j\ldf ePsf cGo kl/jt6af/]tflnsf agf0{k|tt ugxfj\.
- hlj ljsf; s;/L eof]/ hlj ljsf;sf]c\oogdf hljfjz]fsf]dxEjaf/]JofVof ugxfj\.
- efyle\$ ou tyf hlj ljsf;sf]j\ld tflnsf lJBfyl\nf0{c\oog u/fpgxfj\.
- k\pv hljx; peor/, ;l/;k, kG5L / :tgwf/L 8f0gf]/, 3fBf, xfQL, dflg; cflb slxn]pTklQ ePsf xg\;d/0f u/fpgxfj\.

hljfjz]f

- hljfjz]fsf]kl/ro lbgxfj\.
- hljfjz]fsf]klxrfg kf7bk'tsaf6 lJBfyl\nf0{k9b lbgxfj\.
- hljfjz]f aGg]klj\of kf7bk'tsaf6 lJBfyl\nf0{k9b nufpgxfj\.
- hljfjz]f s;/L aG5 egl ;f]gxfj\.
- hljfjz]f lsg cfUg6 / kl/jlt; r66fgdf kf0b6 ;f]gxfj\.
- hljfjz]fsf]dxEj atfpgxfj\.

vlgh OGwg

- vlgh OGwgsf]pbfx/0f;ixt kl/ro lbgxfj\.
- vlgh OGwgnf0{OGwg eGgsf]sf/0f atfpgxfj\.

sf0nf

- sf0nfsf]kl/ro lbgxfj\.
- lJBfyl\nf0{sf0nf aGg]tl/sf kf7bk'tsdf k9b nufpgxfj\.
- sf0nf aGg]tl/sf lJBfyl\nf0{;f/fzdf k|tt ug{nufpgxfj\.
- sf0nfsf]dxEj lJBfyl\nf0{eGg nufpgxfj\.

vlgh tñ

- vlgh tñsf]pbfx/0f;ixt kl/ro lbgxf]\. kñ, l8hñ cflbsf]gdgf bñfpgxf]\.
- vlgh tñ aGg]tl/sf kf7bk'tsdf k9] ljbñf0{k|tt ug{nufpgxf]\.
- kñmod kbñ{/ o;sf]pkof]utfaf/]5nkñn ugxf]\.
- vlgh tñsf]dxñjaf/]5nkñn ugxf]\ .

-a_dñof^sg

```
!= kñ]lsf]pTklQ ;DaGwdf hh{jkñgsf]kl/sNkgf s]xf]nñgxf]\.
@= eññe$ ;do egñf]s]xf]< o;nñf0{sltcñf dxfsNkdf lñefhg ul/Psf]5, gfd
nñgxf]\.
# 8f0gf]/sf]pTklQ, ljsf; / nñk sgsg sfndf eof].
$= hlñfjzñf egñf]s]xf]< hlñfjzñf s;/L aG5 < hlñfjzñf lsg kq] r66fgdf dfq
kf0G5 <
%= vlgh tñ egñf]s]xf]< of]s;/L aG5 <
```

-r_lzlfnsnf0{yk hfgsf/L

kñ]lsf]pTklQ tyf eññe\$ ou

- lzz'uñsf]l;4fñt ñ ;g\!())\$ df cdñ/sl jñflgsxñ RofDalnñ / dfpN6gn]lzz' uñsf]l;4fñt kltkfbg u/]. pglxñsf]egf0cg';f/ ;bñf]glhssf]af6ñaf6 csf]sg} tf/f uñsf]xgkbñ . tl b0ñr sf]kf/:kl/s u?Tjfsifñf zlstñf/f Hñf/ef6f pTkGg e0{kñ]l nufot cño uñ tyf pkuñxñ agñf xgñ.
- whlo s0f l;4fñt ñ hdñ jñflgs 8f- ;l= afñ ljh;fPs/ / ?;l jñflgs c6ñ:d6 o; l;4fñtsf kltkfbs xgñ. uñxñ ;bñf]czaf6 agñf xñggñ. loglxñ cfsfz u^ñf leqsf lgxñf/sf (nebula) sf whfsf s0fxñ ;^sng e0{agñf xgñ.
- kñ]l lñleGg kñf/sf r66fgxñ ldnñ agñf]7fñ lk08 xf]h;nñf0{jfob08nsf]kftnf] kqñ]9fsñf]xG5 . kñ]l k0f{ñkdf uññf]ge0{o;sf]wñlo efu yñkrPsf]xgñf] eñwo/yñdf kñ]lsf]jof; !@,&%^ ls=ld= xG5 .
- kñ]lsf]agññf0{jñ6, DofG6n, aflx/l sfñ tyf leql sfñ u/l hñdf rf/ efudf lñeflht ul/Psf]5 .

k[j]lsf]agf

j;#	tEj	;a	t]nsf]k tzt
1.	knfd	Fe	34.6
2.	clS;hg	O	29.5
3.	l;lnsg	Si	15.2
4.	DofUg];od	Mg	12.7
5.	lgs	Ni	2.4
6.	;Nk/	S	1.9
7.	SoflN;od	Ca	1.1
8.	Pndlgod	Al	1.1
9.	;f]8od	Na	0.57
10.	j]f]d:d	Cr	0.26
11.	Dofulgh	Mn	0.22
12.	sf]fN6	Co	0.13
13.	k]f]k/;	P	0.10
14.	k]f]f;od	K	0.07
15.	l66lgod	Ti	0.05

- IjleGg Ijåfgx;n]k[j]lsf]cfo'sf]u0fgf IjleGg cfwf/df u/]. o;nf0{k[j]lsf]sfndfg (time scale) elgG5 . o; sfndfgsf cfwf/df Ij rf/ ug[xf]eg]k[j]lsf]cfo' sl/a !)

nfvb]v %) nfv jif{ePsf]cgdfg ul/Psf]5 . jf:tjdf k[j]lsf]sfndfgnf0{]flgsx;n] b0{k]sf/df Ijefhg u/]f 5g

 - ;[6;DaGWL sfndfg (cosmic time scale)
 - e]j]zf:qlo sfndfg (geological time scale)
- dflysf b0{sfndfgdWo];[6;DaGWL sfndfgnf0{eGbf e]j]zf:qlo sfndfgnf0{a9L kfyldstf lb0Psf]5 . k[j]lsf];[6 ePb]v xfn;Ddsf];dofjwnf0{e]j]zf:qlo sfndfg jf efyle\$ sfn elgG5 .
- efyle\$ sfnnf0{IjleGg 0/f (era), lkl/o8 (period) / Okf\$ (epoch) df Ijefhg u/L Pp6f tflnsf agf0Psf]5 . To; tflnsfnf0{efyle\$ sfn tflnsf elgG5 .

hlj fj zj

- k[j l s f j ; t x d l g r 6 6 f g d f / x j d / ʃ f h l j x ʒ s f j c w o o g u g j j f c j z j f s f j c w o o g u g j l j 1 f g n f 0 { k f l n o 6 6 f n h l (paleontology) e l g 5 . h l j x ʒ d / k l 5 n f d f j c ʒ t / f n d f c j z j f a ʒ g j l j l o f n f 0 { k m f j ; n f 0 h j } g (fossilization) e l g 5 .

hlj fj z j f s f j d x E j

- ; d o c g ' ; f / j g : k l t / h ʒ t x ʒ s f j c w o o g u g { ; l s 5 .
- s ʒ j 7 f p s f j r 6 6 f g s f j e f l e ʃ c f o ' j l l d s ʒ k n j k l t : y f k g u g { ; l s 5 .
- P s 7 f p s f j r 6 6 f g / c s f j 7 f p s f j r 6 6 f g a l r k f / : k l / s ; D a ʒ w y f x f k f p g ; l s 5 .
- s ʒ j k l g b j z s f j k f r l g e l f j h y f x f k f p g ; l s 5 .
- s f j n f t y f k ʒ j n o d s f j v f g l k ʒ f n u f p g ; x o f j u k ʒ o f p 5 .

vlgh 0 ʒ w g

- s j f j s f n f j a n g j v l g h h ʒ k ʒ f / r 6 6 f g s f ʒ k d f / x ʃ f j x ʒ 5 e g j T o ; n f 0 { s f j n f e l g 5 . s f j n f s f j k ʒ f / e f j t s ʒ k t y f l t g l x ʒ s f k ʒ [t l g D g f g ' ; f / 5 g \

s f j n f s f j k ʒ f /	e f j t s ʒ k	k ʒ [t x ʒ
l n U g f 0 6	s j f j / s j f j a f S n f j	g s l ; P s f j j g : k l t s f c j z j f b j v g j .
; a - l a 6 l d ʒ ;	s f n f j	l a ? j f s f j c j z j f c l n c l n b j v g j .
l a 6 l d ʒ ;	s f n f j a f S n f j / r x l s n f j	l a ? j f s f j c j z j f ; T d b z ʃ o ʒ q n j d f q b j v g j / a N b f l g n f j w j f " c f p g j .
c f ʒ y f ; f 0 6	s f n f j a f S n f j	l k 6 l k 6 e f f ' r g j / a N b f w j f " g c f p g j .

vlgh t j a ʒ l g D g l n l v t s / f x ʒ s f j c f j z o s t f k b ʃ \

- t j c 8 b f P / / f v g j r 6 6 f g .
- v ʒ b f v j l t j ; l h n j ʒ l 5 / j l g : s g j r 6 6 f g .
- t j n f 0 { d f l y a l g g l b g j l s l ; d s f j r 6 6 f g .
- v l g h t j h ʒ t ' / j g : k l t s l x P / l g : s ʃ f j k f a \ f l / s j : t ʃ f j a f S n f j k q a f 6 a g ʃ f j x ʒ 5 .

-s_lj|zi6 p240xç

o; Psf0sf]cGTodf ljBfylŁ lgDglnlvt sfoŁ ug{; lfd xg]5g\

!:= jfob08nsf ljleGg tx -cfhfg tx;d]_ af/]j0fg ug{.

@= cfhg txdf kg{Snf/fCnf/f}sfagsf c;/x¿sf]jOfg ug{.

kʰsʰts jʰftʰj/ʰfɔf xɿ/t uʰksʰf c;/xʌsʰf] ʰofʰof u/l s[ɔd xɿ/t uʰksʰf] dʰxɿj /
pkoʰf]uʰtsʰf]j ʰofʰ ug{.

\$= pBf]uaf6 lg:sg]s]L Uof;x¿sf k|tsh c;/x¿sf]JofVof ug{.

$$-v_{kl}/r_0$$

o; Psf0df ljBfylkē njkljlsfj jfod08nsf]agfBaf/]hfgsf/L xfl; n ugI5g\ . jfod08ndf /xsf]c]hfq Uof; sf]dxEj / o; sf]; Af0f ugIpkfo j0f0 ug{/ ; Af0fsf nflu pkfoxē cjnDag ug{; SgI5g\ . xl/t uk]sf]kl/ro, JofVof, pkof]utf j0f0 ug{; lfd xgkgI5 . s[qd xl/t uk]sf]j0f0 / dxEj atfpgsf ;fy}s[qd xl/t uk]lgdf0f u/L pkof] ug{klg ; SgI5g\ . jfod08n kplf0fsf kplv sf/0fxē atfpg ; SgI5g\ . jfod08n kplf0fsf]c;/ yxf kf0{kplf0f 36fpg]pkfoxē atfpg / ckpgpg ; SgI5g\ .

-u_lzf0f ;fdu

jfod08nsf ljleGg txxĲ ;dfjĲ ePsf]rf6{ knfl:6s -kf/bzĲ, jĲhfh/, cĲhĲ txsf
kfĲ6/xĲ, sfQd xl/t uksf]df8n, cĲBflus Uof;sf]c;/;DaGwl kfĲ6/xĲ .

-3 lzlf0f l;sf0 ljjofsnfk

j fobd08n

- jfod08nsf ;DaGwdf kZgfr/ u/L o;sf]kl/ro lbgxf]\.
- afBdf lrq nYj jfod08nsf ljleGg txxZ bYfpgxf]\jf rf6{kPzG ugxf]\.
- Uof; kbfi{sf]g ;lsg]ePsfni]k[j]lsf];txaf6 hlt dflly uof]xfjfsf]3gTj sd -xfjf kftnf] xg]s/f JofVof ugxf]\.
- k[j]l / o;sf]jl/kl/ /xsf]jfod08nsf ljleGg txxZ;lxT lrq ljBfykZnf0{klg nYg nufpgxf]\.

lgDgd08n

- jfoD08nsf]rf6{kþzġ ugxf] \. pSt rf6df lgDgd08nsf]:yfg b]vpg nufpgxf] \.
- lgDgd08nsf ljz]ftfxġ atfpgxf] \ h:t}|| df0, tfkj]dsf] cj:yf, oxf“ /x]sf] xjfsf]k|tzt, df]d ultjlw .
- df]d / lgDg d08nsf] ;DaGw atfpgxf] \.
- 6k]khsf]kl/ro lbgxf] \.

;dtfkD08n

- o; txsf]df0, tfkj]d, xjfsf]cj:yf cflb atfpgxf] \.
- o; txdf c]hfġ Uof; kf0g]prf0 atfpgxf] \.
- c]hfġ Uof; sf]kl/ro atfpgxf] \.

dWod08n

- kf70k'tsdf dWod08naf/]ljBfylf0{cWooog ug{u]sfo{lbgxf] \.
- df0, tfkj]d / xjfsf]l:yltaf/] ;f]gxf] \.

tfklod08n

- kf70k'tsdf lb0Psf tfklod08naf/]k9ġ lbgxf] \.
- tfklod08nsf ljz]ftfaf/]ljleGg kZg agf0{ ;f]gxf] \.

afx0d08n

- ljBfylġnf0{afx0d08naf/]kf70k'tsdf ePsf k9ġ nufpgxf] \.
- ljBfylġnf0{afx0d08nsf ljz]ftfxġ n]v] k|tt ug{nufpgxf] \.

c]hfġ tx

- c]hfġ Uof; sf]kl/ro lbgxf] \.
- k/fj]ġgl ls/0fsf] dbtn] c]hfġ Uof; s;/L lgdf0f xG5 ;dls/0f;ixt JofVof ugxf] \.
- c]hfġ Uof; ;f]k/fj]ġgl ls/0fn]ubf{l]R5]ġ klg e0/xG5 eGg]s'f ;dls/0f;ixt atfpgxf] \.

➤ kʰ[tɔf cʰhʰŋ lgdʰf / lʲR5]g ;GtInt ʒkdf xʁ5 . ol bʲ}lʲlɔfɔf k/fj]ŋgl
ls/0fsf]pkofʲ xʁ5 eGg]sʲf JoʲVof ugʰf] \.

➤ cʰhʰŋ Uof;sf]dxʁj atʰpgʰf] \. o;n]s;/L kʲjldf /xʰf kʰfɔxʁsf]/lff ubʁ,
atʰpgʰf] \.

cʰhʰŋ txsf]xʰf;

➤ dʰgʲ lgldʰ cʰhʰŋ lʲgʲz ugʲUof;xʁsf]gʲd afʰdʰ nʲgʰf] \.

➤ ol Uof;xʁn]cʰhʰŋ Uof; s;/L lʲgʲz u5{ atʰpgʰf] \.

➤ cʰhʰŋ lʲgʲz ugʲ[Snʰf]ʰnʰf]sfʰg slxn] lsg / s;/L kʰfʲudʰ NofʲP atʰ0lbʰgʰf] \.

➤ pSt Uof; sʰsʰg pks/0fxʁdf / sʰg j:t'pʰkʰfʰg ugʰdʰ kʰfʲ ul/ʁ5, atʰpgʰf] \.

➤ pSt Uof; s;/L jʰod08ndf kʰʰʁ5 / s;/L cʰhʰŋsf]lʲgʲz ubʁ, atʰpgʰf] \.

cʰhʰŋ xʰf;sf]c;/

➤ cʰhʰŋ xʰf;af6 dʰfg;sf]:jʰf:Yo, jʰg:klʰ / jʰod08ndf kgʲc;/ atʰpgʰf] \.

cʰhʰŋ ;ʰf0f

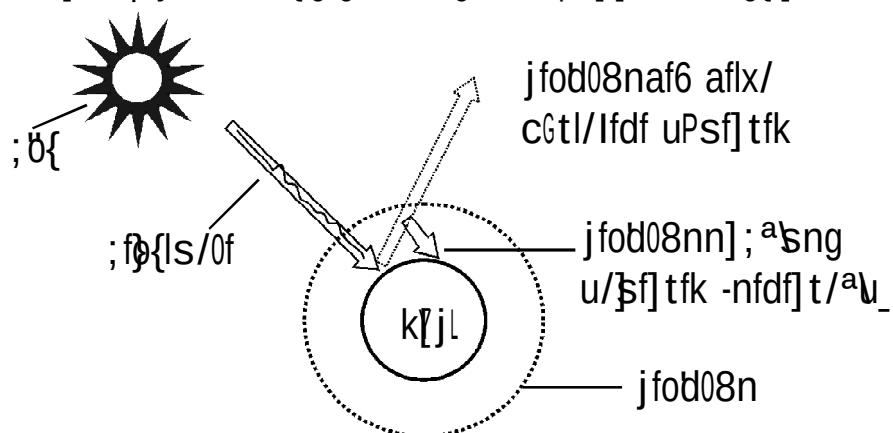
➤ cʰhʰŋ Uof;sf];ʰf0f ugʲ{sʰ}ugʰkʰ5 ln:6 tof/ ugʲnufʰgʰf] \.

xl/t uʰk kʰfj

➤ xl/t uʰk kʰfj sf]kl/ro lbʰgʰf] \.

➤ xl/t uʰkdf kʰfj kʰgʲUof;xʁsf]gʲd nʲʲ sʰg Uof;n]slʰ kʰtʰzʰ kʰfj kʰgʲxʰf]
afʰdʰ nʲʲ kʰtʰt ugʰf] \.

➤ xl/t uʰkdf kʰfj s;/L k5{lgʰgʲlnʰvt cʰgʰ;f/ lʰrʰq nʲʲ JoʲVof ugʰf] \



- ;baf6 kfk t ls/of 5ff] t/a\sf]x65 . k[jlaf6 5f]8g] tfksf]nfd] t/a\ x65 .
jfo08ndf 5ff] t/a\ l55{t/ nfd] t/a\ jfo08naf6 lg:sg ;Sb} . log}
sf/0fn]xl/t u[kdf kpfj k5{egl JofVof ugxf] \.

s[qd xl/t u[k

- s[qd xl/t u[ksf]kl/ro lbgxf] \.
- s[qd xl/t u[ksf]pkof]utf atfpgxf] \.
- s[qd xl/t u[ksf]gdgf ljlofsnfkdf h:t}k0z6 ugxf] \.

xl/t u[k kpfj

- jfo08ndf xl/t u[k Uof; a9l ePdf s]x65 < ljBfyl{ü ;f]gxf] \. ;xl pQ/
gcfPdf lzlfsn]atf0lbgxf] \.
- xl/t u[ksf]kpfj a9b}hfgSf]sf/of JofVof ugxf] \.
- xl/t u[ksf]kpfj a9b glbg s}] ug{k5{< ljBfyl{ü ;f]gxf] \ / kl5 lzlfsn]
atfpgxf] \.

cfB]us Uof;

- cfB]us Uof;sf]kl/ro lbgxf] \.
- kf70k'tsdf ePsf]k9b nufpgxf] \ / cfB]us Uof;df s}] kbfx{c kf065g\<
;f]gxf] \.
- cDnlo jiff{s;/l x65 < ;dls/of;ixt JofVof ugxf] \.
- cfB]us Uof; jfo08ndf a9b}hfbf s}]c;/ k5{< JofVof ugxf] \.

-a_dNofaSg

!= sb}7fpdf k[jlsf];txsf]tfkj]d 32°c eP To; 7fpSf]3 lsnf]d6/ prf0df
tfkj]d slt x65 <

@= lgDgd08n / df]dalr s];Da6w 5 < k|6 kfgxf] \.

cf]h} ljgfz ug]Uof;x6sf]gfd n]gxf] \. cf]h} Uof; s;/l ljgfz x65 <
atf0lbgxf] \.

\$= cf]h} xf;af6 xb]tlgcf]f c;/x6 n]gxf] \.

%= xl/t u[ksf]kpfj egSf]s]xf]<

^= xl/t u[kdf kpfj kfg]Uof;x¿sf]gfd n]yl sg Uof;n]slt k|tzt xl/t u[k c;/ k5{
n]vgxf] \.

&= s[qd xl/t u[k eg]sf]s]xf]< o;sf]Pp6f pko]utf n]vgxf] \.

*= s[qd xl/t u[kleq tfk]jd lsg a9l xG5 < JofVof ugxf] \.

(= cDnlo jiff{eg]sf]s]xf]< cDnlo jiff{s;/L xG5 < cDnlo jiff{af6 s]c;/ k5{<
lj]ofsnfk || s[qd xl/t u[ksf]gdgf agfpg nufpgxf] \

■ b0cf] sfuhs]aS;f lngxf] \. cufl8 k6]sf]efu sf6]xf] \.

■ Pp6fdf sf6]sf] ;txdf kf/bz\$ knfl:6sn]9fSgxf] \.

■ b0cf Pp6fPp6f ydf]d6/ 3';fpgxf] \.

■ b]j]sf]sf6]sf]efu 3fdlt/ k]sf] /fvgxf] \.

■ x/] @ ldg]df b]j]sf]tfk]jd gf] ugxf] \.

■ kf/bz\$sn]9fs]sf]aS;fdf tfk]jd vhf aS;fsf]eGbf a9l xg]5 .

lgisif|| s[qd xl/t u[kdf klq o;/L g}tfk]jd a95 .

-r_lz]fsnf0{yk hfgsf/L

jfod08n tyf o;sf ljleGg txx¿

■ k[j]l j|/kl/sf]xfjfsf]txnf0{jfod08n elgG5 . hg gf06]hg (78.08 k|tzt) /
clS;hg (20.94 k|tzt)ldnl ag]sf]xG5 . o;afx]j fobd08ndf cfuG (0.93 k|tzt),
sfaG8f0cS;f08 (0.03 k|tzt), lgof] (0.001 k|tzt) / lxlnod, ldy], lj]K6g, cf]h],
Pd]lgof, sfaGdgf;f08, cfof]8g cflb xG5g\.

■ jfod08ndf 5.15x10 6g xfjf ePsf]cgdfg ul/Psf]5 .

■ k[j]lsf];txaf6 16 lsnf]d6/ dfly;Ddsf]jfobd08n txnf0{lgDgd08n elgG5 . of]
d08n k[j]b]v hlt 6f9f xb}hfG5 Tolt g}lr;f]a9b}hfG5 . of]d08n dfgjlo
lj]ofsnfkaf6 a9l kpf]jt xG5 .

■ ;dtfklo d08nsf]20 b]v 40 lsld alrdf cf]h]sf]Pp6f tx xG5 h;n];baf6
cfpg]k/j]hgl ls/0fnf0{/f]l k[j]lnf0{/lff ub5 .

cfhfg txd f Snf/fnf/f]sfa[sf]c;/

- Snf/fnf/f]sfa[Pp6f /f;folgs of]us xf]/ o;df sfa[,xf08hg, Snf/g tyf Snf/gsf k/df0f' /x]f xG5g\ . of]cT0Gt}pkof]ul cf]f]us /;fog xf] . o;sf]sg} k[s[ts ;f] xbb} . o;sf]cf]j]isf/ yf] ;ldhn];g\!(#) df u/]f lyP . pgn]o; k]f/sf]Uof; b0{lbgd}kQf nufPsf lyP . o;n]xl/t u[k k]fj tyf cfhfg tx b]j}nf0{ l]gfz ub} .

xl/t u[k tyf s[qd xl/t u[k

- a9l tfk cf]jZostf kg]af]la?jfx[;sf lglDt jg:klt pBfgdf agf0Psf l;;fsf 3/x[;nf0{xl/t u[k elgG5 h;n]la?jfx[;nf0{Gofgf]kfb} . xl/t u[ksf l;;fx[;n] ;b}f]ls/0fnf0{leq l5g{lbG5 t/ leq l5/]f ls/0fx[;nf0{af]x/ lg:sg lbb} h;sf] k;n:j[;k xl/t u[kleq tfk]j]d j[4 xG5 . sfa[8f0cS;f08 afSnf]xb]u/l 9fs]f] k[j]lnf0{xl/t u[k;u thgf ug{;lsG5 .
- xl/t u[kdf e]k[j]lsf]tfk]j]d a9b]k[j]lofnf0{xl/t u[k k]fj elgG5 . of]k[j]lofdf efu lng]Uof;nf0{xl/t u[k Uof; elgG5 . sfa[8f0cS;f08, ldyb, cfhfg, gf06« cS;f08, Snf/fnf/f]sfa[cf]b xl/t u[k Uof;x[; xg\ .

Psf0 @%

aAdf08 (Universe)

cgdfllgt 3G6L M %

-s_ljIzi6 p2Jox¿

o; Psf0sf]cGtodf ljBfyl¿¿ lgDglnlvt sfo¿¿ ug{; lfd xg]5g\

!= ;f¿d08nsf]agf¿ / cfsf/ lrq;xt j0f¿ ug{.

@= ;f¿d08ndf xg]k5¿f/f / pNsfx¿af/]j0f¿ ug{.

k[s[ts / s[qd pkuxaf/]j0f¿ ug{.

\$= tf/fk~hsf]lrq;xt JofVof ug{.

%= tf/fsf]hljg l:yltdf xg]kl/jt¿ j0f¿ ug{.

^= sfnf]l5b|aGg]klj|of JofVof ug{.

-v_kl/ro

o; Psf0af6 ljBfyl¿¿ aAdf08sf];fdfco kl/ro lbg ; lfd xgkg]5 . cfsfzdf b]vg] ljleGg j:tx¿sf]j0f¿ ug{;Sg]5g\ . ;f¿d08naf/] ;fdfco hfgsf/L kkt ug]5g\ . ;f¿d08ndf e0/xg]36gfx¿ kR5¿f/f / pNsfx¿sf]kl/ro lbg / JofVof ug{;Sg]5g\ . k[s[ts / s[qd pkux eg¿f s]xg\ / s[qd pkux lsg 5f]8G5 eGgaf/]atfpg ;Sg]5g\ . tf/fk~h / tf/fd08ndf km/s 56bfpq ;Sg]5g\ . tf/fx¿sf]k¿f/, tf/fsf]pTklQ / tf/fsf]cGto s;/L xG5 eg]JofVof ug{;Sg]5g\ . To:t}tf/fsf]cGTokl5 xg]ljleGg k¿f/sf cjz]fx¿sf]agf¿ / ljz]ttf j0f¿ ug{;Sg]5g\ .

-u_lzlf0f ;fdu|

- Sofnsh¿/, sf8af¿ s]¿L, k¿;n, l:k¿NofDk, dl;gf]tf/, lrD6f, ;f¿kl/jf/sf]lrq jf df¿n, uksf]rf6{jf df¿n, tf/fd08n / kR5¿f/fx¿sf]rf6{ s]¿L tf/fd08nsf]lrq .

-3_lzlf0f l;sf0 lj|ofsnfk

aAdf08

- aAdf08sf af/]¿f ljBfyl¿¿;¿ kZgfQ/ u/L o;sf]kl/ro lbgxf]¿\.
- aAdf08df s¿]5g\ / s:tf j:tx¿ 5g\atfpgxf]¿\ h:t}|| tf/fk~hx¿, g]hf==,

cfsfz u^auf, ;f008n, uk, pkuk, lzzuk, pNsf, wds]' cflb .

;f008n

■ ;f008nsf]lrq b]v0{kl/ro lbgxf] \. ;f008nleq s]kb5g\ atfpgxf] \.

k}sfz jif{

■ k}sfz jif{eg}sf]s]xf]< atfpgxf] \. k}sfz ldg6 / ;s]8af/]kl/ro lbgxf] \.

■ k}sfz jif{sf]dfg / pkof]utf atfpgxf] \.

■ k}sfz jif{f0{lsnf]d6/df kl/oft ug{nufpgxf] \.

■ cGtl/lf Psf0sf]kl/ro lbgxf] \. o;sf]dfg / pkof]utf atfpgxf] \.

;b{

■ ;b}sf ;DaGwdf ljBfyl{xnf0{cfk[h]yxf kfPsf hfgsf/Lx{ eGg nufpgxf] \.

■ ;b{DaGwL tYof^as afBdf n]v] j0f6 ugxf] \ h:t}|| ;b}sf] ;f0h -Jof; , lk08, k[jlaf6 b]/L, ;fk]lfs 3gTj / o;sf]cy{ ;txsf]tfkjd, leql tfkjd cflb .

■ ;b}af6 b]vg]k}sfzh:t}c{ s}lg:sG5 < atfpgxf] \.

■ KnfHdf / ;f0{jtf;sf]kl/ro lbgxf] \.

■ ;b}df zlstsf]pTkfbg s;/L xG5 < atfpgxf] \. o;af6 xf06fng ;dfkt e0{Ps lbg ;b}sf]cGto xg] ;^as] lbgxf] \.

ukx{

■ ukx{af/] ;fdf6o kl/ro lbgxf] \.

■ tf/f / ukdf s}k]/s 5g\< ljBfyl{xnf0{n]vg nufpgxf] \.

■ cfsfzdf x]] uk s;/L lrGg ;lsG5 < sgsg uk b]vg ;lsG5 < atfpgxf] \.

■ afix/L uk / leqluxsf af/]df j0f6 ugxf] \.

■ cf7cf}f ukx{sf]jjld ldnfP/ afBdf gfd n]vgxf] \.

■ k]o}s ukxf]ljz]ftfx{sf af/]df 5nkin ugxf] \.

■ k[jlafx}s cG6o ukdf hlj ljst; gxg}sf sf/0fx{ JofVof ugxf] \.

■ sgsg ukx{ gf^auf]cfvfn]b]vG5 < sg j]hf b]vG5 / sg :yfgdf b]vG5 cflb s/fx{sf]hfgsf/L lbgxf] \.

- ljlēg uxx₂sf]pkux ;^avofaf/]atfpgxf] \. zlgf]pkux l66fgsf]ef]ts cj:yf atfpgxf] \.
- ;b₆f]Jof; 1 ld6/ dfb₆f k[j]l, jk:klt, zlg, d^aun, a_w, z'j] cflbsf]Jof; slt x₆₅ < lx;fa ug{nufpgxf] \. Sofnsh₆/sf]dbt lngxf] \.
- ljl₆ofsnfk ^ sf cfw/df af₆f tl uxx₂sf];f0h ldnfP/ lrq agfpgxf] \jf sfuh sf₆] af₆f 6f:gxf] \. o;af₆ ;fk]lfs ₂kdf sg uk slt 7hf]jf ;fg]yxf kfpq ;lhnf]x₆₅ .

rGb₆f

- rGb₆f₆sf ;DaGwdf kl/rofTds 5nk₆n ugxf] \.
- rGb₆f;DaGwl tYof^as, h:t}ll k08, Jof;;, b/L, u?Tj an, u?Tj k[j]u cflb af₆f n[y] hfgsf/L lbgxf] \.
- glfqdf; / rGb₆f;af/]5nk₆n ugxf] \.
- rGb₆f₆df vfN8fx₂ s;/L ag₆f xg\ atfpgxf] \. k[j]lt/ k₆s₆f] efudf ecbf ljk/Lt efudf a9l vfN8fx₂ b]vg₆f sf/Of atfpgxf] \.
- rGb₆f₆sf]Pp₆}efu dfq ;w₆k[j]laf₆ b]vg₆f]sf/Of atfpgxf] \.
- rGb₆f₆n]k[j]l₆sf]kl/j]df s;/L u5{< /f]hkn]ljwaf₆ k₆z₆ ugxf] \.

lzz'u₆x₂

- lzz'u₆s₆]kl/ro lbgxf] \.
- lzz'u₆s₆]yfg / agf₆af/]lrq n[y] b]vpgxf] \.

kR5₆k/fx₂

- kR5₆k/f s:t₆]b]v₆G5, sx^f"b]v₆G5, sg j]hf b]v₆G5, lsg b]v₆G5 cflb k₆gx₂ u/L 5nk₆n u/fpgxf] \.
- kR5₆k/f₆sf]agf₆, cfsf/ / ;f0haf/] ;fdfGo kl/ro lbgxf] \.
- kR5₆k/f cf₆g₆]slfdf /xl ;b₆f]kl/j]df ul//x₆s₆]lrq n[y] b]vpgxf] \.
- kR5₆k/f₆sf]kR5/ ;w₆;b₆f]ljk/Lt lbzftk₆{k₆ls₆s₆]sf/Of atfpgxf] \.
- kR5₆k/f w₆]jif₆]c₆t/fndf dfq b]vg₆f] sf/Of JofVof ugxf] \.

- kR5k/fsf]kR5/ s;/L aG5 < JoVof ugxf] \.
- ;b\$]glhs cfpbf dfq kR5k/fdf kR5/ b]vgfsf]sf/of JoVof ugxf] \.

pNsfx

- pNsf eg]sf]s]xf]< / pNsf s;/L b]vG5 < JoVof ugxf] \.
- pNsf sf]agf / ;f0haf/]atfpgfx] \.
- pNsf sf]ult / pNsf b]vg] jfod08nsf]txaf/]atfpgfx] \.
- pNsf lk08 eg]sf]s]xf]< atfpgfx] \.

;f]kl/jf/df ;b\$]dxEj

- ;b\$6 s]krf0bfx 5g\< ljBfyk{nf0{n]g nufpgxf] \.
- ;b{gePsf]eP cG0 uxxsf]cj:yf s]xg]lyof]< ljBfyk{nf0{cfGg]cgbdfg eGg nufpgxf] \ / cG0df lzlfns]:ki6 kfgxf] \.

tf/fsf]agf

- tf/fsf]agf klg ;b\$]h:t}ePsf] / ;b\$Gbf cToGt 6f9f /x]fn] ;fgf b]vPsf] eGg]f/]5nknn ugxf] \.
- ;fgf, dem]f, 7hf / cToGt 7hf u/L rf/ kpf/sf tf/fx 5g\ eGg]s/f k]6 kfgxf] \.
- tf/fsf]/^sf cfwf/df ;txsf]tfkj]d lgwf{Of ug{;lsg]s/f atfpgfx];h:t} /ftf] kx]f] ;]f] / lgnf] .
- l:kpNofDkdf Ps 6j]f dl;gf]tf/ lrD6fn] ;dft] ttP/ k]zG ugxf] \. tf/sf] tfkj]d a9]g';f/ /^ kl/jtG ePsf]b]vpgxf] \.

tf/fsf]hljgl

- tf/fsf]pTklQ, ljsf; / cGt s;/L xG5 atf0lbgxf] \.
- g]ef / ;k/g]efdf k/s atf0lbgxf] \.
- /ftf]ljzfn tf/f / ;]f]jfd s;/L aG5 < k]6 kfgxf] \.
- G06g :6f/ eg]sf]s]xf]/ of]s;/L aG5 < aofg ugxf] \.
- s:tf tf/fx 5g\af6 sfnf]l5b]aG5 / sfnf]l5b]s;/L aG5 < j0fG ugxf] \.

sfnf]l5b]

- sfnf]l5b]aGg]klj]paf/]5nknn ugxf] \.
- sfnf]l5b]sf ljz]ftfx¿ atf0lbgxf] \.

tf/fd08n

- tf/fd08nsf]kl/ro lbgxf] \.
- ljleGg kpf/sf tf/fd08nx¿sf]lrq;xt kl/ro lbgxf] \.
- dVo ¿kdf sgsg tf/fd08nx¿ slxn]bvg ;lsG5 < atfpgxf] \ / ljBfyl¿nf0{ /flt cfsfzdf cjnf]sg u/fpgxf] \
- tf/fd08n / df]dsf ;DaGw atfpgxf] \.

tf/fk~h

- tf/fk~hsf]kl/ro lbgxf] \.
- lrq n]y] tlg kpf/sf tf/fk~hx¿sf]j0f6 ugxf] \.
- 7hf]lj:knf]sf]l;4fGt eg]sf]s]xf] < JofVof ul/lbgxf] \.
- cfsfz u^auf eg]sf]s]xf] < o;sf]agf] s:t]5 / o;df ;f]d08n sxflg/ 5 < atfpgxf] \.

-a_dNof^asg

- != kpfz jif{eg]sf]s]xf] < ;b]sf]kpfz kl]l;Dd kUg 8 ldg] 20 ;s]18 nfU5 eg] ;b{ / k]j]lalsf]b/l slt xG5 <
- @= ;f]jtf; eg]sf]s]xf] < o;sf]ult slt xG5 <
- #= leql uk / aflx/l ukalr b0cf]f leGgtf b]vpgxf] \.
- \$= d^aun uk lsg /ftf]b]vG5 <
- %= jw ukdf hlj cl:tTj gxb]sf] ;DefJo sf/0fx¿ s]xg ;S5g\ < sg]tlgcf]f n]vgxf] \. aweGbf z]j]sf]tfkj]d a9l xgfsf]sf/0f s]xf] <
- ^= g]f]f eg]sf]s]xf] < /ftf]ljzfnf/f s;/l aG5 <
- &= sfnf]l5b]eg]sf]s]xf] < sfnf]l5b]s;/l aG5 <
- *= tf/fd08n / tf/fk~halr tlgcf]f leGgtf n]vgxf] \.

-r_lzlfsnf0{yk hfgsf/L

a Δ df08 / ;f008n

- cfsfzlo lk08x Δ af/]c Δ woog ugIj1fgnf0{vuf Δ h lj1fg elg05 . o ; ;DaGwL c Δ woog ugIj1f Δ lgsnf0{vuf Δ h zf:ql elg05 .

- ul0ft Hor Δ tif zf:qdf k Δ pf Δ u xg]Psf0x Δ

- P:6 Δ g Δ l Δ dsn Psf0 (astronomical unit)

1 A.U = 15,000,000km

k Δ pfz jif{(light year)

Ps k Δ pfz jif{= 9.46x10 .. km

kf/; Δ (parsec)

Ps kf/; Δ = 3.26 k Δ pfz jif{.

- ;b Δ h]cfsfz u Δ u Δ fsf]tf/fk~hlo s Δ l Δ hf0{Psk6s kl/j Δ df ug{n Δ flg] ;dofj Δ wnf0{sl:ds jif{(Cosmic year) elg05 . Ps sl:ds jif{= 2500 nfv jif{x05 .

- ;g\!()%) df cNj6{cf0G:6f0gn]lk08 gfz x Δ bf zlst pTkGg x05 eGg]tYo kQf nufP . ;b Δ h k Δ z:t dfqdf x Δ f08 Δ ng Uof; x05 . x Δ f08 Δ ng Uof; lxlnod Uof;df kl/0ft x Δ bf s Δ xl lk08 gfz x05 . gfz ePsf]lk08 zlstdf kl/0ft x05 . cf0G:6f0gsf] ; Δ E = mc² df E = zlst, M= gfz ePsf]lk08 / c = k Δ pfzsf]ult x Δ f].

- cfsfz u Δ u Δ fsf]cfsf/ sl/a !)),))) k Δ pfz jif{x05 h;df b; va{(100 billion) tf/fx Δ x05g\.

u Δ x Δ

लभ क्र.सं.	ग्रह	सूर्यबाट दुरी मि./कि.मि.	सूर्यको परिक्रमा गर्न लाग्ने समय	अक्ष भ्रमण	कि.मि.	गिण्ड कि.ग्रा.	उपग्रहको सङ्ख्या	सतहको तापक्रम	
								अधिकतम	न्यूनतम
१	बुध	५७.९	८७.९६ दिन	५८.६५ दिन	४८७८	०.०५५×१०	**	४२७ C	१८० C
२	शुक्र	१०८.२	२२४.७ दिन	२४३.१६ दिन	१२,१०४	०.८१×१०	**	४८२ C	
३	पृथ्वी	१४९.६	३६५.२५ दिन	२३ घण्टा ५६ मिनेट	१२७५६	११०	१	५८ C	-८८.२९ C
४	मङ्गल	२२७.९४	६८६.९८ दिन	२४ घण्टा ३७ मिनेट	६७,९६	०.१०७४×१०	२	-५२ C	
५	वृहस्पति	७७८.३३	११.८६ वर्ष	९५०.५ घ.मि.	१४३८००	३१७.८९×१०	६३	-१४३ C	
६	शनि	१४२७	२९.४५ वर्ष	१० घण्टा १४ मिनेट	१२०,०००	९५.१४×१०	६०	-१७६ C	
७	अरुण	२८६९.६	८४.०१३ वर्ष	१७ घण्टा १४ मिनेट	५,१८००	१४.५४×१०	२७	-२१० C	
८	बरुण	४४९६	१६४.७९ वर्ष	१८२२ घण्टा	४९५००	१७.२३×१०	१३	-२२८ C	

- $u\dot{x}x\dot{z}n] ; \dot{b}\dot{s}f] j l / k l / P s \ r S s / \ n u f p g] ; d o \ c j l w n f 0 \{ K n f g \dot{b} \ j i f \{ (P l a n e t \ y e a r) \}$
 $e l g \dot{G} 5 \ t / \ u \dot{x} n] c f \dot{C} g f] s l f d f P s k 6 s \ k l / j l d f \ u g \{ n f \dot{U} g \} ; d o n f 0 \{ K n f g \dot{b} \ \ 8 \} (p l a n e t ' s \ d a y) \ e l g \dot{G} 5 \ .$
- $l e q l \ u \dot{x} \ / \ a f l x / L \ u \dot{x} s f] a l r d f \ a 9 l \ ; \ ^a \dot{V} o f d f \ != ^l s = l d = \dot{b} l \dot{v} \ *)) \ l s = l d = \dot{U} o f ; \ e P s f \ l k 0 8 x \dot{z} n f 0 \{ l z z ' \ u \dot{x} \ e l g \dot{G} 5 \ .$

$s f n f \ l 5 b |$

- $; g \dot{\backslash} ! (^ (\ d f \ c d l / s l \ j) f l g s \ h f \dot{g} \ l \dot{A} j x n / n] ; j k \dot{y} d \ s f n f] l 5 b | k Q f \ n u f P s f \ l y P \ .$
- $s f n f] l 5 b \dot{p} f] c f s f / \ / \ k \dot{p} f / \ t f / s f] l k 0 8 \ t y f \ k l / j l d f \ u g] b / d f \ l g e \{ \ u b \dot{b} \ .$