रुई बाभळी

नारायण घुले





रुई बाभळी | Rui-Babhali नारायण घुले vkkepfj=

• प्रकाशक

सौ. कुमुदिनी सिद्धेश्वर घुले सप्तर्षी प्रकाशन,

(सप्तर्षी असोसिएट्स अण्ड पब्लिकेशन्स) गट नं.84/2, दामाजी कॉलेज पाठीमागे, मंगळवेढा, जि.सोलापूर-413305 सय्यद शेख (व्यवस्थापक) मोबा.9822701657

email: saptarsheeprakashan@gmail.com

website: www.saptarshee.in



- मुखपृष्ठ | मांडणी । किशोर घुले
- मुद्रितशोधन | तनुजा ढेरे
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या पुस्तकातील लेखकाची मते, घटना, वर्णने, चित्रे ही त्या लेखकाची असून त्याच्याशी प्रकाशक सहमत असतीलच असे नाही.



eakGosk gsek>axko- eakMagsR; kpaxkeh.k #i Ma \vee krk gsrky Φ ; kpafBdk.k \vee kgs; k xkokyk eakGosk gsuko d I ai Mya; kph \vee k[; kf; dk, tdk; yk \vee 'kh feGrsrh \vee I h]^^ i kphu dkGh ^eaky* ukokP; kjktkua; k xkokyk osk ?kkryk gkrk] Eg. kuu; k xkokyk eakGosk gsuko i Mys*

 $rlags xkoikphu! bFkaikphu] e/; vkf.k vokiphu; k frugh gh dkyko/khrhy bfrgkl kP; k [kqkk l ki Mrkuk fnl rkr-bFkys^, dohjk* nohps einj] ^ekBk fdYyk*] ^egknokps gekMi ikh einj*] ^egknokph fofgj o R; ke/khy ^cEgnokph i pkiHke(kh einj*] ^d".k ryko*; k i kphu bfrgkl kP; k [kqkk vkgr-rj ^x&hl kgckpk nxki] ^Jh l r nkekthph tiph l ek/kh*] ^Jh l r dkUgki k=kph l ek/kh*] ^yrhQcpkpk nxki] ^ekguhcpkps einj o fofgj*] ^d&lMhckbph fofgj*] ^i krjckbiph foghj*] ^x.ks k fofgj o einj*] ^dkQjckbiph foghj*] ^yknMhph fofgj*] ^ckijkGs ukD; kojhy tipk eB*] ^ek#rhpseinj*] ^efj vkbipsniAG*] ^ripkbipsniAG*] l kaxkyk jkMyxrph ^ef'kn*; k l ole/; bfrgkl kP; k vLl y [kqkk vkgr-$

^tusdkV] Jher i Vo/kükpk okMk] tuh uxji kfydph bekjr] cki wxk[kys; kpk okMk] tuk I jdkjh nok[kkuk] Jh I r nkekth efinj*; k I oZbekjrh vokphu bfrgkl kP; k [kqkk vkgr-I kxyh I fi.Fkku dkGkr tujy ^cd² gsl fi.Fkkukps, d vMfeuhLVVj gkrs R; kauh eacGos; kr tuh uxji kfydk] tuk I jdkjh cacyk] 'kkGk ua1 ph bekjr] tusdkVZ; k bekjrh ckdku ?krY; k-

 $xkokP; k e/; Hkkxh Jh I \text{ is } pk[kke.G; kph I ek/kh \lor kgs ; k I ek/kh Hkkorkyh xko xksy \lor kf.k c'khP; k \lor kcklj kpk oI ysyk \lor kgs fo'kškr% gs xko i kphu dkGh oI or <math>\lor$ I rkuk], d fo'kšk dkGth?krysyh gkrh] rh Eg.kts; k xkokP; k \lor kr pkjh cktuuh i p sk dj r p Gh ^; \text{Fks}, d xko \lor kg\text{s}]; kph tk.kho dqkkykgh \lor ftckr gkrk dkek u; s 'k=\(\mu\)kI u xkokpk cpko \(0\)gkok] gk gr\(\mu\)MkG\(\circ\)ki \(\ext{s}\) B\(\delta\)u i kphu dkGh \lor 'kk i \(/\nr\)husgsxko oI foysys gkrs

i phP; k fcTty jktoVhpagtkj o"kWiphpajkt/kkuhpaeaxGosk gsfBck.k- jktkB; k VkJ; keQscdyk vkf.k f'kYi; kpk; k*Isfockl >kyk- ^f'kYi'kkL=] efinjkph mHkkj.kh] ik.; kP; k ckjok] HkO; iil kn] fdYYkk] [kmcl] fdYY; kpk rV*]; k xk\$Vhnuh I tysysgsjkt/kkuh fBck.k-^fcTtyjktoV nf{k.kl xk0; ki; ir vkf.k fonHk] dukWcl] ckyk?kkV; k*Isi; ir foLrkj i koyh gkrh]* vI sbfrgkI I kaxrks; k Hkirnskoj; k jkt?kjk.; kpsi/kkI u eaxGosk; k*Ismup pkyr gkrsckGkP; k vk9kkr bfrgkI kP; k cgrkák [kqkk u"V >kY; k-ckgh ekstD; k [kk.kk&[kqkk vktgh fnI w ; rkr-R; ko#u; k jkt/kkuhpsR; k ckGpsikphu HkO; #i utjr HkjY; kf'kok; jkgkr ukgh-jLrkjLrh

fo [k#u i Mysys^nxMh f'kYi [kkrc] i kphu Hk0; er[h] efin j kps [kkrc] f'kykys[k] ohj xG* \vee 'kkruh [kpk [kp | e/n \vee | ysyh gh Hkreh!

 $egkjk"Vkp] \ u0gsrj \ Hkkjrkps, d \ n\delta r \ Eg.ktsN=irhf'kokth \ egkjkt \ I \ u \ 1665 \ I \ kyh \ R; k8; k i kouLi'kklusgh \ Hkweh i fo= >kyh-; k ftYákrhy f'kokth egkjktkpsvkxeu \ nk[ko.kkjh gh, dyrh, d ukm vkgs; kf'kok; Hkkd ys?kjk.; krhy ekyksthjkt] 'kgkthjkt] \ N=irh I \ blkkthjkt] \ N=irh I \ blkkthjkthjkt] \ N=irh I \ blkkthjkthjkthjkthjkthjkthjkthjkthjkthj$

 $fn Y y h p k = e^{k} k y ckn' k g k ^ v k g x t c^* r j = e x M; k P; k to G p f'kokj k r] c E g i g h; f k s y '' d j h N ko. k h l g r C C k y l k M s p k j o '' k g j k f g y k - n j ' k p j b k j h e x M; k r t f e k e f' k n h r ^ u e k t * i M.; k l k B h r s ; f v l r -$

i s kokb 2 k G k r i Vo/k L ?kjk.; kI = a k G o s k; F k h y e k e y r f e G k y h-i Vo/k L ?kjk.; k r v u d i j k d e h o e R I n h i # "k f u e k L k > k y s R; k u h e j k B h n k S y h h p k d s y h-i v d e k L k > k y s R; k u h e j k B h n k S y h h p k d s y h h p k d s y h h p k d s y h h p k d s y h p k d s y h h p k d s y h p k

v'kh vud ckchiph yklidd i koysyh gh Hkmeh] vkrk ek= dkgh'kh mi f{kr volFkr dkG dfBr vkgs vkfny'kgkP; k dkGkr; fkhy fdYY; kyk vukb; egRo vkysgkrs vkfny'kkgh jktoVhpk vLr dj.; kpk i z Ru eksykauh I rr dsyk- v'kk oGh eaxly; kpk fdYyk R; kauk i Fke gkrh?; kok ykxyk- Eg.ktsvkfny'kkgh jktoVhpsgsi pskOnkj p t.km>kysgkrs N=i rh I blkkthjktkauh eaxGosk fdYyk rkC; kr ?ksåu vkjaxtc ckn'kgkph nf{k.k eksge /kkD; kr vk.kyh gkrh- ejkB; kB; kbfgkl kpk ekufcmmBj kok vI k jktfd; i p R; kauh ckn'kgki qsmHkk dsyk] rkgh; fkup-

 $exc (M); k pan (M) jao (S' k''B Eg. kts; k H k neh y k I r H k neh Eg. kr kr-dkj. k b F ks, d u 0 g M n k u u 0 g M; k pan (M) jao (S' k''B Eg. kts; k H k neh y k I r H k neh Eg. kr kr-dkj. k b F ks, d u 0 g M n ku u 0 g M; r C cy v B j k I r g k n ku x y s r s I r v I s v k g r] ^I o U h I r n kek th [I r p k [k ke G k] I r c k ki k c k b] c r c l o s o j] f V c k p k; [I r x k h i h j] I r y r h Q c p k] I r x k i k c k b] c r c l o s o j] f V c k p k; [I r x k h i h j] I r y r h Q c p k] I r x k i k c k b] c r c l o s o j] f V c k p k j k t] f I r k j k e g k j k t] v k o h c j e g k j k t] c k x M s e g k j k t] k t b R; k n h - *$

rjik0; k 'krdkr I ar pkc[kkeGk gkåu xsys R; k8; kcnny bFka, d \vee [; kf; dk&nardFkk \vee kEgkyk ygkui .kki kI uu , ıdk; yk feGrs rh \vee 'kh----

I ir pkc[kk eaxh]; kr j kgnu eksy&etjih d#u vki ysi kb/ Hkjr vIs eksy&etjih djhr vI rkuk R; kph foBBykoj hy HkDrh rl hlkjgh deh >kyh u0grh- R; kdkGh xkokP; k Hkkorkyh rVcmh ckn′kgkP; k gpdekus ckdkyh tkr gkrh- pkc[kk rVcmhP; k ckdkdkekoj xobl/; kP; k gkrk[kkyh fcxkjh&etj Eg.knu dke djhr gkrk-

∨pkud ckalkysyh fHkar dkl Gyh-R; kr pka[kkgh lkiMyk-R; k fHkarhP; k [kkyh vuod xoMh] etji xk<ysxsys rh xk<ysyh i rsuarj fdR; od o″kšckgji dk<yh xsyh ukghr-rsckalkdke rl p v/köV i Mya

uarj dkgh o"kkluh lar ukenokyk pks[; kph gkMaeaxM; kP; k i MyM; k rVcakh [kkyh th i MyMhgkrh-rh'kksku Vk.kk; yk foBBykuh l kfixrys

 $ukeno \ foBBykyk \ Eg.kky] \ ^^nok] \ ext(); kr \ rVcdkhP; k \ f<xk&; k[kkyh \ frFks \ gtkjks \ yksclkph \ gkMsi \ Mysyh \lor kgr- pk[keG+; kph gkMseyk d'kh \lor kG[krk ; skkj \^**]$

no g1 yso ukenokyk Eg.kky $\frac{1}{3}$ ^~vj sukenok $\frac{1}{3}$ rsl ki svkgs** ukeno Eg.kky $\frac{1}{3}$ ^*rsd1 $\frac{1}{3}$ **

no Eg.kky]^^ i R; cd ekuoh gkM mpyk; ps \vee kf.k dkukyk ykok; ps T; k gkMke/knu ^foBBy&foBBy* \vee I k uke ti , cdw; biy] rs pk[kkeG; kph gkMaI etkokohr- \vee 'kh to<h gkMa feGrhy ro<h \vee k.kkohr-**

I ar ukennokus pks[; kph gkMa nnokuh l kfixrY; k i ek.ks xkGk dsyh- vkf.k i æji ji yk dkl xknoekx&vk.kyh- rh gkMsi æji ji efin jkP; k i fjl j kr Bonu pks[; kph l ek/kh cufo.; kr vkyh-; kruu pks[; kP; k eukr i æj hP; k i kMj akkcí y fdrh vi fj fer HkDrh gkrh] gsfl /n gkrs

nd jslar dkUgki k=kckb2rh bFkyhp-rh 13 0; k 'krdkrp extMaxkoh ^'kkek uk; fdu* ukokP; k uridhP; k ikVh tUekyk vkyh-rh tjh uridhP; k ?kjh tUekyk vkyh vl yh] rjhgh frph foðy HkDrh vo.kiuh; v'khgkrh- Eg.kurhlar inkyk i kgkpyh-

frljslær nkekthiær&ekeynkj-gs150; k'krdkreaxM; krgek; eu fonjockn'kgkP; kgeplek[kkyh ekeynkj Eg.kw. dke djhrgkrs eaxMagsTokjhpsdkBkj! eaxMaxkokpk'krlkjk TokjhP; k#ikuaxkGk dsyk tkrgkrk-rsxkGk dsysysloZ/kkU; ekBekB; kljdkjhiøke/; sBøystk; psvktP; kdkGkr/kkU; lj{k.kklkBhljdkjhekBekBhxknkesvkgr-R; kdkGkrxknkeke/; s/kkU; uBørkiøkr/kkU; Bøystk; ps

 $\begin{tabular}{ll} $$ VIso"kkluo"kkluo"kkluolinklu | Jokin | Jokin$

150; k'krdkreaklyi; kr OkjekBk nqdkGiMyk-gk nqdkGIyx 12o"kBiMyk-v'kh bfrgkIkrukm IkiMrs R; kdkGhIoZykdkps thoueku 'krhojp \vee k/kkjhr gkrs nqdkGkrykd \vee Uukokpuu rMQMuu rMQMuu e#ykxysgkrs, o<h ifjfLFkrh x\(\text{hlkhj}\vIrkuk\)] fcnj gqlerhus i tsyk dIyhp enr fnyh ukgh-

ek= LFkkfud vf/kdkjh nkekthiar ; kauk gh ifjfLFkrh ikgkosuk- R; kauh vusdo:Gk 'kkl ukdMsenrhph; kpuk dayh- ijarqfonj ckn'kgk gapk; quusnkekthP; k vthjok&fouarhpk d/khp xkfiHk; klusfopkj dayk ukgh-

'koVh nkekthirkuh ljdkjh ifj.kkekph rek u ckGxrk]ljdkjh iokæ/khy /kkU; milyso mik'kh ej.kk&; k tursyk okVnu Vkdys; k pophenGsnkekthirkyk ckn'kgkP; k ikfyl kuh idMysvkf.k ckn'kgkP; k iqsgkthj dsys

 $nkekthi\, \text{irkuk}\, ckn'kgkP;\, k\, l\, ekj\, gkthj\, djk;\, P;\, k\, \vee xknjp\,]\, eax M;\, kP;\, k\, l\, j\, dkjh\, /kkU;\, kph\, uqll\, ku\, \, lkji\, kb2\, eax M;\, krhy\, ^foBwegkj*\,;\, k\, ukokP;\, k\, ek.\, kl\, kus\, v\, xknjp\, \, lkj\, yh\, gkrh\, gqek;\, qu\, fcnj\, \&ckn'kgkus\, nkekthyk\, l\, ghl\, yker\, l\, kMys\, \, i\, a;j\, lP;\, k\, foBBykP;\, k\, di\, sup\, nkekth\, ckn'kgkP;\, k\, rkoMhruu\, l\, ghl\, yker\, l\, lyys\, v\, l\, s\, bFkys\, ykcd\, ekurkr-\, bFks\, eax Gos;\, kr\, i\, a;j\, iji\, \&fotki\, jj\, j\, kMoj\, xkokP;\, k\, dMsyk]\, Jh\, l\, ar\, nkekthi\, arkpsekBselinj\, vkgso\, tquh\, l\, ek/khgh\, vkgs\, xkj\, xj\, hckuuk\, nkekthus\, /kkU;\, okVysgk\, bfrgkl\, [kjk\, vkg]\, ij\, arqnkekthph\, ckn'kgkP;\, k\, rkoMhruu\, uedh\, l\, lydk\, dkskh\, dsyh\, gk\, eqnak\, oknkpkp\, vkgs$

Jh I ir xki kckbiphgh v'khp, d nirdFkk vkgs nkekthP; k dkGkrp 15 0; k 'krdkr tks ckjk o"kil yx nijdkG i Myk gkrk- R; k nijdkGkr ykdkuk [kk; yk vUu u0grs I; k; yk i k.kh u0grs eakM; krhy I oZfofgjh dkjM; k Bkd i My¥; k gkR; k- ykdkuk toGikl dlipgh I; k; yk i k.kh u0grs toGp vI ysyh fHkekunh dkjMh i Myh gkrh- v'kk nijdkGh i fjfLFkfre/; sxkokP; k i pisyk FkkM; k vrjkoj vI y¥; k , dk dkl kj I ektkrhy 'krd&; kph ekBh fofgj gkrh- rh fofgj d/khp dkjMh i Mr u0grh- i jirqrh fofgjgh dkjMh i Myh gkrh-

, ds fno'kh R; k 'krd&; kyk Lolu i Mys Lolukr nohus l klixry] ^^re; k dkj M; k fofgjhr uqlrhp ckGrh.k >kysyh i rhork fL= tyl ek/khl kBh l kM- fofgjhyk vki ksvki i k.kh; biy-ek= fofgj i k.; kuaHkji; ji r rligh dkskhgh ek?kkjh oGw c?kk; psukgh-** v'kh vV?kkryh-

nd &; k fno'kh 'krd&; kus i Mysya Lolu vki Y; k dlyfckrhy I oZ ykodkuk I klixrys; ksxk; ksxkusR; k 'krd&; kP; k dlyfckr R; kph I w urdrhp ckGrh.k >kysyh gkrh- R; k I uusags I oZ , sdyao vki Y; k I kI &; kyk o dlyfic; kuuk I klixryjj^^ gsc?kk ekeath] I oZxkokP; k HkY; kI kBh eh R; k fofgjhr ekÖ; k ckGkI g ftor tyI ek/kh ?; k; yk r; kj vkgs rligh ek>k fopkj d# udkekÖ; k cfynkukelGsek>k xko okprvI sy rj R; ki {kk nd jaHkkX; o iq; dke dkskravkgs**

frP; k dlympkrhy I ołykodkauh fryk; k fu.kł kikl w ijkoRr dj.; kpk [kw [kw iż Ru dsyk-ijarqfruadqkkpp, "dyaukgh-'koVh R; k 'krd&; kuso xkokrhy ykodkauh 'krd&; kP; k I wsyk R; k fofgjhr tyl ek/khl kBh I kMk; paBjoya vkre/; sfryk jkg.; kl kBh nksu [kkY; k rkrMhusckakwu ?ks; kr vkY; k-, dk [kksyhr frps I a kjkps I oZ I keku Boys , dk [kksyhr [kkl frP; k ckGkl kBh i kG.kk ckakyk xsyk- l oZ xkokrhy yksd R; k fno′kh fofgjhoj , d= vkysR; k fL=us vki Y; k

ckGkl fgr R; k dkj M; k fofgjhr i øsk dsyk- ckGkyk i kG.; kr Vkdyso MkGs>kdw gkr tkbhw l ol xkokpk frus fujki ?kryk- frFkavl yt; k l olykdkuh fofgjhP; k fo#/n fn'ksyk rkbl dsys rkcMrksc fofgj i k.; kuarthsp Hkj yh! R; k i k.; kr R; kfL=huaxkokl kBh thor tyl ek/kh ?kryh-gh , d nar dFkk vkgs

R; k egku] Fkkij] i rhorpa uko gkra xki kckb?! rôgki kl w ykod xki kckbiyk Jh I r xki kckb? I rckkkw ykxysvktgh eaxM; kP; k i piyk I r xki kckbiph ekBh fofgj vkgs rh fofgj vkti; ir d/khp dkj. Mh i Mysyh ukgh- v'kh v[; kf; dk vkgs gh v[; kf; dk vkEgh ygkui .kki kl w , cdr vkyksvkgkr-

e/okpk; 20n%r v/o; iJh t; frFklfVdkpk; 2gsR; kpsi i; hy dkGkrhy xknh pkyfo.kkjsFkkj 0; DrheRo ; Fkp gkåu xsys eaxly; kP; k t; frFkkluh ekBh xiFkl i nk fuekZk d#u ekBk yk\$dd feGfoyk-

 $xkokP; ke/; spk{kkeG}; kph I ek/kho; k I ek/khP; k Hkkorkyh cktkjiB oI foysyh vkgs pk{kkeG}; kP; k I ekjp tuh uxjikfydph bekjr gkrh- gh bekjr I kaxyh I kEkku dkGkr nku etyh nxMh ckdkyh xsysyh gkrh-; k bekjrhP; k I ekjp uxjokpuky; kph nxMh bekjr fnI rs; k okpuky; kph o xEkky; kph LFkki uk gksåu 150 o"ks>kysyh vkgr-; kpk vFkZgsxko Qkj i phli k I u I kladfrd]' k{kf.kd dnzgkrs gsy{kkr; rs}$

; k okpuky; kyk nku njokts vkgr-, d tilj; k uxjikfydk bekjfrlekj o nljjk njoktk i kBhekxsek#rhelinj o i Vkax.kkP; k lekj- okpuky; kP; k i kBhekxsykyekrhpsek#rhps i Vkax.k vkgs ; k i Vkax.kkr vuid l Hkk o dk; ble gkrkr- i Vkax.kkP; k lekjp ek#rhpstiuselinj vkgs elinjkyk ykxwu , d fofgj vkgs ; k fofgjhoj , d ekBk gkb ckdkysyk vkgs ; k gkbkruu l xG; k xkokyk i k.khi ji oBk dsyk tkr gkrk- fofgjhyk fpdVuu ekBh eMblivkgs; k eMbliyk fpdVuu vkBoMk cktkj l kBh dVVsckdkysysvkgr-; k dVV; kP; k nksligh cktnyk vkMrh gkli; k-

bFknup toG tulk fdYyk vkgs fdYY; kyk ekBspkj c#t vkgr-fdYY; kr ekeynkj dpjh vkgs fdYY; kP; k i kBhekxsegkno efinj] egkno fofgj o d".k ryko vkgs fdYY; kP; k I ekj i Vkx.k vkgs; k i Vkx.kkP; k I ekj I jdkjh nok [kkuk] R; kyk ykxnu tilj; k dkYkph bekjr vkgs

; k dkykil ek#u tksjlrk tkrks rksFky nkekth e@njkP; k pk&dkrp tkrks; k pk&dkr, dk cktwyk nkekth e@nj] nd &; k cktwyk b@ky'k ldwyph bekjr o i Vkax.k vkgs R; kyk ykxwup i pk; r I ferhph bekjr vkgs ; k bekjrhP; k I ekg , I Vh LVW vkgs; k LVWI ek#u tksjlrk I xG; k xkokyk oGI k ?kkywu tkrk] rkp jlrk fotki ji&i aji ji jlrk Eg.kwu vkG[kyk tkrks fotki jiyk tkr v I rkuk gk jlrk xkokyk oGI k ?kkywu ckj kGsoskhr; rks bFkspkj jlrs, d=hr vkysysvkgr-, d I kyki jiyk tk.kkj k jlrk] nd jk I kaxkY; kdMstk.kkj k jlrk] frijk fotki jidMstk.kkj k jlrk vkf.k pkFkk i aji jidMstk.kkj k jlrk-vispkj jlrs, d=hr vkysysvkgr-; k pk&dkrp

ndjs, d tupsek#rhpsetinj vkgs R; klekij efjvkbipsnåG vkgs; k noGkP; k i kBhekxsl kazksyk jLR; kP; k MkO; k cktnyk Le'kkuHkmeh vkf.k egkjokMk vkgs rj mtO; k cktnyk mojihr xko i ljysyk vkgs lkazksyk jLrk fuEE; k xkokyk oGl k ?kkymu i estkrks

rl p; k xkokpsfrl jso% k"B Eg.kts; k xkokyk egkjk"Vkrhy o l kyki ji ftYákrhy TokjhpsdkBkj Eg.kugh \lor kG[kystkrs bFkyh ekynkMh Tokjh o jkT; krp u@snskkr ifl /n \lor kgs bFksTokjhps mRiknu, o<; k ekB; k i ek.kkr gks; kpadkj.k Eg.kts; k xkokyk ykHkysyh tehu-; k xkokP; k mRrj] i v0. \text{k} nf{k.ksyk e\$yku&e\$y dkGh] l i kV] dl nkj tehu i l jysyh \lor kgs; k tehuhr i j.; ki ji rk i kÅl >kyk rjh \lor eki TokjhpamRiknu feGrs

tehu brdh I i kV] brdh I i kV vkgsdh 10&15 fd-eh-d**ßg**h ckak ukgh] d**ßg**h vksk] unh ukgh]d**ßg**h p<mrkj ukgh- un rk I i kV xkGkpk eshkuh Hkkx i I jysyk vkgs gh dkGh tehu brdh [kksy vkgsdh] dkgh dkgh fBdk.kh un rh 'kdMksQN/ [kksy dkGh ekrhp I ki Mrs

mUgkG; kr; k tehuhyk brD; k ekB; k Hkxk i Mrkr dh] d/kh d/kh; k Hkxkke/; sygku ygku tukojgh \lor kMdrkr-

, d o"khlmllgkG; kr nij kjh \vee pkud , dk rkl kr <xQWhl kj [kk 4 bp i kÅl i Myk-j kukr pjk; yk xsy¥; k gtkj ks' kG; k o ex; k tehuhrhy Hkxkr \vee kMdw \vee kr tehuhrp #rw e¥; k-

v'kh gh tehu vkgs i kÅI I # >kyk dh] ykd j LR; kdMstho okpo.; kI kBh /kkorkrdkj.k, dnk dk fp [kykpk j kMk>kyk dh] R; k fp [kykrw ckgj i M.ks vfr'k; vo?kM o efi'dy gkrs; k tehuhyk d/khgh ukaxj.kh dj koh ykxr ukgh-, dnk i j ysdh] fi d dk<k; ykp tk; p] v'kh gh tfeu; k xkokyk ykHkyh vkgs; k dkG; k tehuhr dpgh ckxk; r ukgh] fofgj ukgh fdøk i k.koBk ukgh fdøk vksk ukgh]unh ukgh-?kjkrw i k.kh ?kow tkosykxrs j kukr, [kknk ek.km i k.kh ekxr vI y rj] 'gh Hkkdj [kk-i.ki k.kh ukgh-* vI aEgVyatkr gkr]R; k dkGkr-

T; koGh Tokjhph i ji kh gkrji R; koGh e\$/ku&e\$/ uq rsTokjhpp fi d fn I rs 8&10 QW

mp Tokjhph rkVamHkkjyh dhjkukr xsysyk ek.kwl jkukrp pqrks rksfn'kkghu gksåu e\$yksu&e\$y uq R; k mp Tokjhrwu HkVdrks R; kyk yodjjLrk lkiMr ukgh- Eg.kwu Tokjhps fid mp vkY; kuarjjkukr lglk, dVk ek.kwl fQjr ukgh- lqkh l# >kyh dh] nksu&nksu efgus lqkh ykxwu jkgkrs, o<; k ekB; k iæk.kkr Tokjhps fid ; rs dh] lqkh ek.kl kdjoh iwkZdj.ksvo?kM gksåu tkrs



Tokjhph eG.kh d#u Tokjh gs/kkU; ?kjh vk.kys tkrs rigk yksckuuk Tokjh Biok; yk ?kjkrhy tkxk deh i Mrkr- Eg.kuu cktkjkr] vkMrhoj] ftdMsfrdMsuq rh Tokjhph i krhp i krh fnl rkr- Qkj i ϕ hlvxnh i kphu dkGki kl w bFksTokjh i ϕ kæ/; sl kBfo.; kph i Fkk vkgs vl k bFkyk d"kh&bfrgkl vkgs -

Jhlir nkekthiirkuuh 150; k 'krdkr xxkk] tequk ghljdkjh i i i i i s [knyh dsyh] riligk exkyn; kP; k vklikl ph 'kadMksxkosvkB fnol cSyxkM; kne/knu Tokjh okgnu ur gkrs rjhghljdkjh i i i i i stjdkeh >kyh ukghr- ex, dk, dk i i i i kr fdrh Tokjh l kBoyh tkr vliy!; kph dYi ukp djrk ; r ukgh-

^ip* Eg.ktstehuhr [kknysysekBsmHksHkq kj-; kykp ip EgVyatkraipkr Tokjh Hk#u ipkph rkMacn dsyh dh] ipke/; svkiksvkip TokjhP; k xW ikl w dkciu&Mk; &vkDl kbM fuekik gkr vl rks; kp dkciu&Mk; &vkDl kbMeGsvkr ipke/; sfdMjfdVd] en; k thorjkgw'kdr ul rkrvkf.k; k l oifdMhikl w Tokjhps vkiksvkip Lji{k.k gksåu o"kkiup"kivkre/; sTokjh pkaxy; k fLFkrhe/; sjkgw'kdrs ip m?kMy; kurj vkre/; smr#u nksu&rhu fnol Tokjh dk<yh tkow'kdr ukgh-dkj.k vkr brdk dkciu Mk; vkDl kbM l kBysyk vl rksdh] vkre/; sxsysyk euq; xqne#u ejrks R; keGsip m?kMy; kurj fdR; xd fnol vkryk dkciu&Mk; &vkDl kbM deh 0gk; ph okv ikgkoh ykxrs ip m?kMy; k m?kMy; k vkr dkskh ek.kh iMwu; sEg.kw jk=nufnol R; k ipkphjk[k.k djkoh ykxrs fdrhrjh ek.kl sjk=hp; k vakkjkr ipkar iMwu ey; kP; k?kVuk?kMr vl r-

Tokjhpsfid vfr'k; deh e'kkxrhe/; sbrdsveki fidrs R; keGs bFkyk 'krdjh vkG'kh] nboknh vkf.k vskJ/nkGw cuysyk vkgs QDr igik; yk vkf.k I skhykp jkukr tk; ps ckdhP; k iwkJoGr bFkysykxd >IhhusxIi k ekjr o pdkV; k fi Vr cI rkuk fnI rkr- bFkY; k ykxdkuk tkLrhr tkLr oG ekxdGk feGr vI Y; keGseukgatukps [kG bFkscjp [kGyso cf?krys tkr gkrs

 $\label{eq:csykle} $$ d_{R}; k = c_{S}kl_{R}; k = c_{S}k$

bFkyh ek.kla vfr'k; l ([kklhu vkf.k tehunkj vlY; ke(Gs bFks Okj i phhikl w vaxol=kpsickj i kgk; yk tkLr feGrkr-vuxd ykxd vaxol=s½j [ksy½ Bonw jkgkr vlr-vaxol=Bo.kaekBi.kkpay{k.kletyatkrgkra

R; kpcjkcj bFks vákJ/nk Qkj #tysyh gkrhs ?kjk3kjh vákJ/noj fo'okl Boyk tkr gkrk-Hkkukerh] Hknr ykx.kg dj.kh&/kj.kh dj.kg vækr; skg Hkkukerhus?kjkoj nxMsi M.kg ?kjkrhy oLruvkiksvki iš/.ksvl svekuoh; o v?kkgh i dkj bFkstkLr i æk.kkr ekuystkr-

tx.; k1 kBh tkLrh /kMiM dj.; kph xjt u1 Y; keqGs bFkyk ek.kd f'k{k.kkik1 w dk1 kmij-fi < $\dot{\gamma}$ ku&fi < $\dot{\gamma}$ k fuj{kjrk] \lor Kku] \lor 4kJ/nk qsnqxijk bFksi kpohyk i qtysysqkrs

 $50 \ o \ 60 \ P; \ k \ n'kdkr \ extMaxkokpk \ et[; \ 0; \ oll \ k; \ 'ksrh \ gkp \ gksrk- \ xkokr \ vBjk \ i \ xM$ tkrh o ckjk cyyrskj jkgkr gksrs I olyksdkpathou 'ksrhoj p voyseu gksrs



 $\forall k \text{epgh ?kijk.ka'krdjhp-} \forall k \text{eP; k } \forall k \text{fi} < \uparrow k 'k \text{fhrp } dke \text{djhr} \forall l \text{yY; k } \text{gkR; k-} \\ \forall k \text{epa?kijk.kafi} < \uparrow k \text{fuj } \{kj- \forall k \text{knj} \forall k \text{eP; k } \text{fi} < \text{hryk } dk \text{skh } \text{f'kdysyk } \text{gkrk]} \text{gs} \forall k \text{eP; krjh}, \text{rd.; kr u0grs} \text{toG toG l xGaxkop } \text{fuj } \{kj \text{gkra } \text{QDr ckge.k]} \text{ekj okMh]} \text{xqtj} \text{t} \text{fuj } \{k \text{trhrysykclp } \text{fyfg.kkj} \text{gokp.kkj} \text{l k} \{kj \text{gkrs } \text{brj } \text{trhr} \forall \{kj \text{kpk x4kgh u0grk-} \text{kgh } \text{gkgh } \text{gkgh$

vkeps?kj xkokP;k dMsyk-xkokikl w iæjinj&fotkinj jkM tkrk];k jkMP;k vyhdMs vkepa ?kj-vkeP;k xYyhyk fpdVwp pknckjokMk-jLR;kP;k ifydMs ekaxokMk] egkjokMk-ekaxokM;kyk fpdVwp,d ekBk ryko-;k rykokps uko dncj ryko-;k rykokP;k ifydMsVndMh o VndMhP;k mrkjkyk vkeph xkomjph tehu-bFks I oZ HkkodhP;k tehuh-;k xkomjyk ykxwu Le'kkuHkmeh-vkeP;k 'knrkyk ykxwup ygku i knjkph nQu Hkmeh o R;kP;k i fydMs ngu Hkmeh-xkomjyk fpdVw tksmp ekG gknrk];k ekGkyk;nrkGckpk ekG Eg.krkr-;k ekGkoj;nrkGckpa Bk.kda bFkanj vekokL;k&i ksi ksi ksi ksi keyk ekmedaHknradk<k;psdke e/;jk=hi;ir djhr vI r-

vkeP; k xYyhP; k , dk nq &; k cktnyk [kMkck xYyh- [kMkckP; k enijkHkkorhP; k ifjljkyk [kMkck xYyh vlsEg.kr vlr- [kMkck enij ifjljkrp t; eYgkj rkyhe gkrh-; k rkyehrjk=u&fnol xYyhryso xkokrysiSyoku?kergkrs

vkEghjkgkr gkrk] rksokMk vktkckuh ckalkysyk gkrk-; k okM; kr nku fgLl sgkrs, dk fgLL; kr vkEghjkgkr gkrkso n() &; k fgLL; kr vkeP; k ofMykai {kk ekBk vkepk e/kyk psyrk ukuk o R; kps dlyfpjkgkr gkrs vkeP; k okV.khyk pkj [k.kkph tkxk o R; k i est ki k- okM; kP; k e/kke/k FkkMhl h ekalGh tkxk gkrh-

vkepk Fiktjyk pjyrk nknk vkep; ki kl ju rivju Fikth; k virjkoj jikgkr gkirk-nknkpk oldlik Lora= gkirk-nknkp; k okV.khyk tikxk tiklr fnysyh gkirh-ckifkysysvkB [k.k o cktjyk yxrph Hkj i ji ekdGh tikxk-R; k tikxr nknkusekBsNI i j?kkrysgkirs

 $nknkP; \ k ? kj kP; \ k \ i \ fy a Msgkx.knkjh \ gkrh- \ , \ ak \ cktwyk \ ck; \ akph \ gkx.knkjh \ vkf.k \ nd \ \&; \ k \ cktwyk \ i q \ "kkph \ gkx.knkjh \ gkrh- \ ck; \ akB; \ k \ gkx.knkjh \ yk \ jk? kkckpk \ okMk \ Eg.kr \ vI \ r- rksQkj \ ekBk$

i Mak olunk gkrk-; k olun; kr dehr deh 20&25 i MD; k fHkrh gkR; k-?kMysysn×Mghs [kni gkrs rks i ijkru akGkryk alBY; krjh I jnkjkpk olunk vI kok vI k vnkt gkrk-

vkeP; k ?kj kHkkorkyh I xGh ?kj sHkkochphp gkrh- vkeph I o7.Hkkochph ?kj s20&25 gkrh- vkEgh xkokP; k 'kst kj h v I yM; k vokbôpsi qt kj h gkrks R; k vockbōyk ^ropkbō EgVyst kr gkrs; k ropkbōpsi qt kj h vkeph Hkkoch v I .; kcnnypk bfrgkl v I k okpk; yk feGrksfd]-----

 $nkekth \ i \ rkP; \ k \ dkGkr \ 12 \ o''kkpk \ nqdkG \ i \ Myk \ gkrk- gk \ nqdkG \ b-I-1455 \ rs1467 \\ ; \ k \ dkGkr \ i \ My; \ kph \ ukm \ bfrgkI \ kr \ I \ ki \ Mrs ; \ k \ nqdkGkyk \ ykxd \ nqkkphphpk \ nqdkG \ Eg.kr \ gkrs ; \ k \ nqdkGkr \ I \ xGaeax\(plavkl \) i \ Myagkra \ xkokr \ QDr \ nkup \ ?kjsjkfgyh \ gkrh- , \ d \ baxG \] \ nq jsfoBBy \ dI \ xkoMs \$

12 o"kkP; k nqakGkurj [kwi ikÄl iMyk-lxG; k tehuh dl.; kokpw ifMd iMY; k-v'khfi dkowtehu ifMd iMY; kurj ckn'kgkyk fprk i Myh-; k tehuhpk egl nygh feGr uûgrk-o; k tehuhyk dl k; yk dkskh ek.kl gh uûgrh- nqakGkr ftdMafrdMatx.; kl kBh ykz ykz ij egy [kkr ek.kl afu?kwu xyh gkrh-fcnj ckn'kgkP; k njckjkr baxGsuked , d ckn'kgkpk l pd gkrk-rksl pd eaxMaxkopk gkrk-rks, dsfno'kh ckn'kgkP; k i q; smHkk j kfgyk o dquhil kr ?kkywu Eg.kkyk]^^ gqtji] ckyY; kcnny ekQh vl koh-**

ckn'kgk cksyyk]^^ cksyk] dkfQj! ro>sekQfd; ktk; sxk-**

baxGsEg.kky§ ^^vkeP; k xkoh eaxM; kyk 12 o "k§ekBk nqckG i Myk gkrk- R; k clkGkreaxGosk vkl i Myk gkrk- vkrk i kÅl i k.kh pkaxyk vkgsijarqtehuh cll k; yk clkskh ek.kl aukghr-**ckn'kgkusfnok.kyk l oZekfgrh i śk cljk; pk vknsk fnyk- gqtjkuk fnok.kusl ktxry§^^vkrk frFka QDr nkup ?kjk.khjkgkrkr-, clcl xkoMso nq jsbaxGs; k xkokpk egl ny xsys13 o "kå'kb; vkgs bFkyh gtkjks, clj l (i cl]clkGh tehu ek.kl kB; k clj.; kokpnu l /; k i fMcl i Mysyh vkgs ckn'kgk fnok.kyk Eg.kkyk]^^ gpe clj fn; k tk,] ogkblch tehu yksknesckW fn; k tk,-**

fnok.kusbaxGsyk | kfixry}^^ rfigh eaxl/l; kyk tk-frFkad| xkoMso rfeps?kjk.ksfeGw ykdkwk tehuh dl.; kl kBhrfeP; k vkG[khp3ukR; k xkR; krhy ek.kl kwk rfigh vkokgu djk-**

baxGsvkf.k dl xkoMs; kuth vkiY; k l tafkhr ukrokbidkutk cksykonu ?kryso gtkjks, dj tehuh R; kutk dl .; kl kBh fnY; k- r@tki ji gsxkogh fanj akn' kgkP; k rkC; krp gkrs frFksvkeps i nožt ?kny.] nohpsi qtkjh j kgkr gkrs gs?knysbaxGso dl xkoMps r@tki ji kpsHkki h gkrs

bakGsvkf.k dl xkoMuh r@tki jikpsfoBksth?kgyso dGl ksth?kgys; k@; k'kh l i dZl k/kyk o eak¶; kr tehuh dl .; kl kBh eak¶; kyk ; s; k cnny fopkj ys f'kok; vækckbiþaBk.kdaeak¶; kr mHkadj.; kpabakGuh opu fnys

vkepsi možt] nku HkkÄ ?kypseaxNj; kr vkys R; kuk xkoktoGph xkomjph nku ′k&rhu ′ks , dj tehu vckckbpaBk.kdacufo.; kl kBh o dl .; kl kBh fnyh- rl p cEgijh jkM] ckj kGsj kM ; Fkigh R; kauk 500&500 , dj tehuh dl .; kl kBh c{khl h fnY; k x¥; k-v'kk i/nrhus gGigGw eacGosk xko i tjgk ol oyk xsyk-ckn'kgkus tehu dl .kk&; k ykchkuk R; kt; k ukos tehuh buke d#u fnY; k-ckn'kgkpk egl ny i tjgk l # >kyk-bFkaeactn; kr R; kp dkGkr vuxjo#u fude vkys; k fudekaukgh gtkjks, dj tehuh dl .; kl kBh dl xkoMsvkf.k bacGauh fnY; k-bFksfude Hkkodh v/kšxko gkrh-i es; kt; kr pkink vkMukokP; k QG; k i MY; k-; k pkink vkMukokpsnod , d vkgs; kipsnior [kinkck vkgs; k pkink vkMukokP; k ykchkuk pkink tRrsEg.kw vkG[kystkrs; k pkink tRR; kph Hkkodh Qkj ekBh vkgs; k pkink tRR; kr vkirkMinj nRrij l koath] okdMij xekij Hkkstuj Vgyij ykinjxkoj dkumdkinjtBkj b-vkMukokpsykd vkgr-[kinkckP; k efinjkr pi k"Vehyk yacj i qt.; kpk o cxkM i qt.; kpk ; kpk eku vkgs; kr vkorkMs; kauk nske([kh fnyh xsyh Eg.kw vkirkMsnske([k vl s uko R; kpsi Mys

R; kpcjkcj 14 vkMukokpsykcl ?kgynuk tkMHkkÅ ekurkr-tkMHkkÅ Eg.ktsn/kHkkÅ-14 vkMukokpsnocl vkf.k ?kgynpsnocl oscGstjh vI yj rjh 14 vkMukokpsykcl vkf.k ?kgys; kpr cth 0; ogkj gkr ukgh- Eg.ktsFkkMD; kr; k pkhk vkMukokr ?kgysgh 15 oh Hkkoclh ekuyh tkrs gs15 vkMukokpsI oZykcl eavM; kr, clkp Hkkxkr j kgkrkr-; k Hkkxkyk [kMkck egkxYyh Eg.krkr- i R; cl Hkkoclh²; k NkY; k NkY; k vkgr- okclMs xYyh] nRrukxeks xYyh] vkorkMs xYyh] I koath xYyh] xkosxYyh r'khp vkeph ?kgysxYyh-

eacly; kphiophiklou xkojpuk nku Hkkxkr foHkktu >kysyh vkgs rhu Mkackok ojpk Hkkx o rhu Mkacko; k [kkypk Hkkx- gs rhu Mkac Eg.kts rhu [khc ykGs; kii; k ?kjklekj vkgr- ojp; k Hkkxkyk 'kfuokj i B vlogh Eg.krkr-; k ojp; k Hkkxkr vBjk i xM tkrhjkgkrkr- [kkyp; k Hkkxkr tkLrhr ejkBk lektjkgkrks fdYyk Hkkxkr ckEg.k lektjkgkrks vkf.k xkokp; k oskhip; k ckgj egkjokMk o ekxokMk vkgs gh R; koGh xkokphjpuk gkrh-

ifgY; kikl wu [kkypk Hkkx o ojpk Hkkx; kpk, deadkonny vl ysyk [ktjul fnl r vl s vkV; kikV; kpg] ykskikVpsl keus vl kr] dtpR; k vl kr] okoMh Li/kkZ vl kr] fdøk dtpygh dkj.k vl ks ojp; k Hkkxkrhy yksdkph [kkyp; k Hkkxkrhy yksdkojksj ugeh HkkM.ks0gk; ph- d/kh d/kh rh brdh ekBh HkkM.ks0gk; ph dh]; k HkkM.kkr vusdt.k x Mkhj t [keh gkr vl r-

, dnk vlip dlipy; krjh dkj.kko#u [kkyP; k Hkkxkryk ckcwcccV] jl ?kk.kokyk; kiph ojpk Hkkx Eg.ktsiB Hkkxkrhy, dk ekG; kP; k ek.kl k'kh ckpkckph dlipy; krjh dkj.kko#u >kyhiB Hkkxkrhy ykodkauh ckcwcccVsyk brdaekjya] brdaekjyadh ckcli; k vaxkoj 20&25 tlic; kpsokj dsysxsys I mibkuh ckcwR; krw okpyk- i jirquirj [kkyP; k Hkkxkryk ek.kli I gl k ojP; k Hkkxkr tkr ul s i BHkkxkryscjM] oMj] vkf.k [kkyP; k Hkkxkrhy ekax tkrhpsykod; kipk mi; ksx Hkkan.kkl kBh brj I ektkrhy ykod tkLrh d#u ?kr gkrs ekBh ek.kl aHkkan.kaykow ukewweG jkgkr vl ruqll ku xjhckipp gkr gkra

, dnk i BHkkxkrhy , dk cjiM lektkrhy i Syokukusekak tkrhrhy ckbZkh i eidj.k days ekak lektkusR; k i Syokukyk vudoGk pki w dk<ys rjhgh R; kpsi eidj.k Fkbcysukghpk#u rsekakokM; kP; ktoGp v ly¥; k vkeP; k 'krkr; r v l s

, dnk ukxi pehP; k fufeRrkus [kkypk Hkkx o i BHkkx; kpor VkV; ki kV; k Li /kkl > kY; k-; k Li /kir [kGrkuk dqkhrjh dqkkyk dk; rjh V I H; ckyya; ko#u brdh HkkM. kapkyw>kyh] brdh HkkM. kapkyw>kyh dh] [kGkMwr Vxknj gk. kkekjh I # > kyh-urj c?kgh R; kr i Mys, d V/kkirkI frFks V {kj ' k% y < kbl pkywgkrh- VkEgh ygku i kjaykcuu c?kr gkrks, deadkyk mpywu Vkd. kj ykFkk ?kky. kj cpp; k ekj. kj i kt/kr gkrkusekj. ksoxjsgsi dkj I # gkrs i kfyl nksup cnksclrkyk gkrs R; ke@srs, o <; k ekB; k I emk; kpaHkkM. k Fkkcow'kdysukghr- toGtoG 1000 rs1500 ek. kl a V/kklrkl, deadkuk ekj r gkrh- HkkM. k fkkcow'kdysukghr- toGtoG 1000 rs1500 ek. kl a V/kklrkl, deadkuk ekj r gkrh- HkkM. k dkskhgh I kMow'kdr u@gra fo'kskr% i BHkkxkrhy i Syoku Vkf. k [kkyP; k Hkkxkrhy i Syoku eMGh HkkM. kkr i esgkrh-, o < k oG HkkM. kagkrh i jarq'kl=kpk] ykdMkpk o nxMkpk okij dkskhgh dsyk ukgh- QDr gkrkuao i k; kua, deadkyk ekjyatkr gkra; kr [kkyP; k Hkkxkryk [kMkck xYyhryk nRrk ckcj; k r#. kkus v udkuk t k; cm dsys 'koVh dkgh tk. kR; k ek. kl kuhj i pkuh; såu HkkM. k I kMoys HkkM. kal kMok; yk tk. kk&; k i pkukgh ykFkk cpD; kpk ekj [kkok ykxyk- 'koVh HkkM. k I kMoys HkkM. kak kxki kxh > kyh-

R; kp dkGkr pk[kkeGk l ek/khpk ft.khb/nkj dsyk xsyk- R; k ft.khb/nkjkP; k dk; blekr iæ(k i kgqksEg.kmu l kaxyh l kuFkkupsJhear fparke.kh rkR; k l kgc i Vo/kiu o R; kB; k l (jo| i Ruh Jherhjk.khl kgc l j Lorh nøh mifLFkr j kfgysgkrs

rks I kgGk i kg.; kI kBh xkokrhy vud ykdkuh xnhīdsyh ft.kki/nkjkuarj e([; i wtk Jhear i Vo/kū jktsvkf.k jk.khI kgc; kapsgLrs>kyh-R; kuarj eMbirhy i Vkax.kkr, d ekBk eMi Vkdyk gkrk-R; k eMikr Jhear fparke.kh i Vo/kū o jk.khI kgc; kapk ekBk I Rdkj >kyk-fparke.kh I kgckapk frFksNkt/kI k njckjp Hkjysyk gkrk-

; kp eMikr eaxM; krhy xfg.khpsgLrdyk] f'ko.kdyk o u{khdke; kpsekBsin'kZu Hkjoysysgkrs rsin'kZujk.khl kgckwuh Lor%fQ#uikfgys R; kurj; k in'kZuke/khy Hkkx?kryY; k Li/kZdke/; sifgys rhu uncj ifj{kdkmekQir dk<.; kr vkys; k ifgY; k rhu uncj fL=; knuk jk.khl kgckB; k gLrsc{khl nsåullekudj.; kr vkyk-; k Li/kZd fL=; kne/; sdk>h xYyhrhy l kgcyky dk>h; kB; k iRuh l kSl dyuch l kgcyky dk>h; knuk iFke dekodkpsc{khl feGkys

c{khl lekjalkkurjjktsojk.khphjkg.; kph0; oLFkk dklkjeG; krdsysyhgkrh frFksekBekBsrœwVkd.; krvkysgkrsjktæjkejR; kpsdkghiksyhlghgkrsnjckjkrhydkghekudjheMGhghgkrh-dklkjeGk; krvudræwVkd.; krvkysgkrs

jkt]jk.kh; kpk eDdke eaxMa; Fks15 fnol gkrk-R; kurj rsl kaxyhyk fu?ku xsys

R; kurj, d?kVuk?kMyh-xkokrhy iSyoku ek#rh pûgk.k; kP; k Hkkokyk /kMMhjke pûgk.k; kpk Hkkå ek#rh pûgk.k pûgk.k; kpk Hkkå ek#rh pûgk.k [kwip larkiyk-larkikP; k Hkjkr rksikfyl LVskuoj pkyw xsyk-R; kP; k gkrkr ryokj gkrh-rks ryokj?ksåu QkstnkjkP; k vækkoj pkyw xsyk-R; kyk ikfyl kwh?kjko?kkryk ijarqies; skk&; k ikfyl kwh rksryokjhusgYYkk d# ykxyk-dBY; kp ikfyl kwh iestkåu ek#rhyk idM.; kps /kkMl gkruûgrs

QkStnkj ek#rhyk xkG; k?kkyw Bkj ekj.; kP; k r; kjhr gkrk- c?; k ykolkph Qkj ekBh xnhZteyh gkrh- ek#rh fi l kGysyk gkrk- rks uach ryokj ukpor gkrk- gk l xGk rek'kk rkl nkw rkl pkyngkrk-

dne x#th bilky'k Ldnypseq[; k/; kid gkrs rseMbP; k cktnyk vI yV; k 'kkGrp Fkkocysysgkrs R; kuh vkG[kys ek#rh vf/kd dkG ryokjhusfrFks xkGkG ?kkynykxyk rj 'koVh OkStnkj xkGhckj dj.kkj- vuod ykodkuh ek#rhyk i Vonu I klixrys vuodkuh ek#rhyk 'kkr dj.; kpk i z Ru dsyk- i jørqek#rh i Syoku 'kkør gkr u0grk- dqkkpp , cdr u0grk-

v'kk ifjfLFkfre/; s ek#rhpsfe= nkenv..kk]fcVij ujl wgs dne x#thyk Eg.kkyj ^x#th] vkEgh e/kh xsykj rj ek#rh vkepa, xdk; pk uk; -jkxkuavkeP; koj ryokjhusgYyk djhy- ek#rh rfigkyk Qkj ekurks rfigh e/; stkÅu ek#rhyk 'kkr djk o R; kph ryokj gkrkrw fgl dkow?; k-**

 $ifgY; kmk x \# thauk gs/kkMI dj.ks \lor'kD; okVys ijarqx \# thauh fopkj dsyk] ^ \lor ki.k \\ xlip clyk] rj ek#rh i Syoku , [kk|k ek.kl kpk fdaok i kfyl kapk tho ?kbJy- f'kok; 'ksoVh i kfyl kauk ek#rhyk xkG; k ?kkynu Bkj ekj.; kf'kok; i; kJ; p j kgk.kkj u kgh- R; ki {kk gk l o <math>I \lor U$ FkJ VkG.; kl kBh \lor ki.k, dnk i z, Ru d#u i kgkok- f'kok; ek#rh i Syoku gk x # thauk Okj ekur gkrk-

 $x\# th/kkMI \ d\#u \ dpjhP; \ ki \ esssyj \ c?; \ kph \ [kii \ ekBh \ xnhl > kysyh \ gkrh- \ dne \ x\# th xnhlru okV \ dk-r \ dk-r \ ek\#rh i \ Syoku \ to Gi \ kgkpys$

 $x\# th\ ek\#rh\ i\ \ yokuyk\ Eg.\ kky\]^ek\#rh\ rh\ ryokj\ ek>rdMsnsc?kw\ nsvkf.\ k\ xi\ xpkua?kjh\ py-\ ek>s,\ rd-**-$

ek#rhEg.kkyk]^^x#th]ehOk\$tnkjkykekjY;kf'kok; gFkuavftckrgky.kkj ukgh**-

 $x \# th] \begin{tabular}{ll} $$ x \# th] $$ $ $ x \# th] $$ x \# th] $$ x \# th] $$ $ x \# th] $$

ek#rh i \$yoku Eg.kkyk] x #th]rFighe/; s; \$\delta\$ udk- \tikt eh Qk\delta\thijkyk [kykl d\forall'; kf'kok; jkgkr uk; -; kr eh esyksrjh eh ?\kcj.kkj uk; -**

 $x\# th /kkMI \ d\#u \ ek\#rh \ i \ Syokukto G /kkor \ xsyso R; \ kauh \ ek\#rh \ i \ SyokukpaeuxV \\ T; k gkrkr ryokj gkrh rs i dMya \ ek\#rh \ i \ Syoku Qkj f/kli kM gkrk- rj x#th <math>\lor R$; ir clydsgkrs gRrhi & sok?k fdøk brj i k.kh fnI kok $\lor I$ srsfp= fnI r gkrs

c?; kryk , dt.k Eg.kkyk] ^^dk; ch Eg.k j kek! i $\$ yokux#thyk ekj ra] i $\$ yoku yb $\$ fi I kGya - R; kyk toGpaykcpadkskp dGr ukgh-**-

n(jk Eg.kkyk] ^^vjs^kmdj] vlagqkkj - i Syoku x#thoj gYyk dj.kkj uk; - i Syoku x#thyk yblekura - rok , mdyarj x#thmpa, mdw kdsy] vlap okVra -**

 $x\# \text{th tkjkr vkjMy} ^\wedge \text{ek\#rh. Vkd rh ryokj cktnyk- rwl /; k ek.kwl jkfgyk ukghl-rwtukojkl kj [kk filkGyk; - Vkd rh ryokj cktnyk- ukgh rj] Qkj ekBk vuFklgkbly- QkStnkj rę; koj cnqhP; k xkG; k >kMsy- rok lkk.k tkbly- rwesyk rj rę; k egykckGkuk ekxa dksk l kblkkG.kkj\ vl k oMsi.kk d# udkl-**ek#rh]^x\psi+th] eh vkt ej.kkj rj gk; uk; rj ekj.kkj rj gk; - r\psigh ykc tkok- ekÖ; kl kBh r\psigh r\pspk ik.k /kkD; kr ?kkywudk- l kMk eyk vxmj- r\psigh tkok n\psi- eyk vkt thor jkgk; pauk; - vu dqkkyk thor fBok; pach Ugk; -$

x#th] ^^ek#rh] ryyk ek>h 'ki Fk vkgs Vkd rh ryokj cktnyk-**

'ki Fk \lor kg \S EgVY; kurj ek#rhua \lor ki Y; k gkrkryh ryokj x#thB; k gkrh fnyh \lor kf.k x#th i Baeku okdow ek#rh mHkk jkfgyk o Eg.kkyk]^^ x#th] rBgh gkrkrY; k ryokjhuaek>a \lor ki I vd eBddamMok- \lor kt eyk dqkkpk rjh I kBk ekBk djk; pk gk; -**

 $x \notin thuh \ ryokj \ gkrkr \ ?ksrY; \ kurj \ nkeil \ fcVil \ ujlwie aiGr \lor kys \lor kf. k \ R; \ kuh x \notin thP; k gkrkrw ryokj \ ?ksryh- ek#rh x \notin thP; k x Gk i Mwu j Mr gksrk- ek#rhP; k \lor Jwax \notin thpa vax fHktyagksaiksyl ek#rh i SyokuP; k toG <math>\lor kys \lor kf. k x \notin thuk \ Eg.kkyl ^n [j] \ i Syokuyk \lor Vd \ djkoh ykxsy-**$

x#th Eg.kky3^^ dk; Eg.kw**

x#th i\$yokuyk Eg.kky{] ^^ek#rh] r@gh ikfyl kucjkucj tkok- r@gkyk eh tkfeu feGowu lkMorks ekő; koj fo'okl Bok-

 $ek\#rh\,i\,\$yokuyk\,\lor Vd>kyh-\,dne\,x\#\,thauh\,I\,\,ksyki\,j\!\!iP;\,k\,BksdG\,ofdykauk\,\lor k.kys \lor kf.k \\ ,\,d\,nku\,fnoI\,kr\,ek\#rhyk\,tkfeuoj\,I\,\,kMoys$

xkokr nkekthph t=k Hkjr gkrh- t=pk ps/jeu dksk 0gk; på ; kr ekBk okn fuekZk >kyk-dne x#thuk exkN; kr ekBk eku gkrk- xkokuaR; kuk nkekthP; k t=psps/jeu cufoys

i kang ax guku ekus xkokrys, d vfr'k; /kMMMhpsdk; drigkrs R; kauh x#thauk psvjeu 0gk; yk fojkók dsyk-gku ekusgs52 I kyki kl nu uxji kfydr uxji pd gkrs R; kapk LoHkko /kMMI h gkrg frrdp rsU; k; kuapky.kkj sgkrs paplnP; k ekxkauarsokxr u0grs vkf.k dksk paphuaokxr vI sy rj R; kyk rsi kBh'kh vftckr ?kkyr u0grs x#th dkakal i {kkpsgkrs vkf.k gku ekusdkakal fojkókh gkrs

, dsfno'kh I dkGh I dkGh gkuekusrkR; k o efgedj x#th cktkjkr xlik ekjr pkyysgkrs ykGs; kB; k nkjkr , d ?kVuk ?kMyh- xkokryk , d xNI , dk ?kjmkt ckbiph NM dk<r gkrk-

gkwekus rkR; kwh rscf?krya \vee kf.k rkR; k R; k x\nkyk Eg.kky\nterm\n^dkjsikjk] r\nyk dksk \vee k; k&cfq.khqkbir dk ukqhr *

 $x \in Eg.kkyk]$ ^nq &; kP; k ck; kuk eh vk; k cfg.kh dk Eg.kw ekuik **

 $\label{eq:rkR} $$ rkR; kEg.kky \end{substitute} $$ ^\sim vkj si kjk] r_{\end{substitute}; k cfg.khph] $$ vkbph n_{\end{substitute}} ih dkskh v'kh NM dk< yh rj \end{substitute} $$ vkhph] vkbph n_{\end{substitute}} $$ vkhph NM dk< yh rj \end{substitute} $$

xM Eg.kkyk] ^^eh dk; gkrkr ckxM; k HkjY; k gkbir 0g; **

rkR; kyk jkx vkyk vu Eg.kyk] ^^áß; k vkbJyk ----ykoyk- gsxkcMae?kki I uaeykp myVp ckyra -**

Eg.kww rkR; kuaR; k \times Mykyk nkw FkkckM; kr fnY; k- \times M i kj \times k] eh c?kww f?krwEg.kr fu?kww \times Myk-R; k \times MykuaMw[k /kj \times k-

, dnk rkR; k cktkjkr cl ysvl rkuk] frFka; Åu R; k xM i kj kuarkR; kyk f′k0; k fnY; k-rkR; ktoG nku pkj i kjagkrh- R; kuh R; k xM i kj kyk pki w dk<ya rjhgh rsxM i kj xaxli cl r u0gra

, dsfno'kh rkR; kyk vákkj kr xkBuu R; kuarkR; kyk ekxkouu MkD; kyk nxM ekjyk-rkR; k'kfjjkuaQkj etcur gkrs rkR; kuai frdkj dsyk-rkR; kyk ek#u rsxM i kgixai Guu xsya R; k xM i kgikyk fojkskh i kVhP; k ykcdkauh gkrk'kh /k#u rkR; koj p myV QkStnkjh dsyh-rkR; kyk \vee Vd >kyh-rkR; k , d nku fnol kr l Vys ekeyk dkYkir xsyk-

rkR; k Eg.kky] ^^ukgh ekj ya**

dkVkLuank9kkukgh funk8k I kMya rkR; kyk R; k i kjikuaekjyagkraijarqrkR; kuadkVkIr ukgh Eg.kwu I kfixrya rkR; kP; k; k okx.; kerGsR; k xM i kjikyk i 'pkrki >kyk o R; kusrkR; kpsik; /kjyso rks Eg.kkyk] ^^rkR; k ek>apqbyaj eyk ekQ djk-**

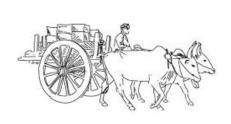
rkR; k Eg.kky $^{tk} ryk ekQ dya^{**}$

vkeP; k ?km/; krY; k 'krkrys'kstkjh nRrki ir /kkoxMsgsgkrs R; kuarkR; kdMardkj dsyhdh] r@'khjke ?km/; kuaek>a 'krjsVya - 'krekst.; kl kBh rkR; k Lor%jkukr vkys doBodjdMuu 'krekstya myV vkepp j ku nku rhu fnM nRrki irkP; kr fu?kkya

rkR; kpstjh nRrki ir fe= \vee I y \S rjh rkR; kuanRrki irkyk I klixry \S ^^/kkaxM \S rs?kl \S ; kph nku rhu fnM ?kl \S ; kuk ns \S u Vkclk-**

nRrki irkauh rkR; kpk 'kCn ekuyk- \vee kf.k 'krkph gnnhph n \times Mau0; kusj koyh- rkR; kpk 'kCn dkskp ekMr u0grs u- ik- okMkir 50 o 60 n'kdkr rkR; k i pkj djhr u1 ysrjh okMkirhy ykd rkR; kuk i pM erkuafuoMu nr gkrs rkR; k d/kh fuoM.kdhr gjysukghr-

, dnk dk; >ky $\}$ Qk\$tnkj kuaexM; kryk dMck ckgjP; k ftYg; kr U; k; yk cnh ?Kkryh-



'krd&; kps Qkj Qkj uqllku gksÅ ykxys I xG; k 'krd&; kuh rkR; kyk I kixryi ^^rkR; k] rfigh tkow QkStnkjkyk I kakk dh] dMC; kP; k xkM; k vkMowudk Eq.kwu-**

rkR; kua Okstnkj kyk | klixry]^^ 'krd&; kB; k xkM; k vkMowudk-**

Okstnikjikyk Hik; adj jikx vkyk-Okstnikj ekj.; kl kBh rkR; kP; k vakkoj xsyk-

rkR; k tkxojp Fkkcyk o Eg.kkyk] ^1 kgc] eh ch reP; k vækoj ; A 'karks ij eh reP; k onhjoh bTtr djrn k-** 'krd&; kpk ipM ikfBck rkR; kyk gkrk- gsc?knu QkStnkjkusdMck ckgj U; k; yk ijokuxhfnyh-

vI sgs vkepsxkopsgkueku&rkR; k uffrd Okstnkj gkrs

eaklyi; kr egiyh/kj pklolkr, d ikj gkrk-R; k ikjkoj ykod ugehl kBh xlik ekjr clysyh vlk; ph-R; k ikjkyk xoG; kpk ikj vlaEg.kyatkr gkra; k ikjkoj lokh >kyh dh ykodkB; k >lyhP; k >lyhh xlik ekjr clk; P; k-; kp pklodkr R; k dkGkr ikp lgk gkWsyagkrh-lkgcyky dk>h] dlyfyd gtkj j ybhoj Hkkd yj fnuwHkVth] nkenv...kk xkskokMdj; kph gkWsyagkrh; k gkWsykr 2 i s sfnysdh pgk feGk; pk-nku i skkr Xykl Hkj el kyk nwik feGk; pa gkWsykr Hkth] fpoMk] ckywkkgh] ykMiy ftych] i jhHkkth] f'kjk] oMk] xlynk.kh vlsinkFkZfeGr gkrs nku i skr dlyykgh i nkFkZfeGk; pk-, d vk.; kr Qlyy uk"Vk 0gk; pk-

eh d/kh d/kh pk#u dMck fodyk dh] 2 i skparjh gkWsykr [kk; pksvkf.k , d vk.kk vkb&yk uovu | k; pks

cMkiar gtkjjjkÅck fdYynkj] 'klarkjke fdYynkj] rkEg.kdj] iVV.k'kVVh] enklj xMkiar ukx.klj jkepmzjRuikj[kh] ipok{kjh cajdny;knoh cktkjkr nadkuagkarh-rjjrhyky 'kBth] Mksktps'kgk] nkenvk..kk xkskokMdj] cjjdyj] dkrkG] ij"kkire ekjokMh] jktekus; kph vkMr nplkuaeMbi ekj gkrh

R; kr jrhyky 'kBthph \lor kMr , d uæj pkyr gkrh- dkj.k 'kBth l qxhP; k \lor xknjp 'krd&; kuk l qxh djk; yk \lor MMOgkUl i\$ s|k; ps l qxhr 'kBthB; k \lor kMrhoj gtkjksikB; kB; k FkM; k i MyY; k fnl k; P; k-

 $xkokr\ dkgh\ ck;\ dk\ 50\ o\ 60\ P;\ k\ R;\ k\ dkGkr\ vfr'k;\ drRooku\ Eg.kuu\ vkG[kY;\ k\ tk;\ P;\ k-\ ckGwekGh\ ;\ kuph\ Egkrkjh\ vkbl^jkgh\ ekGhu^*\ Lor%c$yxkMh\ pkyok;\ ph-\ ndjh\ drRooku\ efgyk\ vatekblgtkjs\ gh\ efgyk\ Lor%300&400\ ,\ dj\ tehuhph\ nfkjfk\ djhr\ vl\ s\ rhl\ jh\ efgyk\ tkudhckbljkepmz\ ykxwgh\ efgyk\ Lor%'krh\ ikgkr\ vl\ s\ pki Ms\ xefthph\ vkbl\ ghgh\ vfr'k;\ drRooku\ efgyk\ Eg.kuu\ vkG[kyh\ tkr\ gkrh-\ R;\ kuph\ vkf.k\ jk.khph\ pkaxyh\ vkG[k\ gkrh-\ R;\ keGs\ l\ xGk\ xko\ R;\ kuuk\ ekur\ gkrk-$

, dnk eakly; kyk Qkj ekBk i ji vkysyk gkrk-tw vkf.k tyvie/; sQkj ekBk i kÅl i Myk-Irr, d efguk i kÅl i Mrgkrk-eaklyko vkl i kI psykod vrfo"Vhyk?kkcjys eakly; kP; k i f'pesyk eakly; kP; k oj vI ysyk d".k ryko rlyko hkjyk gkrk-d/khp d".k ryko rlyko krk- rksd/kh Qwsy; kpk we ulgrk-R; koGps'kkI w xkQhy j kfqys

vpkud nijkjh 3-00 oktrk d".k ryko QWyk-ryko QWY; kcjkcj ifgY; kmk fdYyk Hkkxkrik.kh?kij ys vpkud /; kuh&euh ul rkuk] d".k ryko QWyy] vl sakskkykp d/kh Lolukrgh okVys u0grs fdYyk Hkkxkrik.kh vkY; kurjik.; kpk ykmk ?kjk&?kjkme/; s?knj Y; kurj ykdknuk dGuk]^, o<ai k.kh dBuu vky; * dkskkykp dk; dGru0grs.

i k.kh xlþl?; kbrdsvkgðj rkði; ðr ryko QlþY; kpk dkyok >kyk- ykxd l∮ko§k i Gwykxys cj.pl sykxd fdYyk Hkkxkrw i Gw c∉M xYyhdMsi Gkys

c#M xYyhrgh i k.kh vkysyp gksrs

rykokpk Hkjkok QWyk r&gk R; k HkxnkWkph #mh ifgY; kmk deh gkrh- HkxnkWkph #mh tl t'kh ok<r xsyh rl &r'kh ik.; kph ikrGh ok<r xsyh- ik.; kph ikrGh gGøgGwok<r xsyh- ik.k gkuh tkLrh gkÅ 'kdyh ukgh- rl p ryko fnol k QWY; kelGøgh ykodkpsik.k okpysijarqfoRrgkuh Qkj ekB; k i ek.kkr >kyh-

i k. kh ckt kj i Bsr ?kd ysrûgk ykadkuuh nqdkusi Vki V an disyh- vkMrhoj /kkU; kP; k FkMh T; k BoY; k gkR; k R; k okgiu x¥; k- nqdkukP; k akgij to<k eky Boyk gkrk] ro<k eky okgiu xsyk $\label{linear_continuous_continuous} $$ \operatorname{cktkjiBuarj} \operatorname{ekjokMh} \times Yyh] \, \operatorname{yknMhP}; k \, \operatorname{Hkkorkypk} \, \operatorname{Hkkx} \, \operatorname{dk>h} \times Yyh] \, \operatorname{flkeuxj]ckjkGs} $$ od \, \operatorname{dkGh} \times Yyh] \, \operatorname{pkhlkkj} \, \times Yyh] \, \operatorname{klkhkkj} \, \times Yyh] \, \operatorname{klkkkkj} \, \operatorname{klkhkkkj} \, \operatorname{klkhkkj} \, \operatorname{klkhkkkj} \, \operatorname{klkhkkkj} \, \operatorname{klkhkkkj} \, \operatorname{klkhkkkj} \, \operatorname{klkhkkkj} \, \operatorname{klkhkkj} \, \operatorname{klkhkkj} \, \operatorname{klkhkkkj} \, \operatorname{klkhkkj} \, \operatorname{klkhkj} \, \operatorname{klkh$

'kfuokj i Bpk Hkkx cjkpl k dkj Mk j kfgyk-tkLrh gkuh [kkyP; k Hkkxkr >kyh-ojP; k Hkkxkr Eg.ktsiB Hkkxkr gkuh deh >kyh-dkj.k i BHkkx gk mp \vee kgs nkekth i r efinj kpkgh Hkkx mpkoj \vee lY; keGsfrdMsi k.; kph i krGh deh j kfgyh-

 $ukx.koklMh] \ iqklijkikluu \ eDr jkfgyh-ijkpsik.kh xaxk&teupk] \ f'kmseGk] \ oklMhojps \\ rG] \ dcj rGs; kr ikgpys f'kmseGk] \ dkl kj eGk] \ fdYyk Hkkx] \ iqklik.; k[kkyh gkrk-; k Hkkxkrik.; kphikrGh tkLrh gkrh-$

; k i jkP; k i k.; kcjkcj vud olrwokgwu tkr gkR; k-; k i okgkcjkcj nqdkukP; k i qss Boysyh ukj Gkph i krh okgwu tkr gkrh-dk>h xYyhrhy, d dk>h vkMukokpk eui(; rsukj Gkps i krh dk<.; kl kBh i k.; kr mrjyk-rksukj Gkpsi krs/k#u ckgj vksr gkrk-brD; kr R; k i okgkr, d Nlij okgwu; r gkrs rksukj Gkpsi krsvk.kk; yk xsysyk dk>h R; k Nij kr vkMdyk-R; kyk i okgkP; k ckgj i Mrkp vkysukgh-R; krp rksciMw esyk-; k i jkr cktkj i Brhy vud nqdkukph gkuh Okj ekBh >kyh-vud nqdkunkj kpk eky i k.; kr okgwu xsyk-?kj si Myh]?kj ke/khy olrwokgwu xsy; k-

 $ijkuarj\ ijixLr\ ifjljkr\ nyny\ iljyh-vusdki;\ k.?kjkr\ xkG\ lkpyk-dkghi;\ k.?kjkr\ ik.kh\ rapu jkfgys\ dkghiph\ ?kjsi\ Myh-fp[ky]\ nyny\ nij\ djk;\ yk vkB\ ngk\ fnol\ ykxys\ ;\ k dkGkr\ dkgh\ ykxd\ nkekthipk\ nsÅG]\ [khlkckpk\ nsÅG]\ Hkjkckpk\ nsÅG\ ;\ k\ ifjljkr\ jk=h\ >ki\ r\ gkrs\ dkgh\ 0;\ ki\ k&;\ kauh\ vki\ yh\ xknkesykclkauk\ vkB\ ngk\ fnol\ jkgk.;\ kl\ kBh\ ekxdGh\ d\#u\ fnyh-foBBy\ /kkakMs ;\ kauhgh\ lkakkyk jkM\ uftdpsxkMkouu\ ykxdkauk\ >ki\ .;\ kl\ kBh\ ekxdGsd#u\ fnys$

ijkurj xkokreytj; kph l kFk i l jyh-eytj; kP; k l kFkhr∨ud ykd eR; weq[kh i Mys R; koGh xkokr nku rhu MkDVjp gkrs MkWhpxkodjkP; k nok[kkU; kyk Qkj ekBh xnNZ>kyh-fnol &jk= nok[kkuk pkywBokok ykxyk-; k dkGkr MkWhpxkodj] MkWhske([k] MkWcMkndj]; kuh fnol jk= ykdkuk oS|dh; l ok fnyh-

HKX rhu

vkepsvktkick fpekthvklik miphi ji o. kizkýk] ukd ljG] vakkrika;h 'ktilkickjkcih o i ka;js'ktilki/kkrj- tler%' kkdkgkjh vl sgkrs vkeps l xG; kr FkkýyspiyrsfoBkicknknk- ugeh R; ktilkickpe ekfgrh l kak; pjrh v'kh--- ^^vkeP; k vktkickpe tle 1857 P; k ctilkP; k oGpkvkeph vkth ekgkG rkytp; kryh bijoMs; k xkoph- ; kpk fookg 1875 P; k nijdkGkr >kykvkeP; k vktkickyk, d ygku Hkkå gkrk-rksn'kjFk-n'kjFk 10&12 o"ktipk gkrk-vku , ds fno'kh xkokr egkutiko i fikkpsykid vkys n'kjFkpk ygkui.kkikl uup v/; ktedMs vf/kd vksk gkrkegkutiko i fikkpsykid ekguhcopkP; k nioGkr 10&15 fnol mrjysgkrs R; k dkGkr n'kjFk R; kiph l iok djhr vl s vktkickP; k oMhykipsuko egkniigkrs , dsfno'kh egknipkck n'kjFkyk Eg.kkyk] ^^vkja n'kjFkk] mBl til k; knoGkr tkåu cl rijk-dk; rjhdke&/kink djdh ejnk-**

n'kjFk Eg.kyk] $^{\sim}$ kck] eyk R; k c ϕ k ykck θ ; kc#cjp jkgk; yk \checkmark koMra - Ekh R; kG; kcjtkcj tkr θ *

egkniçk \vee ki Y; k Fkkij Y; k yıdkyk Eg. ktsfpekth \vee kli kyk Eg. kkyk] ^^fpek] rwrj | kax-ref; k /kkdV; k Hkkokyk | etkow- | kj [kal kj [ka Eg. kr; aR; k copk ykdkıc#cj Ekh tk. kkj gk; -**

vkf.k [kjks[kjpan'kjFk R; k egkut|kko i likh; ykschkejkej, cl. fno'kh fu?kwu xsyk- R; kyk vkckuay; aq\ndya i jarqrkschkejh I ki Myk ukgh-

uarj egkjk"Vkr Hk; kud lyxkph l kFk vkyh-R; k oGh fpekthvklikpsoMhy egkmuzkck vkf.k vkb2j [kekckb2nk9kmch lyxkP; k l kFkhr xsys fpekth vklikpaN= gjoya lyxkP; k l kFkhe@s fpekthvklik vkiY; k l kl jokMhyk bjoMsyk xsys frFkgh 4&8 fnol kr lyxkph l kFk i kgkpyhvkthP; k dNymckrhy toG toG l oZek.kl slyxkP; k l kFkhr esys fpekthvklik vkf.k dkl kckbZ extN; kykijrvkys

xkoh ofMykikftir xkoktoG xkomjh 10 , dj tehu gkrh o <oGl okViyk 12 , dj gydh ekGkph tehu gkrh- fpekth vklikyk ifgyh eiyxh >kyh- frpsuko pmickbi pmickbi 10 o"kkiph >kY; koj frpayXu HkkypkMhP; k gfjck xoGh cjkcj yko.; kr vkya

vkthpk i kG.kk ykm vIY; ke@sR; k egyhP; k i kBhoj egyxk 6 o"kkZurj tUeyk-R; kpa uko foBkck Bp.; kr vkya foBkckP; k i kBhoj 6o"kkZual kukckbZtUeyh-frP; k i kBhoj 6 o"kkZuscGh tUeyk- o R; kP; k i kBhoj vkepsofMy 'kMnQG r@'khjketUeys I k/kkj.k IyxxkP; k I kFkhP; k oGh foBkcknknkpk tUe 1898 I kypk-rj cki pk tUe 1922 I kypk-nk9kkaHkkokæ/; s 24so"kkpavrj gkra fpekth vkli kuavki yh ofMyki kftir tehu rj I blkkGyhp i jirqbrj tehuhgh fodr ?krY; k-

rj dkgh [kalkuadky; k-cEgijh okVph i fgY; kmk 11, dj tehu pkG[kcdMw fodr ?kryh-urj 6, dj tehu R; kp tehuhp; k cktwyk ukx.; kr fodr ?kryh- 4, dj l kukjkr ?kryh- o l kayhps ykxw; kph rhl , dj tehu 1930 l kyh [kalkua dayh-ykxwgse@psl kayhps rsT; \$B vfHkurs Jhjke ykxps ukrokbid gkrs ykxw i phi kl w l kayhps Jheir l jnkj i Vo/ku ; kps njckjkr eul cnkj gkrs R; kpk , d enyxk i q; kyk gkrk o , d enyxk ekeynkj each; kyk gkrk-eachlaxko l kayh l i Ekkukr vl ye@sykxwekeynkj cjkp dkG each; kr l i Ekkukpsekeynkj Eg.kw dke djhr gkrs R; kuk 30 , dj tehu ckjkGsokVsyk oBk&; kr l i EkkukdMw feGkysyh gkrh-ijirqrh tehu R; kuk dl .ks 'kD; u0gra Eg.kw rh tehu ykxw kgckuh fpekthvkli kyk Eg.ktsvkeP; k vktkckyk 5&5 o"kkP; k cksyhoj [kalkuaykoysyh gkrh-vkepsvktkck j kepmzenki 'kBthpsfe= gkrso jkepmz'kBth ykxw kgckpsfe= gkrs vktkckoj R; kpk Qkj fo'okl gkrk-e@kr vktkck i kekf.kd o , dopuh oRrhpsgkrs R; kuk xkokr , d l Ttu o l /ku 'krdjh Eg.kw vkG[kystkr gkrs 'kBthoj fo'okl vl' Y; ke@srh rhl , dj ftehu R; kwk dl .; kl kBh [kalkwafeGkyh gkrh-

, d fno'kh ykxwekeynkjkph cnyh I kxyhyk >kyh- ykxwekeynkj tkrkuk jkepmz 'kBthyk Eg.kky] ^fpekthvklik reP; k fo'okl krysvkgr- tehu R; kB; kdMp jkgw|k- [kM eyk o"kklyk euhvkMM] d#u i kBor tk-**

uarj ykxwekeysnkj fjVk; j >kys o espbłyk esykadMsjkgk; yk xsys vkeP; k vktkockps o; gkr vkyagkraR; kespa vktkockuh vki yk Fkkjyk esyxk foBkockyk I klixrył ^^bFkuu i spsrq; k ukokoj [kli ykxwl kgockuk o"kkP; k o"kkłyk Hkjr tk-vkf.k tehu rsph fr?kaHkkÅ feGwu djk-vkrk ekb; kpkuaftehu gkruk; -**

I k/kkj.k 1940 i kl w tehuhpk [kM foBkcknknkP; k ukokoj Hkjyk tkr gkrk- 1948 I kyh Loræ Hkkjrkr i fMr ug#uh 5@6 tehu dGkyk feG.; kpk dG dk; nk i kl dyk-^dl sy R; kyk tehu* gk dk; nk Hkkjrkr ykxw>kyk-R; koGh gjhck 'kBthpsoMhy j kepmz'kBth okjys gkrs oMhykB; kekxs?kj drigfjck 'kBth >kysgkrs gfjck 'kBth ∨kf.k foBkcknknkphgh e⊊h R; kB; k ofMyk i ek.kp i espkywj kfgyh-

gfjck enkl; kips v ktkick lijtey enkljkt LFkkue/kiu 18 0; k 'krdkP; k li#okrhyk i fgY; kink liksyh likFkkuP; k vkJ; kyk vkysyagkirs

gfjck 'kBthps vktkck I kaxyhps I liFkku jkts Jher i Vo/kiu ; kuuk Eg.kkyij^^
jktijvkEgkyk repk vkJ; gok vkgs vkeph vucl ?kjk.khjktLFkkue/kuu egkjk"Vkr vkyh vkgrvki.k Okj n; kGwo U; k; hjktsvkgkr- gs, schu vkEgh repp; kclMs 'kj.k vkyksvkgkr- vkEgkyk
repp; k jkT; kr i kekf.kcli.ks I kockj clhpk /kmk cl#u [kk; yk o txk; yk i jokuxh feGkoh gh
fourh-**

jktuh njckjkrhy eu l cnkj ykxuuk fopkjys $^{\circ}$; k ekjoM; kph l i wklik'ołkkeh 'kkókk \vee kf.k rs[kjk[kj i kekf.kd o l pkb/hus/kmk dj.kkj \vee l rhy rj R; kuuk \vee ki ysl li.Fkkukrhy exGoss; k xkoh \vee kJ; |kok-**

 $ykxw; kpaiVo/klujktP; k njckjh otu gkraykxwuh enkl'kBthph f'kQkjl dyh]^^rs pkxysvkgrlpkYhoikekf.kdi.ksl kodkjhpk/kmk dj.kkjsvkgr-**$

enkl'kBthuk eakGoss; FksiVo/klu jktauh jkgk.; klkBh tkxk fnyh o lkodkjdhpa yk; lUlgh fnya r8gkikluu enkl?kjk.kaeakMj; kritekf.kd o lpkYhusjkgkr gkra R; kB; k?kjkrgfjck'kBthgsekBs'krdjhgkrs R; kauk 900, dj tehugkrh-ykxwvkf.kenkl?kjk.; kpk nktrkuk r8gkikluupkgkrk-

 $i \not \in S1948 \ yk \ diG \ dk; \ nk \ ykxw > kyk- \ ykxwekeynkjpsi = gfjck' kBthuk \lor kys R; k i = kr fyfgysgkrij ^fpektho R; kph egyafoBkck] cGh <math>\lor kf.k$ rG'khjke $\lor fr'k; \ i \ kekf.kd \lor kgr-rs \lor ki yh tehu xsyh 18 o''ki [kMkuadjhr <math>\lor kysys \lor kgr-R; \ kuh d/khgh [kMl prployk ukgh-rjh rh 30 , dj tehu eyk R; kukp | k; ph <math>\lor kgs \ dG \ dk; \ | kuarj R; kph ; k tehuhoj gDd <math>\lor kgp \ ij \ rrek > h bPNk \lor kgs gh tehu foBkckusLor%P; k ukos <math>\lor fr'k; \ deh \ i Skkr \ txki \{kk fuEE; k fderhr fodr ?; koh-eh R; kuk [kjnh d#u nrks**$

gjhck 'kBthuh foBksck]cGh] rG'khjke fr?kkuk ckykow ?kryso I klixry $]^n$ gh tehu rGhfuEE; kfderhr [kjnh d#u ?; koh-**

foBkck Eg. kkyk]^^'kMth do<; kyk bdr ?; koh vI a rĘgkyk okVar; -**

'kBth]^^ gsc?k foBkck] I /; k R; k okVyk , djh 100 #- nj \lor kgs rÆgh , djh 50 #i; s i æk.ks1500 #i; sykxæk | kor \lor kf.k t ehu [kjsh d#u?; koh-**

 $foBkick]^{-1}/; k \lor kEgh fr?kach Hkko; xGa; xGajkgk; ywgkÅr-tjh ftehu ekö; k ukokoj \lor l yhrjh eh ekö; k nkligh Hkkokauk ch l eku rhu fgLl ad#u 10&10, dj nskkj gk; - rok ek>aEg.k.ka<math>\lor$ l agk; ijridkauh 500&500 #i; sHkjkoa \lor ku rh ftehu [kjnh d#u?; koh-ftehu ekb; k ukokoj \lor l Y; ke \cdot GsifgY; knk ekb; k ukokoj [kjnh d#u?; koh- uarj R; k nk \cdot Ykauh [kjnhpk [kp \cdot Hk#u \lor ki Y; k \lor ki Y; k \lor ki Y; k ukokoj d#u?; koh-

'kBth]^^bBkck]c#cj ckyrw-cGh]rG'khjke repk bipkj dk; gk; \
cGh]^^nknk Eq.krw rheyk ekU; qk;-**

rG'khjke]^^eykch ekU; gk; -**

'kBth] ^rok vI adjk i R; sdkuh 500&500 #i; sbMuckyk | k- eh ykxwI kgsckyk i = i kBorks vkEgkyk R; kP; k'kh 0; ogkj Bjok; yk espbJyk tkoaykxy- eh vu bMuck 0; ogkj Bjok; yk frdMa espbJyk ; srw Eg.kwu i = R; kwuk i kBorks vkEgh frdMwu vkY; koj [kjsnhP; k Vk; ekyk I xG; kwuh 500&500 #i; sykxwI kgsckwuk | k-**

 $I \times G_7^* \text{ k Hkkokauk gfjck 'kBthpa cksy.ka i Vya gfjck 'kBthauh ykxw I kgckauk i = i kBoy}^^VkEgh eacbiyk; rw - dok; s^A | k ro<adGok**$

gfjck 'kBthuh i = i kBoY; kuarj ykxul kgckpamRrj 15 fnol kr vkya frdMagfjck 'kBthofoBkckyk vkeD; k rkj [ksyk eqcb3yk; k Eg.kw l kfxrya

gfjck 'kBthps ukrokbid I ksyki ji yk gkrs R; kuk nkikkpajišopa; s; k&tk.; kpafrdhV dk<k; yk I klixrya Bjyš; k rkj [ksyk 'kBthonknk bFkw eqpbiyk xsys

ykxılı kgıcıku.h R; kıpaLokxr dıya pgki k.kh ox\$s>kya vkf.k 0; ogkj kyk fr?kacı ys

 $ykxwlkgcEg.kkyil^{a}^{gfjck'kBth} tehuhph fdærrfigh I kakk-frFkatehuhpk nj dk; \\ vkgsrsrfigkyk ekfgr vkgs eh rj ekb; ki=krEg.kkykp vkgsdh] tehu txkr pkyyil; k fuEE; k fderhr ns ks'kBthua I kakkoa vkf.k eh , sdkoa vkepk o'kBthpk nkt.rkuk rhu fi<; kipk vkgs vkeP; k okMofMykuh 'kBthp; k okMoMhykuk eakil; kr jkgk.; kI kBh JherkdMsf'kQkj I dayh gksh-'kBthpa?kjk.karhu fi<; kikI w eakil; kr xq; k xkfomkuaj kgkravkgs vkeP; k vktkskph f'kQkj I ; kX; gksh- vI aeyk eukeu okVrsvkgs$

gfjck 'kBth] ^^vxnh cjkcj ckwykr l kgc rfigh- ehp foBkockyk l kfixryavki.kkyk dnG dk; | kruatehu feGrh; k i j r 'kh?; k; ph Ugkbł vkRrki; ir ykxwl kgockuh vki Y; koj fo'okl Vkdyk; - R; k fo'okl kyk tkxw k- ek>aEg.k.kafoBkockyk i Vyao vkEgh fgdMa0; ogkjkyk vkyw**

ykxwlkgc]^^cksyk 'kBth]dk; njkuatehu foBkckyk |kohvlar@gkykokVr; **
'kBth]^^gsc?kk lkgc]R; k okVsyk, djh 100 #i; snj pkywykgs vki.k, djh 50 #i; s

iæk.ksfoBkckyk tehu∣koh∨laek>aer∨kg**-

FKMMk oG I xGp xli cl ys

 $ykxwl kgc FkkMk oG fopkj d\# ykxysvkf.k foBkckyk Eg.kky]^^ga cksyk] foBkck]^** foBkck] ^^eh 'kBthpich ekM.kkj llgk; vku repach ekM.kkj ukghł eyk 'kBth Eg.krrrsch ekU; vkgs ij eyk okVra regh, djh 10 #i; sdeh djkor vkf.k, djh 40 #i; snj /kjkok**$

I kgc] ^^dk; 'kBth] repadk; Eg.kuavkg&**

'kBth]^gsc?kk | kgs] foBksk vfr'k; i kekf.kd vkgsEg.kuup fgFkarÆgh cksykoY; koj vkyk; -n(jk fcymj ek.kn vl rk rj fgdMavkykp ul rk-- OxplV d@ dk; | kuatehu feGr vl rkukfgdMa; k; phdk; xjtgk; dk; **

I kgckauh FkkMk fopkj dsyk o I kgc Eg.kky3^fBd \lor kgsfoBkck Eg.krk; R; ki \rightleftharpoons k.ka0; ogkj d#; k 40 #i; s, djh; ki \rightleftharpoons k.ks1200 #i; s \rightleftharpoons yk foBkckus | kor \lor kf.k d/khgh [kjnh d#u?; kos**

0; ogkj Bjyk-foBk α kual kg α kuuk 400 #i; sfg1 kj fnyk-

I kgc Eg.kky]^^foBkck b1 kjkph clk; xjt vkg&]**

foBkck] ^1 kgc rttgkykns; kl kBh 400 #i; s?ksÅu vkyks - rsrttgkyk fnyto i kfgthyektö; ktoG rj fBowldk; djk; psgkbir-lkgc] vkxxkMhrua; rkuk gh i sa thoki (kk tkLr tiwl vk.kY; krh-vkrk ijr tkrkuk g; k i skkyk eh dok tink R; ki fjl rtep; kdMajkgw|k-[kjnhP; k Vk; ekyk 800 #i; sjktk nrwvku [kjnh d#u f?krw

I kgc Eg.kky]^^fBcl vkgs Bo bFkaVcykoj i\$ **

foBkrckua100&100 P; k pkj ekB; k ukt/k ekst nu R; kB; k Vrcykoj BroY; k-

gfjck 'kBth] ^cja \vee krk rægh ekplefgU; kr xkokclMa; k- roj 800 #i; sR; k nk9kk Hkokuuk xkGk djk; yk l kxrks ; k; P; k \vee xmj pkj fnol i = fygk l kgc-**

to.k&[kk.ka>kyh- jk=h nk9kalkgckP; k caxY; koj jkfgys o lolkG mBwu ckjhomj LVskuyk vkysfrFkwu rsFkV lksykiyiyk vkyso eaxM; kyk cluaia; ji yi ekx3vkys

, d efgU; kurj ykxwl kgc vkys BjY; kiek.ks30 , dj tehu foBkck nknkP; k ukokoj [kjsh d#u fnyh- nknkus rG'khjke o cGhdMu 400&400 #i; s ?ksÅu 800 #i; s jk[k ykxwl kgckuk fnys [kjshpk [kp2fr?kkuh Hkjyk-ykxwl kgc expbyk xsys

gfjck 'kBth', d fno'kh nknkyk Eg.kky \S ^bBrck vkrk nk \S kk \S ; k ukokoj 10&10 , dj dok d#u fnrv** foBkck]^^d#u nrvdh] ek>auko mrk&; kyk ykxyadh [kj \S h d#u fnrv**

 $\label{eq:gf_ck'kBth} $$ gjck'kBth}^{ak} = gf_ck'kBth}^{ak} = gf_ck'$

foBkck]cGh vkf.k rG'khjke gsfr?ksHkkÅ- vkepk vktkck okjY; kurj gsfr?kscktwyk oxoxGsjkfgys vkeP; k vktkckph 45, dj tehu gkrh- rh i i i i i ktyk 15&15, dj okVw vkyhvktkckpsnku okMsgkrs, d xYyhr vkf.k nij jk xYyhP; k dMsyk] Eg.ktsxkokP; k dMsyk- xYyhryk okMk vkEgkyk vu e/kY; k psyR; kyk fuEek fuEek fnyk- vkf.k foBkcknknkyk xYyhP; k dMpk okMk i wkZ fnyk- R; kpk Fkkjyk ycd vkeP; k ck- P; k o; kpk gkrk- Eg.kwp foBkcknknkyk, d Lora= okMk fnyk xsyk-

; k fr?kk Hkkok@; k okV.; k tjh >kY; k \vee l Y; k rjh gsfr?ksHkkÅ , dk eukuaok×r o j kgkr gkrs ckqgP; k yksCkauk okVk; pa; kph d\varphiqs\varphiu , d=p \vee kgr-d\varphygh egRokpk fu.k\varphi ?; k; pk

>kyk rj gsfr?ka, decdk0; k fopkjkup?; k; ps e/kY; k psyR; kpsvku vkeP; k ck- pa FkkMaiVr u0gra ijang foBkcknknkP; k LoHkkoke@ars>kduu tk; kpa foBkck nknkP; k i kBhoj, d cfg.k gkrhfrpauko I kuk- Eg.ktsrh ek>h vkR; k gkrh- fryk ekgk@rkyp; kr btxkokr fnysgkrs frpk ekydjktock ybZrjdVh gkrk- e/kou e/kou vkR; kyk ybZekjk; pk rôgk vkR; k foBkck nknkdMa; Åu jkgk; ph- vkR; k vkyh Eg.ktsnksu nksu efguanknkdMp jkgk; ph- ; k frUgh Hkkokph vkbZdkI kckbZ fryk vkEgh dkI kvkDdk Eg.k; pks rhgh nknk toGp jkgk; ph-

 $nknk \lor keP; k \ dk/rpkr \ I \ xG; kr \ Fkkij yk \lor I \ Y; ke \ Gai R; \ clkP; k \ ?kjkr \ deh \ tkLr \ rkp \\ c?kk; pk- \ dksk \lor ktkjh \lor I \ yk] \ rj \ R; kyk \ nok [kkU; kr \ nknkp \ U; k; pk- \ nok [kkU; kr \ i$ s to Gps \\ ?kkyk; pk \lor u \ urrj \ ekxwu \ ?; k; pk- \ \lor kepk \ ck- \ nknkyk \ y; \ ?kkcjk; pk- \ dok \ dok \ \lor kepk \ ck- \ \lor keP; k \ \lor kbil \ ak \ Hkbblk; pk \ ij \ nknk \ \lor kyk \ dh \ xi \ xkj \ cl \ k; pk- \ \lor kepk \ ck- \ \lor kbilj kcj \ Hkbbly; kpa \ dGyadh \ nknk \ i \ Gr \ ; k; pk \ vu \ \lor keP; k \ ck- \ yk \ f' k0; k \ | k; pk- \ d/kh \ d/kh \ ekjk; yk \ vakkoj \ ch \ tk; pk- \ nknk \ \lor keP; k \ ck- \ yk \ , o<; k \ f' k0; k \ | k; pk] \ ekjk; yk \ vakkoj \ tk; pk] \ ij rq \lor kepk \ ck- \ nknkyk \ d/khgh \ my Vacksyk; pk \ ukgh- \ xIi \ cl \ k; pk- \ fd \ pk- \ kij kruu \ mBuu jkxkuackgij \ fu?kuu \ tk; pk- \ vkeP; k \ vkbilyk \ nknk \ yxdhl \ kj \ [kk \ l \ kl \ klkGk; pk- \ vkeP; k \ vkbilyk \ nknk \ yxdhl \ kj \ [kk \ l \ kl \ klk] \ pk- \ vkeP; k \ vkbilyk \ nknk \ yxdhl \ kj \ [kk \ l \ kllkkGk; pk- \ vkeP; k \ vkbilyk \ nknk \ yxdhl \ kj \ [kk \ l \ kllkkGk; pk- \ vkeP; k \ vkbilyk \ nknk \ yxdhl \ kj \ [kk \ l \ kllkkGk; pk- \ vkeP; k \ vkbilyk \ nknk \ yxdhl \ kj \ [kk \ l \ kllkkGk; pk- \ vkeP; k \ vkbilyk \ nknk \ yxdhl \ kj \ [kk \ l \ kllkkGk; pk- \ vkeP; k \ vkbilyk \ nknk \ yxdhl \ kj \ klk \ l \ kllk \ l \ kllkkGk; pk- \ vkeP; k \ vkeP; k$

 $\begin{tabular}{l} $$ $$ Vkbiyk nknk Eg.k; pk] ^gsc?k nkjdk] dk; deh tkLr eyk I kaxr tk-ij rG'khjke c#cj dok HkkMr tkÅ uxI - ek>k Hkko rG'khjke I jG I Hkkokpk HkkcMk gk; - R; kyk , o<adGr Ugk; - jkx vkyk dh HkMkHkMk cksyr vI rw ij R; kparweukoj d/kh?kr tkÅ uxa - I a kjkr , [kknh xksV deh tkLr gkr vI rh- HkkM; kyk HkkM ykxr vI ra rsyk dk; ntkya [kij yarj eyk I kaxr tk-dk; deh i Myarj eyk I kaxr tk-ij rG'khjkec#cj d/kh okn ?kkyr tkÅ uxa** \end{tabular}$

vkb2 kaxk; ph]^^feB]fejpi]R; ky oGoj vk.kuu fnya dh laiya ek>a HkkMk; pa dk; dkj.kp Ugkb2**
nknk]^^vladj] xYyhr nqdku gk; - R; k nqdkukruadk; ykxhy rhikjkuk i kBow vk.kr tk- R; k
nqdkunkjkyk m/kkjh ekMnu fBok; yk eh l kaxrw R; kph m/kkjh rqG′khjkeyk l kaxw , dne o″kl gk
efqU; kyk Hkkxorwex >kya**

 $$$ \sqrt{kb_0^*r_0} < a > kyarj cj_p > kya dkj.k fnol Hkj R; kuh jkukr tkR; kr- npkukpadk; $$ \sqrt{k.kk}; paEg.kyarj i$ ach to Gul R; kr- ex eh o Goj I $ kd dl k dj.kkj **$

nknk] ^^rwdk; dkGthd# ux-ehnplkunkjkyk vkRrkp I karw ex >kya**

vi k vkepk Fkkijyk pilyrk nknk gkrk- R; kyk vkEgh oMhyki {kkgh tkLr ?kkcjk; pks R; kpa fr?kkii; k ?kjkoj ckjhd y{k vi k; pa vkEgh d/kh rG; kr i kigk; yk xiyksrj nknk vkEgkyk f'k{kk djk; pk- d/kh vkEgh fpipk dk<k; yk xiyks vu nknkyk dGyadh] nknk vkEgkyk Okoluaekjk; pk-FkkMD; kr nknk Eg.ktsvkepk vktkockp gkrk- eh ekÖ; k vktkockyk d/kh i kgk; yaukgh- rksvkeP; ktlekP; k vxknjp eilyk- i jarinknkP; k #i kuavkEgh vktkockyk jkst i kgkr gkrks

nknk lektkr d/kh dqkkyk Lor%pan&[k lkakk; pk ukgh- Lor%pan&[k cktwyk BsÅu brjkæ; kl (k nt%[kkrp rksvf/kd lejl 0gk; pk-loZHkkÅ o,dcfg.k; kpkplå kj rksc?kr gkrk-lkukvkæ; kyk rksQkj vk/kkj nr gkrk-njo"khZl kukvkæ; kyk ikplgk ikrh tqkGk] rsy dk<k; yk djMh] nkGh] 'kakk]x@kph <i cSyxkMhr ?kkywu ikBowu | k; pk-brdh rksikBP; k cfg.khoj ek; k djk; pk-

HKX pkj

ekb; k vkbipsekgji <kid ckHkkGxkto rk-ekgkG ft-l kykiji-ekb; k vkbips Eg.ktsvkthpsuko fttkckblvkf.k vkbip; k ofMykpsuko HkkÅ xk; dokM] vklik xk; dokM vkf.k HkkÅ xk; dokM gsnkiksHkkÅ HkkÅ-HkkÅ Fkkjyk o vklik ygku-nkikkuk 20, dj tehu-R; ki idh 10, dj dk; eLo#ih fofgj ckxk; r-

HkkÅyk rhu egyh- i fgyh fgjd.kh] nd jh rGl k&ek>h vkb] frl jh fdl ukckbł fgjd.kh 6 o″kkiph gkrh- rGl k pkj o″kkiph vkf.k fdl uk nksu o″kkiph gkrh- r&gk HkkÅ xk; dokM vktkjh i Mys HkkÅsuk i kYkpan([k.kagkra vud o\$| ksuk o MkDV) ksuk nk [kfoyai j rqdkghp xqk u@rk-

rígk xkokryk , d jke dídkMh ukokpk eu(; HkkÅyk Eg.kkyk] ^^HkkÅ] rígh ríghtkiýp; k i fydMs vkJ k rkytp; kr mtuh xko gkbł R; k xkoh rígh i kVkoj foykt dj.; kl kBh tkok- frFka, d oS egkjkt gkbł- R; kpk ybłekBk eB gk; - R; k eBkr rígh tkok- vku frFkY; k egkjktkadMnu vkSkhn?; k- rígkyk cjkcj xqk; hy- frFkaeBkr rígkyk efguk i líkjk fnl jkgkok EgVyarj efgukHkj jkgk.; kP; k r; kjhus rígh tkok- eBkr l Skd i k.kh dj.; kl kBh l loz gk; - jkgk; phch l lozgk; -**

HkkÅusjke d&dkM; kpk l Yyk ekuyk- dkj.k HkkÅ Qkjp o&kxwu xsyk gkrk- ikt/kr n([kw ykxysdh] R; kyk ej.kP; k onuk gkr gkt; k- 'koVh 'koVh tksl kxsy R; kpa, sdw b&kt d#u ?kr gkrk-

Hkkå] Hkkåph ck; dksfttkckblvkf.k R; kph rhu ygku ydjavlav[[k dlyfc mtuh eDdkeh xsya frFkaoS] egkjktkuh Hkkåyk rikl yao l kfixry] ^^, d efguk eBkrjkgkoaykxsyvkf.kvkSk/ka?; koaykxrhy- fgFkajkgk.; kph l ks gk; - l Skd rephrEgh d# 'kdrk-**

 $\label{eq:hik-def} Hikk ^A Eg.kky ^3 ^e gukHkj vkSk/k ?k ^Au xqk; rvlyrjvkEgh t#jjkgkrwvkEgh efqukHkjjkgk.; kP; kjhfu'khpvkywqkmr-**$

o\$| egkjkt]^^ fBd ∨kgs rÆghjkgkok**

Hkkå vkf.kR; kpadlyle frFkajkfgya 15 fnol vksk/la?kryh-

vkf.k, d fno'kh vpkud Hkkåyk j Drkph myVh >kyh o HkkåpaR; kr fu/ku >kya

o\$\ egkjkt fttkckb\\yk\Eg.\k\y\\\^ckb\\\ r\p; k\uo\&; k\yk\ngu \vk\Egh\nr\k\\\ pk\y\y\\ dk\\^*

vkth Eg.kkyh] ^^vkepaxko ybłykoc gkbł fgFkwu I kaxkok /kkMyk rjh xkokdMph ek.kl a ; k; yk nku fnol rjh ykxrhy- nku fnol e<adlafBok; på rok r@ghp vkepsHkko]Hkkodh cuwu ngu | k**

 $\label{thm:likelihood} Hkk \mathring{A} pafu/ku \mid dkGh > kyagkra \quad R; kyk ngu \mid k; yk jk=hps 8\&9 \ oktys \quad rkij; ir fttkckbP; k frUgh egyh Hkqlua0; kdG > kY; k- /kkdVh fdI uk Hkqluaj Mwykxyh- e/kyh rGI k o Fkkj yh fgJ d.kh <math>\lor$ kbJyk Eg.kkY; k] ^^ \lor kEg.kyk ybJHkqdk ykxY; kR; k-**

fttkckbZiqsa ekBa dkMa i Mya uo&; kpa e<a tkxpj fBow yxdjkd kBh l \$kd dlk cuok; pk\ fttkckbZyk vkiY; k frUgh yxdjkph Hkqd\$ kBhph rMQM c?kouk-

'koVh fttkckbłFkkgY; k fgjd.khyk Eg.kkyh] ^^fgjd.kh] rpkck eyk; - e<acktwyk fBow eh I \$ kd dl k dj.kkj\ fgFkavkiY; k toGpach oG[khp@hdqkhUgkbł rok rwvku r@l k nkgkh xkokr tkok vu Hkhd ekxw Hkkdj r@lMk ekxw vk.kk vkf.k vktP; k fnl rp [kkÅu fnl dk<k-r@pp; k ck· yk tkGyadh] eh r@gkyk I \$ kd d#u tå ?kkyrh-**

 $fgjd.kh \lor kf.k rGI kua \lor \{kj'k\% x kokr Hkhd ekxhryh-nku pkj Hkkdjhps rqlM]pV.kh ekxw \lor k.kyh o fr?khuhqh rsf'kGai kdaHkkdjhparqlMavkf.k pV.kh [kkÅu i kb'kph <math>\lor$ kx 'keoyh-

HkkÅP; k e<; kyk frFkaR; kp xkoh l a'; kdkGh ngu fnya xya-frl &; k fno'kh jk[k l koMyh

fttkckbl rhu ydjkuk ?kåu ckHkGxkoyk vkyh frFkavkY; kurj fttkckbluauojk e¥; kph ckreh nhjkyk o Hkkodhyk I kixryh

 $\label{eq:continu} $$ fttkckb]^{\vert_{a}} = uo\&; kyk d'kh ekjhu\ ek>k uojk ek#u eyk ckMdh 0gk; phgkU grhdk; **$

vklik]]^r+; koj ek>k b2 okl Ugk; - rw[kkb/kjMh gkb1 -**

xkokrY; k pkj tk.kR; k ek.kl kuh vklikyk l etkow l kMrxrya o fttkckb½k frP; k uo&; kP; k ?kjh jkgw | k; yk ijokuxh fnyh- vkiyk l [[kk HkkÅ eyk rjh vklikua dl yp l ks j&l rdikGyaUgk; -

fttkckbZckHkQcxkokrjkgkrgkrh-vklikuafttkckbZykdlyhpenrdsyhUgkbZfttk/kretgihd#uLor%paorhuydjkpaikb/Hkjrgkrh-eksyetgihdjhrdjhrfrua2&3′kG;k/krY;k-oR;k'kG;kjk[kk;ykfgjd.khykorQlkykikBforgkrh-eksyetgihvkf.k'kG;klk;kmRiUukruufttkckbZdl&cla?kjpkyorgkrh-

 $vkrk \; fgj\;d.kh \; ngk \; o''kkiph] \; rGI\;k\; vkB \; o''kkiph \; vkf.k \; fdI\; uk\; I\; gk \; o''kkiph \; >kysyh \; gkrhvkthuavkli kyk tehu okVuu \; ekfxryh-vkli kuaokVuu \; |k; pal kQ ukdkj ya$

 $fttkckbl \lor klikyk Eg.kkyh]^{^{}} \lor kEgkyk ftehu ~~|~k;~ph~ul~y~rj~~[kk;~k~ij~rh~tokjh~rj~~|~k-^{**}$

vklik d/kh FkkMhQkj tokjh | k; pk- d/kh | k; pkp ukgh- vl svks-krk.khrpfttkpsfnol pkyysgkrs vklik tehugh | k; ykr; kj uûgrko ikVkijrs/kkU; gh | k; ykr; kj uûgrk-

, dsfno'kh eaxlyl; kguu fpek?kgy]foBksck?kgy]cGh?kgy]gfjckxoGhckHkkGxkoykvkys

fttkyk fpekth vklik Eg.kky] ^^fttk] rwHkkypkMhcMwu vkeph toGph ukR; kryh gk; - ek>h Fkkgyh ikjxh HkkypkMhr rþ; k ekekyk Egath gjhck xoGhyk fnysyh gk; - Eg.kwp vkEghrþ; k ekekyk gjhckyk c#cj f?kow vkyngk; -**

fttk Eg.kyh]^^dk; skadsyà**

fttkpk ekek gjhck] ^^rb; k FkkjY; k i kjhyk ekx.ka?kkyk; yk vkEgh vkyw -**

fttk] ^^dqkkl kBh**

fpek] ^^ek>k /kkdVk i kj xk r@'khj ke l kBh**

 $fttk] ^-eyk uojk Ugkbł etyxk Ugkbł ck- Ugkbł vkrk ekb; ktoGpk ukl; kryk rok ekekp gk; - rok ekekyk cjaokVr vI ay rj eh ek>h i kjxh fgjd.kh rtgp; k i kjkyk | k; yk r; kjgk; - ylu Bjya$

r@'khjke o fttkph Fkkjyh i kjxh fgjd.kh; kpk fookg eaxhla; Fksl i Uu >kyk- R; ko@h I kaxyhpsol irnknk i kVhy Hkmehxr gksåu eaxhl; kP; k f'kmekekto@jkgkr gkrs f'kmekek vkeP; k nknkpsnklir gkrs R; ker@sf'kmekek o ol irnknk vkeP; k ck- P; k yXukyk vkysgkrj v'kh ekfgrh feGrs

yXukr fgjd.kh 10 o"kkph gkrh- fgjd.kh ukmk; yk vkyh- 2&3 o"kkua'kgk.kh >kyhfttkckbuafgjd.khpk oVHkj.kkpk dk; be ckHkGxkoyk Bøyk- fttkckblexky; kyk vkyh- fruajhrljlokiuk oVHkj.kkP; k dk; bekl kBh ckHkGxkoyk i «P; k vkBoM; kr; k; pafueæ.k fnya o ckHkGxkoyk tkrkuk rhfgjd.khyk cjkcj?koÅu xsyh-

, d ∨kBoM; kuarj eaxM; kph l×Gh ikgqks eMGh dk; blæklkBh ; skkj ∨kgr EgVY; kuarjfttkuafdMmd&feMmd ekMmu dk; blækph r; kjhdsyh-

i jarqnqmbkph xksV v'kh ?kMyh dh] T; k fno'kh eaxll; kpsi kgqks; skkj gkss R; kp fno'kh fgjd.khpsi VdhP; k jkxkusfu/ku >kya fgjd.khyk ngu nåu fttkph Hkkodh ?kjh vkyh vkf.k eaxll; kP; k i kgq; kph c\$yxkMh nkjkr vkyh-

fgjd.khpk.eR; w>kY; kuarj.nku.o"kklusi.jr.eak.M; kpsfpek.?kgynlfoBkck].cGh.?kgynlgjhck.xoGh.vkys

gjhck fttkyk Eg.kyk] ^^fttk]fgjd.kh oVHkj.kkP; k dk; Zlekfn'khp okjyh- gsn[k rwgh i poya vkrk nku o"këR; k ?kVusyk >kyhr- rok vkepaEg.k.kagk; dh] r@'khjkeP; k ?kjkr fgjd.khpk 'kji uûgrk- vkrk rph nijh ikjxh r@I kyk frFkanh- vku fqjd.khpan(kbil #u tk-**

 $fttk]^{n}gjhck ekek] eh \lor krk ek>h n(jhikjxhrGI kyk frFkanskkj Ugkbłdkj.k ftFkaekb; k FkkijY; k ykdhpk 'kij qrk] frFka/kkdVhyk eh nr uk; -**$

 $fpekth Eg.kky]^{n} gsc?k] fttk ropafgjd.kh x Y; kpan([k deh dj k; pavl y] rj rop; known (k deh dj k; pavl y) rj rop; known (k k i kj hyk ekb; k ropafgjd.kh x Y; kpan([k deh dj k; pavl y) rj rop; known (k deh dj k; pavl y) rj$

 $\label{eq:fitth_scale} fttk \ ukgh \ Eg.kr \ gkrh \ vkf.k \ fpek] \ foBkck] \ cGh] \ gjhck \ I \ xGsfttkyk \ I \ etkow \ I \ kxr \ gkrs$

'koVh I xG; kR; k vfr vkxgkeGsukbIyktkLro rh rGI kyk rG'khj keyk | k; yk r; kj >kyh-rG'khj ke vkf.k rGI kpayXu >kya rGI k yXukr 10 o"kkiph gkrh-

r@'khjke fnlk; yk dkGk lkoGk ijarg'kjhj cGdV o pagjk dkekuajkiysyk] mpoh I kMi kp QW] I Mi krG ckdkk] ukd FkkMI acjai jrgʻkM; kyk xksy] MkD; kyk I k/kk i Vdk] vækr rhu xM; kpk Injk] dejsyk tkM ikaja/kkrj] ik; kr dkrM; kP; k tkM tM Oguk- nekuadok pkyk; ph I o; uûgrh- pkyk; yk ykxyk rj vki Y; kp uknkr [kkyh eku ?kkynu pkyk; pk- d/kh d/kh i kBhekxa gkr ckákou pkyk; pk- i kBhekxaMkok gkr mt0; k gkrkr /kjysyk v1 k; pk- , dk gkrkuaugeh ckš/a pkGok; pk- d/kh d/kh ekxP; k ekxackNaekstk; pk- ugeh dk; rjh fg'kkc]dk; rjh vk[k.kh MkD; kr pkyysyh v I k; ph-?kjkr FkWklk k rjdVh i jargckgg vfr'k; 'kkar LoHkkokpk- eM vkyk rj d/kh d/kh ?kjkrY; k o ckgjP; k ek.kl kuk gl ok; pk- d/kh fqmh Mk; yktk ekjk; pk] d/kh foukn djk; pk-f'keX; kyk ge[kkl xYyhrudyk djk; pk-d/kh dqkkpk dkY] dqkkph l kgch Vki h]?kkyw gkrkr nAndaf?kÅu QkStnkj cuk; pk- d/kh dkGh Vkijh] dkGk dkV ?kkynu x#thpal kak ?; k; pk-, o<a ek= [kja dh ckggi ck · yk xæR; k LoHkkokpk ij ∨fr'k; ljG] ikekf.kd Eg.kuu ykd vkG[kk; ps tok; vk cl vk rj i kpp fefuVkr tok; pk-rkVkr dk; ch f'kYvd] d/kh m"B Bok; pk ukgh-rkV pkVnu&id nu [kk; kpk-vkeVhP; k dkY; kf'kok; d/khp tpk; pk UgkbZ ngh] nvlkkph vkoM Qkj gkrh- eV.kkph ∨koM i .k gkrh- ?kjkr ok<foy¥; k ckcdMkp} ?kjkrY; k dkcM; kp} dkcMhpaeV.k d/khp [kk; pk ukgh-ik.; koj o i{kkøj cgn l; kj dj.kkjk ∨kepk ck·-c\$ykoj eqykl kj[kaiæ dj.kkjk-ikolkP; k fnolkr c\$/kuk ikolkr d/khp ckdkk; pk ukgh-fuok&; kyk vk.kuu ckdkk; pk-d/kh d/kh cSykncjkncj xlik ekjk; pk- cSykpaeNda/k#u dijokGk; pk- cSykn; k rkMkpk endk?; k; pkcSykauk o\$.k] xor Hkji ij [kkÅ ?kkyk; pk- vkBoM; krua, dnk cSykauk rG; kyk usÅu /kopk; pk- vk/kh e/kh okGyð; ki nkMdk ?kvÅu R; kpsnku Hkkx d#u ?kvÅu cSykpa′kjhj ?kkl k; pk-ck-ito<k cSykoj ine djk; pk- ro<p cSyach ck · oj ine djk; ps ck pk vkokt , pdyk dh cSyadku Vodk#u ck-dMac?kr mHkk jkgk; ph-ck-ph Hkk"kk cSykauk dGk; ph-ck-cSykyk ^mB* Eg.kyadh cSyamBau mHkk jkgk; ph- ^c\$ * Eq.kya dh] [kkyh cl k; ph- ^eku [kkyh ?kky* Eq.kya dh c\$ya [kkyh eku

?kkyk; ph-^py* Eg.kyach] pyk; ph-^ Fkkæ* Eg.kyach] Fkkæk; ph ck- ph Hkk*kk c\$ykæuk dGr gkrh-c\$ykoj] xkbōj] Eg'khoj i {kkøj ck- Qkj Qkj i le djk; pk-

vkbpaekgipauko ^r@lk* ∨ku lkljpauko ^0nkjck-* lkljh ukmk; yk ∨kY; koj clksk rj Eg.kyank9kkph uojk ck; clkph ukoal kj[kh ulkohr- EgVY; koj ∨kbpauko r@lkP; k , pth 0nkjclk Boyagkra ijarql xGst.k ^nkjclk* Eg.kk; ps ∨kbZfnlk; yk FkkMh Bqkxh-jax xkjk] ukclk MkG; kuauhVl] cli yko o clkGi pgjk xky] ′kjhjkuan.kclV] e/; e ckikk] MkGsekBso ik.khnkj-pkj pk9kkr mBmu fnl.kkja0; fDreRo! ∨keP; k Hkkochr loZpgyR; k o pgyr pgyR; ke/; s∨kbZmBmu fnlk; ph-

 $ij\ ck\cdot P;\ k\cdot vu\ vkbP;\ k\ LoHkkokr\ FkkMh\ fHkUurk-\ ck\cdot \ fp\ ckv\ dljh]\ vkbl[kfp\ d\ o\ FkkMh\ ijki\ ckjh\ o\ Rrhph-\ ck\cdot \ yk\ 'krhr\ d''V\ djk;\ yk\ vkoMk;\ pa\ vkbJyk\ nvlk\ nvlk\ nvlk\ k, kph\ tukoja\ I\ kMkkGk;\ ph\ vkoM-\ ck\cdot \ jkxhV]\ vkbl\ vfr'k;\ 'kkar]\ ck\cdot \ pk\ vkokt\ ekBk-\ vkbJpk\ vkokt\ FkkMhk\ ckjhd-\ ck\cdot \ yk\ f'k{k.kkph}\ vkoM}\ Qkj!\ ck\cdot \ yk\ I\ akhr]\ fl\ uekph\ vkoM\ Qkjp\ deh-\ vkbl\ ek=\ vfr'k;\ jfl\ drk\ vl\ ysyh]\ I\ akhr\ fl\ uekph\ vkoM\ vl\ ysyh]\ dFkk\ , kd.;\ kph\ vkoM\ Qkj-$

nkiškki; k LoHkkokr dkgh ckcrhr l kE; rkgh gkrh- nkiškgh \vee akU/ni; k fojkiškrys nkiškgh egykoj Okjp i ie dj.kkjs nkiškgh l al kjh- nkiškkukgh pkavya pavys i nkFkZ [kk; yk \vee koMk; ps , dedkoj nkiškkpk Okj Okj foʻokl] i ie-nkiškkpserHkn fdjdkG- ek= Hkkin.kad/kh Ogk; ph ukghr ek= fdjdkG erHkn- nkiškkukgh okV] \vee ki yk l al kj ekBk Ogkok- egyaekBh Ogkohr- Hkko&Hkkodhr \vee ki yk >inki koj tkok] nkiškkpk LoHkko brjkakh rgyuk djk; pk \vee ftckr uOgrk- R; keGaT; kph i \vee kr gkr gkrh] R; kP; kcnny Onsk] eRI j d/khp \vee kbZoMhyki; k eukr fuekZk gkr uOgrk-nkiškkpkgh LoHkko I jG o HkkcMk gkrk-

 $ek>h\ \lor kblrGl\ k\ eaklyl;\ kyk\ ukmk;\ yk\ \lor kly;\ kuarj\ ek>h\ \lor kth\ fttkblusxkokryh\ i\ kpek.kl\ axkGk\ dyh\ \lor kf.kl\ l\ kfxrylj\ ^^gsc?kk]\ i\ p\ eMGhauklj\ ek>k\ uojk\ e\#u\ l\ kr\ \lor kB\ o''kll>kyhekb;\ kfnjkual\ kr\ \lor kB\ o''kll'\ eyk\ d/khfpi\ Vlklj;\ l\ (nkfnyaukgh-eh\ txwd'kh\^**$

i po eMGhuavkli k xk; dokMyk ckykow vk.kya o fopkjył^^ gsc?k vkli k] rwfttkyk ftehu ch nr Ugkbł [kk; yk/kkl; ch nr Ugkbł/ruadlatxkoh rok rwfrP; k uo&; kphftehu rj ns ul yarj fryk ftehuhpk o″kkpk [kM rj nh-**

∨kli kuaFkkMk fopkj fuoRrhcjkcj ckgj tkÅu dsyk-fuoRrh gk ∨kli kpk psyr HkkÅ-

fuoRrh \lor kli kyk Eg. kkyk] $^{\circ}$ i p ykschauk okchMacksywuchw [kM fnowEg. ka uarj nså uxa i j gFkai pokP; k I ekgi [kktyp fnrwEg. k**-

vklikuai poklekj tehuhpk [kM fttkyk | k; pk danyk dsyk-

 $fttkckbJyk\ uo\&;\ kph\ 10\ ,\ dj\ tehu\ gkrh-\ rh\ tehu\ fruavkiyk\ I\ [[kk\ nhj\ vklik\ xk;\ dokMyk\ [kMkuao"kkP;\ k\ cksyhoj\ dl\ k;\ yk\ fnyh-$

vkthyk, drhljhegyxhgkrh-frpsukofdlukckbł fryk frFkafrP; k xkohp fnyagkra ijrqfrpk uojk pkaxno p0gk.k l kykinjyk ujflax fxjth feye/; sdke djhr gkrk-rksfrFkp I kykinjykjkgkrgkrk-

nktigh egyhph yXua >kY; kuirj \vee kth ckHkGxkokr , dVhp jkgkr gkrh- fryk egyxk uQgrk- frph tehugh nhjkuscGdkoY; keGsrh ntk[kh o fujk'k gkrh-

frus, dsfno'kh vki Y; k nhj kyk Eg. kkyh]^gsc?kk Hkkoth] ek>h ftehu rfigh cGdkoyh gk; - rfigh eyk o"kkpk [kMch nr Ugkbł eh tx.kkj dl h\ eyk nku yxdh gfr- R; kuk pkGh dkd.ka djk; ykch ekb; kdMai s aul R; kr- eyk tx.; ki j rh 10 P; k , s th 5 , dj ftehu rjh | k-**

vklik xk; dokM] ^^gsc?kfttk] 5 , dj l kMu , d xkkch eh tehu ryyk nskkj Ugk; -**
vkth] ^^gsc?kk Hkkoth] 10 , dj ftehu ekÖ; k uo&; kph gk; - eh dk; rkjgkyk Hkhd
ekxrUgkbł ekb; k uo&; kph ftehu eh rkjgkyk ekxrh; k- eh rkjgkyk rkjgphftehu ekxrUgkbł
**

vklik xk; dokM] ^^gsc?k] fttk] ryyk eyyxk Ugkbł nku eyyhp gŷr- gh ftehu dk; | kua ryyk feGr Ugk; - gh ftehu ekb; k ck- ph gk; - rok eh ryyk gh ftehu dokp nskkj Ugkbł eh ryyk tehu nr Ugkbł*

 $fttk] ^ex eh txwd'kh**$

vklik]^^eyk dk; I karn; k\ en t xwd'kh\ dke dj**

fttk] ^^eyk dke gkr Ugkbł**

vklik]^^dke gkr UgkbZrj , d ekBk nxM dejyk ckak vku fgjhr mMh ek#u tho nh-**
nhj ∨l ackywykxY; kuarj ∨kthyk Eg.ktsfttkb½yk Qkj Qkj n&[k gkr gkra fryk dk;
djkoà dkqhp dGr u0qra

, dsfno'kh ifgY; k ckGri.kkl kBh ek>h \lor kb \rlap \lor kthdMsxsyh \cdot \lor kth \lor kf.k nhj \lor klik xk; dokM, dkp okM; kr jkgkr gkrs

vklikk xk; dokM]^^vkxajkMa rgyk i kfixryauk] rwgFkajkgwuxwEg.kuu- i kfixrya vi rkuk rfp; k ysdhyk ckGkari .kkyk gFkad'kky vk.kya i kax**

toGp vklikph nku rj.kh ikja mHkh gkrh-vklikuavkiY; k r#.k ikjkuk l kūxryā vkRrkP; k vkRrk ák ckMD; k ck; yk ?kjkruagkdywu | k-frpal keku ?kjkP; k ckgj Qxdwu | k-ckMD; k ckbīyk] ák jkM ckbīyk ekb; k ck-P; k ?kjkr jkgwnå udk-gh?kj ekb; k ck-pagk; **

vklikP; k egykuch ?kjkrya vkthpal keku ?kjkckggi Qidya o nk9kh ek; yidhauk ?kjkckggi gkdynu fnya vkthy; jMyh-vkthyk vk/kkj | k; yk dkskp vkyau0gra dkj.k l oZHkkodh vklik xk; dokMyk?kkc#u gkrh-

ek>h vkbZvo?kMysyh gkrh-; k ?kVdsyk dlBatkoavku dqkkpk vkJ; ?; kok gk ekBk i'u vkthi qsa gkrk-vkthual o??kj l keku xkGk d#u i kB; kr ckdkyao 'kstkj kP; k ?kj kr Bbya

vkth ekb; k vkbłyk ?ksåu dkerhyk pkyr pkyr fu?kkyh dkj.k dkerh gsvkthpa ekgj gkra frFksvkthph QDr payrh jkgkr gkrh vkthpsvkbleoMhy vkthP; k ygkui.khp okjysys gkrs vkthP; k payR; kusokjY; kuarj Qkj m′khjk Egkrkj.kkrp naj jayXu dsyagkra payrajh dkgh fnol kr okjys R; kesβs vkthP; k ekgjh QDr , dVh vkthph payrh jkgkr gkrh payrhf′kok; vkthyk ekgjpa naj ja dqkhp u0gravkth vkf.k vkbł dkerhyk mUgkr pkyr vI rkuk] Fkduu d¢yYP; k toG vI y∀; k ckckI kc i kVhy ukokP; k emhj otk I ek/khtoG FkkcY; k-vkthuaR; k I ek/khykik; ki Muu ekx.ka?kkryadh]^^ eqyxk gkså nh-repauko Brh.**

vkthuavkeP; k vkbipai fgyackGri .k dkerhr dsya i fgyk esyxk >kyk- vkthyk [kii vkum >kyk- vkthyk esyxk uûgrk- vkthyk l [[kk HkkÅ uûgrk- R; kesGsi fgyk ukrw?kjh tllekyk vkY; kurj vkthuaR; k ukrokpauko ckckl kgs Boya

 $\label{eq:ckcklkgckl} \text{ckckl kgckl}; k t \text{ tllekurj } \text{ } \text{vkth } \text{ ckG\&ckGrh.kyk } \text{?kpnu } \text{ extll; kyk } \text{ } \text{vkyh- o } \text{ } \text{vkth } \text{ extll; krp } \text{jkgnykxyh-}$

, dsfno'kh \vee kthua \vee ki yh I oZde&dgk.kh nknkyk I klixryh- i fgyh yd fgjd.khyk \vee xknj rG'khjkeykp fnyagkra rh okj Y; kurj nfjh rGI k rh rG'khjkeyk | k; yk r; kj uûgrh-

ijrqR; koGh nknkua vkthyk Ikfixrya gkraj ^fttk] rwdk; dkGth d# uxa rq; kydhyk vkEgh rG gkrkrY; k QkMkl kj[ka I blkkGrks vkt rph ftehu rþ; k nhjkuath cGdkoyh gk; -rh ek?kkih feGfo.; kI kBh vkEgh enr djrw**

∨kthuaR; koGh nknkua fnysyaopu nknkyk ∨kBo.k d#u fnya

nknk Eg.kkyk] fttk rwdk; dkGth d# ux- eh ryyk fnysyaopu i kGrw eh ryyk ; k dkeh enr djrks ryyk ftrdsfnol gFkajkgkrk ; biy rp<afnol j kgk-**

fttkb/Eg.kkyki] ^^gsc?kknknk] eh ckckl kgc l gk efgU; kpk gkbil; ir gFkajkgkrh- uarj rfigh ekb; kc#cj ckHknGxkoyk; såu fuojrhukukyk l kaxwu ek>a?kj vklik xk; dokMyk ek?kkjh | k; yk l kaxk- eh ek>al xGal keku 'kstk&; kP; k?kjkr fBowu vkyh; k- rfigh rfo<afuojrhukukyk l kaxkyk; k-fuojrhukuk gk nknkpk ekol Hkkå gkrk- o vklik xk; dokMpk pøyr Hkkå gkrk-

I gk efgU; kurj nknk o fttkbZckHkGxkoyk dkerhekx&xsyh- tkrkuk dkerhP; k ujgjh Hkkd ys; kukgh nknkuacjksj?krya ujgjh Hkkd ysgsn(&; k egk; (nkr; jkiP; k Hkkehoj y<kbZd#u vkysysvfr'k; /kkM'kh toku gkrs ujgjh Hkkd ysgk fttkbjok pgyr e&g.kk gkrk-nknk] ujgjh Hkkd y} ofttkbZl ožt.k ckHkGxkoyk xsys ifgY; kmk fuojrhukukyk HkVys

fuojrh ukukP; k ?kjh xY; kuarj ujgjh Hkkl ysukukyk Eg.kkyk] ^^gsc?kk] fuojrh rÆgh vklik xk; dokMyk uhV l etkom l kakk-fttkckbjpa?kj vkf.k 'kr fryk ijr nsEg.kkoa ukgh rj cjk bjokj gkskkj UgkbZ**

 $\label{eq:continuity} $$ fuoRrhukuk] ^gsc?kk] $$ eh $$ \forall kIi kyk gFkacykow ?krkso uhV I etkow I karrwc?kw k dk; $$ Eg.krwrs.**$

FkkM; k oGkuafuoRrhukukuavkli kyk ?kjh cksykow ?ksrys

 $\label{eq:likelik} $$ Vklik Fkkkhauera?ks^{A}u ckyyk]?kj jkgk; yk eh | k; yk r; kj gk; -ij 'kkr nskkj ukghfryk [kk; kijrk eky nsrw**$

 $\label{eq:continuity} \mbox{ujgjh]$^{$\cap$}$ fBd gk;]I /; k fryk frps?kj ek?kkjh | k- tehuhpadk; rh u*rj c?k***$

fttkblpa?kj fttkblyk vklik xk; dokMuaijr fnya fttkblual xGal keku ?kjkr ?kkrya fttkblyk [kpkl kBh 50&60 #i ; snknkuatoGpafnya

 $nknk \lor kf.k \ ujgjh \ Hkkd \ ysijr \lor ki \lor kiY; k \ xkoh \ \lor kys \ nknk; rkuk fttkb\ yk Eg.kyk] ^rsyk jkgwokVay frrdh fnl jkgk- ul ya rj eax\ y; kyk ; h- \lor kEgh rsyk l \ \ blkkGr\ w \ Vklik dMuarr\ h ftehu \ dk\ ykrupadk<w ?\ ks^\; k- \ Vklik rl kftehu rk\ blk rk\ blh | k; pk \ Ugkb\ l\ v | afnl ra -**$

HWox i kp

 $ek>k\ t\ Ue1950\&51\ I\ kykryk-ek>k\ t\ Ue\ >kY;\ kuarj\ I\ xG;\ kauk\ vkB\&i\ akjk\ fnoI\ kr\ dGyadh]\ t\ Uer%\ ek>snkligh\ ik;\ okdMsvkgr-\ rsvtcp\ gkra\ t\ Uer%\ nkligh\ ik;\ okdMa\ brda\ okdMadh\ ik;\ kP;\ k\ Vkpk\ i\ epavu\ ik;\ kph\ i\ eph\ cktwEg.ktsik;\ kph\ ckVkph\ cktwekxa\ myVsi\ ats?ks^au\ t\ Uekyk\ vkyksgkrks\ R;\ kenGseyk\ t\ UeY;\ kuarj\ c?k.;\ kI\ kBh\ xYyhrhy\ ck;\ kph\ o\ xM;\ kph\ vykVgh.\ ykylsgkrks\ R;\ kenGseyk\ t\ UeY;\ kuarj\ c?k.;\ kI\ kBh\ xYyhrhy\ ck;\ kph\ o\ xM;\ kph\ vykVgh.\ ykylsgkrks\ R;\ kenGseyk\ t\ UeY;\ kuarj\ ppkl]\ i\ R;\ cdt.kvk'Pk;\ ZO;\ Dr\ djhr\ gkrk-$

 $b finjk \lor k th Eg.kyh]^{^{}} ck; ! ck; ! l kj tk] gh y d \# Egath ek.k M ok V rukgh ck; ! gh H kurpo \lor l yai kg thy - l kj tk] ryk ek f gr gk b Žuk \ H kurkpai k; my Va \lor l R; kr-eh, dnk [kG; koj f p m cf?kryag q a j kr²; kyk [kG; kr; såu V ki h r n kua H kj r g q a eh t kxh > kyh <math>\lor$ u [kG; kr dksk x M h ek.k M g k;] Eg.k w d finy ?k såu [kG; kr x syh] rj, d ek.k M [kG; kr yan kua V ki h r H kj r g q k-ek Ü; k g kr kr d finy g q k-d finy k p k m t M R; k P; k i k; k oj i k M y k-rj R; k p a i k; my V a f n l h l d k G h y x c x h u a m B w c f ? k r y l r j R; k p h i k o M [kG; k r my V h m e V y s y h f n l y h **

 $\label{like} I kjtkvkth Eg.kkyh]^^ 0g; \cite{Market} ck; ! rwEgurh rh [kjagk; - ák rG'kMP; k ykdjkpach i k; myVp fnl R; kra rok gh i kj xaHkwr&fcr tYekyk vkya ck; dqkkl Bkmd \$

c?krk] c?krk l xG; k xkokr dkyok >kyk- rG'khjkeP; k ?kjkr tUekyk vky\$yayid# Hkur gk; !! Hkur gk; !! **

, d erj&noj'kh ; rksvu rksckGkpsik; rikl w c?krks erjsnoj'khP; k Hkkorkyh ykd teysysgkrs vkrk erj&noj'kh dk; Eg.krk] rs, d.; kl kBhik; dkpsdku Vodkjysgkrs

erj&noj'kh ekbkk Fkkgjyk poyrk foBkckyk Eg.kkyk]^^ gsc?kk foBkck--- gh yd# ek.klkP; k vkorkjkr ul wu HkwrkP; k vkorkjkr tUYekyk vkysyayd# gk; - gh tlatlaekBagopy] rlarladk; rjh peRdkj d#u nk[kfoy- lxG; k?kjkckjkyk]xkokyk] lxG; kouk /kkD; kr vk.khy-?kjkryh lxGh ek.klagGwgGw?ksÅu tkby-rok gs pk vkRrkp dk; rjh cmkcLr djkyk gok-

 $ekxa; k xkokr \lor'khp, d ?kVuk baxG; kP; k ?kjkr ?kMyh gkrh, d baxG; kpk ek.kll ?kkM; koj cl w 'krkrw ?kjhjkrP; kyk <math>\lor$ kB uÅ oktrk; sÅ ykxyk gkrk] rok, d l nj ckbZfpnnp i .k ek.kl kP; k ośkkr i navkyh \lor u Eg.kkyh-

^^ baxGekek]baxGekek]eh ; #Å dk] nep?; kc#cj \ **
baxGekek Eg.kkyk]^^ ekÖ; kcjkcj dißa; rhl \ nyk dksk uojk&ydjickGaukghr dk\
*

HlwrckbZEg.kkyh] ^^ eyk dqkh&dqkh UgkbZ eh , dVhp gk; **
bacGekek Eq.kkyk] ^^vkrk udwi Ngk c?\ni*

 $ijr\ note ijr\ note ijr\$

bak Gekek Eg.kkyk] ^^ vkrk udwi t/gk c?kt/*

rh HkurckbZ bakGekekyk jkstp xkB i Mwykxyh o jkstp rh fopk# ykxyh-^^eh reP; kcjkcj; så dk** bakGekekyk 'kudk vkyh-rh ckbZekuw u l w fpmp v l yai kfgthy-**

 $bakGekek\ ,\ dk\ erj\&noj'khdMsxsykoR;\ kykrksEg.kkyk]\ ^^ckck]ehlokhvlY;\ keGs\\ jkst\ jkrP;\ kyk\ 'krkojua;\ k;\ yk\ eyk\ vkB&uÅ\ oktR;\ kr-\ rok\ xkokP;\ k\ toGp\ vlyY;\ k\\ f'kaiT;\ kP;\ k\ oM;\ kr\ jkst\ ,\ d\ l\ nj\ ck;\ vkMoh\ ;\ rh\ o\ ^^eh\ ;\ sÅ\ dk\^{**}\ Egunu\ bpkjrh-\ eh\ dk;\ d\#\^{**}$

 $earj\&noj'kh\ ckck\ Eg.kkyk]^{\ rw\lor l\ adj-\ R;\ k\ ckbpaik;\ danykP;\ k\ mftMkr\ fuj\ [kwu\ c?k]\lor u\ eyk\ l\ kx]\ ik;\ dl\ agkbr\ rh]\ l\ yVadh\ myV\lambda^{**}$

nd &; k fno'kh bacGekekuuh uhV fuj [kwu R; k ckbpai k; cf?krya rj bacGekekuuk \vee I a fnI yaclh] R; k ckbpai k; myVagkra Egath Vkpk i qa \vee u ckVaek \times a

bakGekekua erj&noj'khyk lkfixry]^^ ckck]dky jkrh R; k ckbpa ik; fuj[kwu cf?krya]rjrhik; myVavlY; kpafnlya ij ckck]eyk rh ckbly; vkoMyh; k-**

 $rok = erj \&noj'kh \ ckck \ Eg.kkyk] ^rh \ ckblek.kM \ ul \ uu \ Hkmrli'kkpp \ gk; - fryk tjh rw c#cj ?ksÅu vkyk] rjh rh Hkmr fi'kkp ck; oskhi; irp rlp; k c#cj ; hy- oskhP; k vkr rh fi'kkPp ; skkj Ugkbl**$

 $baxGekek\ Eg.kkyk]\ ^^tjh\ rsfi'kkPp\ \lor I\ yarjh\ rsQkj\ pkaxyagk;\ -\ efgukHkj\ \lor kEgh\ HkVr\ gkÅr-\ eyk\ \lor kRrki\ rji\ Hkrkuadk;\ ch\ dsyallgkbZ\ myVarsHkrr\ \lor I\ yarjh\ eyk\ ybZ\lorkoMnykxya\ gk;\ -\ eyk\ ?kjh\ \lor k.knu\ frP;\ k\ c\#cj\ yxhu\ djrk;\ bBy\ dk\^{**}$

 $erj\&noj'kh \ ckck \ bjokjkr \ i \ Myk-erj\&noj'khua \ MkGacn \ dsya \ rkMkrY; k \ rkMkr \ rks \ dk; \ rjh \ i \ Wi \ Vr \ gkrk-$

 dd kph cV dkiwu ?kh- Egath rh HkwrckbZrhp; k c#cj ?kjh; hy- ?kjh \vee kY; kuarj frph dki ysyh dd kph cV \vee ' kk fBodk.kh fBo dh] fryk rh I gtkl gth gkrkyk ykx.kkj Ugkb \tilde{t}^*

baxGeke kauh njo'khual klixrY; k i ek.kap daya fryk ?kkM; koj i kracl foya vu-frP; k ekadG; k l kMyY; k ykacl Md dal kruu , d cV gGpp vkMfdR; kuadki uu ?kryh- o rh cV NkV.ktP; k f[k'kkr Boyh-

od hP; k toG \lor kY; kcjkrcj Hkurhu ckb/ Eg.kyh]^^ek>h dd kpoh cV ek?kkjh nh] eyk ; \$khP; k \lor kr ; \$rk ; \$kkj ukgh- ek>h dd kpoh cV ek?kkjh nh- **

Eg.knu rh tkj tkj kr vkj Mwykxyh-

 $\label{eq:backer} bacGekek Eg.kyk]^^ ruvl adj v?kmj ?kkkl/; kP; k [kkyhmrj-ehrgyk rlp; k dd kph cVek?kkjh nsrw**$

Hkurhuckbī ?kkMı; ko#u [kkyh mrjyh- Hkurhuckbī [kkyh mrjy; k c#cj] bacGækekua ?kkMı; kpk yxke ekxa[kpyk- R; kcjkcj ?kkMk m/kGr i q:afu?kkyk- bacGækekpk ?kkMk i q:ai Gr gkrk-vu Hkurhuckbī ?kkMı; kP; k ekxa ekxa i Gr gkrh- 'koVh bacGækek ?kjh vkyk vu R; kua R; k Hkurh.kckbiph dd kph cV tkR; koj vI yY; k ykdMh [kkckP; k rGkyk , d Hkkd HkM; kua i kMysyā] gkra R; k Hkkdkr] rh dd kph cV vkr <dyyh o Hkkdkr puµk Hk#u eskkuarsHkkd cm d#u Vkdya dk; epa

Hkurhuckbjók ukblýkt >kyk o rh bak Gsekekcjkoj R; k jk=h R; kP; k ?kjh j kfgyh-

nd &; k fno'kh baxGækekuackEg.kkyk ckykow vk.kyao R; k Hkirhuckböjkoj xkB ek#u?kryh o xkákoZfookg ykow ?kryk-

rh ckbZ Hkurhu vI yh rjh fnI k; yk Qkjp I qnj o r#.k gkurh- frpadkGadd ykucik; kP; k youhi; ir ykucr gkura MkGaekBj dkGavu ik.khnkj gkura 'kjhj ybip ckun&ckt fnI r gkura jax xkijk gkurk- brdk xkijk gkurk dh] ?k'kkruafxGrkuk ik.kh I (nk fduok ?kkl I (nk fnI r gkurk-

bak Gekek cjkoj pkGhl &i llukl o"kärh ck; cks Eg.kw jkfgyh- fryk rhu pkj ydja >kyh-rjhgh rh ckb7r#.kp fnl rgkorh-

 $b\textbf{a}\textbf{c}\textbf{G}\textbf{e}\textbf{k}\textbf{e}\textbf{k}\textbf{E}\textbf{g}\textbf{k}\textbf{r}\textbf{k}\textbf{j}\textbf{k}\textbf{t}\textbf{D}\textbf{d} > \textbf{k}\textbf{y}\textbf{k}\textbf{g}\textbf{k}\textbf{r}\textbf{k}\textbf{-}\textbf{I}\textbf{x}\textbf{G};\textbf{k}\textbf{x}\textbf{k}\textbf{o}\textbf{k}\textbf{y}\textbf{k}\textbf{R};\textbf{k}\textbf{c}\textbf{k}\textbf{b}\textbf{c}\textbf{n}\textbf{n}\textbf{y} \vee \textbf{k}\textbf{p}\textbf{c}\textbf{k}\textbf{o}\textbf{k}\textbf{V}\textbf{k};\textbf{p}\textbf{k} \\ \textbf{d}\textbf{h}\textbf{g}\textbf{h}\textbf{g}\textbf{h}\textbf{g}\textbf{k}\textbf{g}\textbf{k}\textbf{y}\textbf{k}\textbf{k}\textbf{k}\textbf{g}\textbf{k}\textbf{g}\textbf{k}\textbf{p}\textbf{l}\textbf{n}\textbf{j}\textbf{o}\textbf{r}\#\textbf{k}\textbf{d}\textbf{k};\textbf{fn}\textbf{l}\textbf{r}\textbf{h}\textbf{l}$

, dsfno'kh Qkj ekBk ikÅl iMyk-ikÅl ,o<k ekBk iMyk dh] bacGekekph iMoh dkl Gyh-T; k [kkckr] rG[kluk o [kkoc; kB; ke/; sR; k fi'kkp ckbjoh dl kph cV Boyh gkrh-rh cV ckgj vkyh-R; k fi'kkp ckbjuarscf?kryavu yxksyx fruarh dl kph cV mpyyh o iMR; k /kkd/kkj ikol kr fpjdr&fpjdr oskhP; k ckgj fu?kuu xsyh-r&gkikluu R; k bacGpauko iMya-- HkurbacGs iMya

 $ghnardFkk ek>k payrk foBksck nknkyk R; k earj \&noj'khual kaixryh vu rksEg.kkyk]^^gs c?kk bBuscknknk] rajp; k ?kjkr tYekyk vkysyackG I ajnk Hkurp gk; - rsHkur rajph ygkukpaekBadsya rjh rs, duk , d fnoI i Guup tk.kkj- rajpkyk rsvMp.khr vk.k.kkj- rok R; kP; koj vkRrkp dk; rjh b3ykt djk**$

foBkck nknk Eg.kyk]^^ ex dk; blykt djk; pk Eg.krk; \ rsrjh eyk | kaxk-**

 $erj\&noj'kh \ bBnck \ nknkP; k \ dkukr \ dk; \ rjh \ vfr'k; \ ckjhd \ vkoktkr \ i Vi Vyk \ vu fu?knu x syk-**$

?kjkryh I xGh ek.kl a, d= vkyh- vu dk; djkoà Eg.kuu bipkj d# ykxyh- ofMykph vkbZdkI k vkDdk] Fkkjyk pyrk&nknk] e/kyk pyrk&ukuk] ofMy&cki ij vkbiph vkbZfttkbZvkf.k ek>h vkbZnkj dk I xGsbipkjkr cI ysgkrs

Ukkuk Eg.kyk]^^ ásyk ek#u Vkdysyp cja \vee Opoh xkGh ?kkynu ek#u Vkdysyacja gkb3y- **

yxp ek>soMhy rG'khjke cki wEg.kky $\S^{^}$ Ugkb \S ugkb \S rI aeh d# nskkj Ugkb \S eh R; kyk ek# nskkj Ugkb \S^{**}

ekő; k vkbph vkblfttkblEg.kkyh]^^ gsc?kk eMGh] eh dk; Egurh rh, sdk- gh ysd# ekb; k i kjhpagk; - rÆgkyk l MkkGk; yk tM tkr vl yarj eh ásyk ekb; k xkoh f?kÅu tkrh vku l kMkGrh- eh fo/kok ck; - eh ásyk nRrdiæ Eg.kmu ?krh- vu ásyk ygkukpaekBadjrh- ekb; k uo&; kph ngk, dj ckxk; r ftehu gk; - rh ftehu ek>k nhj cGdkomu cl yk; - rok rh ftehu áß; k ukokoj djrh- ásyk ygkukpaekBadjrh- tjh gh gsi kýxai k; kuaokdMavl yð rjh eh ásyk ckjda, [kknafdjk.kk nækkymu fnrh**

rG'khjke Eg.kyk] ^^ gsc?kk] fttkekeh ek>ayıd# I khlkkGk; yk eh ukcj Ugkbł rGgh dGgh?ksÅu tk; phxjtUgkbłek>h eh c?ku ekbł k yıdjkpadk; djk; parh**

foBkck nknk Eg.kyk]^^ c?k r@'khjke]uhV bipkj dj-rhp; k i kVh tYekyk vkya gh ripa yd# gk; - ápadk; djk; parsriph rwBjho- rwápk ck- gkbil - vkEgkyk dk; cky.; kpk yblgkd Ugkbł **

I xGh ek.kl aftdMafrdMafu?kwu xsyh- nq &; k fno'kh foBkck nknkual klixry] vki.k mpxkodj MkDVjyk ásyk nk[kow k vu MkDVj dk; Egurwrsc?kw k- l xGht.k ckGkyk Egath eyk MkDVjdMs?ksÅu xsys

 $\label{linear_model} $$ MkDVj rikI rkr vu I kxrkr]^^gsc?k foBkck] ; k ckGkpsik; vkbP; k xHkkir vI rkukp okdMs>kysysvkgr- yd# xHkkir ok<r vI rkuk] ckbLuavks>ampyY; koj fdøk xHkkir vI rkuk$

ikVkoj i MY; keGsvkryk xHkZfQ# 'kdrks rksxHkZikVkrY; k i kVkr fQjr \vee I rkuk] R; kP; k i k; kyk fi G i Mu i k; okdMsqksÅ 'kdrkr**

fttkb]^^ MkDVj]gsik; uhV djk; yk dk; blykt gkbldk**

MkMDVjkpk IYyk , schu ckGkyk ?kjh \vee k.kyao ?kjkr IoZek.kla, d= ; sÅu fopkj fofue; d#ykxyh-

fttkb]/^gsc?kk bBncknknk] cGhukuk] ikjkyk błykt djk; yk eh l ksykinjyk ?ks^u tkrhrFkaek>k /kkdVk tkobłpkaxno fxj.khr dkekyk gk; - fxj.khrhy dkexkjkuk o R; kł; k dlyckrhy yksdkuk eGsgklihVye/kh QqdV błykt djR; kr- eGsgklihVy ekBagk; - rh ujflax feypagklihVy gk; - R; k ekB; k nok[kkU; kr us^u ekÖ; k ukrokoj błykt djrh- eh rfigkyk ikp i\$ sekxr Ugkbł QDr áß; koj błykt djk; yk rfigh ijokuxh | k-, oaEg.k.karfigkyk gkr tkMnugk; **

 $dkl \ k \lor k D dkl^{n} \ gsc?k \ fttkl \ \lor k eP; \ k \ ukrokyk \ cjadjk; \ pack \ ukgh] \ rh \lor k epa \lor k Egh Bjow \ rwckGkyk o R; R; k \lor k blyk \ \lor ftckr \ dkpach \ f?k Lu \ tk; \ pk \ dke \ Ugk; - I gk \ efgusuo \&; kyk ck; \ dwl \ k Muu j kgkrk; hy \ dk\ rwp I \ kac- ek>k r G' khj ke xjhc gk; - d"VkGwgk; - R; kpk I å kj \lor I po ok<r tk.kkj gk; - Fkkj yk \ ckckl kc e · I \ / kM/kkdV gk; - R; kP; k u' khckr \lor I ay rj \ v twu yxdja R; kyk gk; kyh- R; kr , d i kac Ga v I ya Eg. kwu dk; fc?kM yà R; sua c I w ? kj kph j k [k.k \ dayh rjh c [[kG gk; - \ v ki w ? kj j k [kk; yk , dkna c eaf Borw R; syk I dkG I å; kdkG pkj Hkkdjh Vkdrwdk Ugkb \ r I aák i kac G; kuapkj Hkkdjh [kk Åu ? kj j k [kyarjh Hkh yb Z>kya dk; djk; pagk; rh ek Bk nok [kkuk \ v ku I kyki yi\ gFka\ v omk i k Å I i k.kh Ugkb Z j kukr I x Gae jokup > kyagk; - ; mkpao jh I dl at xk; pà rh ek Bh Hkj kar gk; - rok ek b; k I wayk \ v u ukrkyk dkpach U; k; padke Ugkb Z eh I k Q I kac w fBorh-tj usyarj b b kj c j k 0gk; pk Ugkb Z ** nknk | ^ \times k D dk R; k y x j kyk t tkh ek Bh Hkj kar gk; - rok rw, o <ao jh I nkj d kyk \ v u R; k i kj kyk f? k Å u t k Å ux I - i g P; k o j I h k Å I i k.kh p kacyk > kyk d h á k i kj kp \ v ki w i k; kpa\ ki j h' ku d #; kr , o <ao ji I j kgwn h ** o j I h i k Å I i k.kh p kacyk > kyk d h á k i kj kp \ v ki w i k; kpa\ ki j h' ku d #; kr , o <ao ji I j kgwn h ** o j I h i k Å I i k.kh p kacyk > kyk d h á k i kj kp \ v ki w i k; kpa\ ki j h' ku d #; kr , o <ao ji I j kgwn h ** o kac h i k k pacyk i j h' ku d #; kr , o <ao ji I j kgwn h ** o kac h i k kpacyk > kyk d h á k i kj kp \ v ki w i k; kpacyk j h' ku d #; kr , o <ao ji I j kgwn h ** o kac h i k kpacyk > kyk d h á k i kj kp \ v ki w i k; kpacyk j h' ku d #; kr , o <ao ji I j kgwn h ** o kac h i kpacyk > kyk d h á k i kj kp \ v ki w i k; kpacyk j h' kac h i kpacyk > kyk d h á k i kj kp \ v ki w i k; kpacyk j h' kac h i kpacyk > kyk d h á ki kj kp \ v ki w i k; kpacyk j h' kac h i kpacyk i j h' ku d #; kr , o <ao ji I kac h i kpacyk i kpacyk i kpacyk i kpacyk i kpac$

r(G'khjke]^^ nknk Egurwrh [kjagk; - ,o<a ofjl jkgwnh- ijr i $_{k}$ P; k ojlh gpa \vee kijh'ku d# ; kr-**

 $fttkb]^{\ \ }gsc?kk] \ bBuck \ nknk] \ MkDVjual \ kfixry; \ apacloGaik; \ gkbir rojp \lor kijh'ku dj.kal ki agk; -i ljgk fucjik; >kY; koj \lor kijh'ku uhV 0gk; pallgkbirh rlįgP; kil eljrj MkDVjkauh I kfixrya ul0g\h^*$

nknk]^^ c#cj gk; IxGafttkckb] ij gFkaIxGam?kM; koj Vkdwu yxhP; k yxh nkjdkyk rwd'kh dk; f?kÅutk.kkj gk; ** dk; bpkj ikpkj gk; dk Ugkb& fttk] rwvIadj-rwvtwu, d efgukHkj gFkajkgk-fQ#urwrq; kxkoh tkÅu; h-roj vkepachjkuekG ekxdGagqra-rw gdMaeaxM; kyk xqkh ikM0; kP; k Vk; ekyk; h-rok c?kwdk; djk; parh\vkrk mxp oknkokn ux**

nknkP; k I kax.; k i æk.ks \vee kth efgukHkj j kgwu uarj rh frP; k xkoh fu?kwu xsyh-; k xkdkGkr ek>auko Biok; pajkfgyai jarqeyk I xGs^i ki V*; k ukokua \vee kG [kr gkrs

R; k o"khl 1951&52 e/; si kÅ l deh i MY; ke \mathbb{G} sn(dkGh i fjfLFkrh fuekl k >kyh gkrhea**x**lna gs xko Tokjhpa dkBkj gkra i jarq e \mathbb{A} Gos; krgh \mathbb{V} R; Yi i kol ke \mathbb{G} s TokjhP; k fi dkph ok<>kyhp ukgh- f'kokjkr l o \mathbb{E} ^e \mathbb{G} oku* >kysysgkrs ^e \mathbb{G} oku* Eg.ktsrkVkph i \mathbb{G} skh ok< u gkrk R; kyk Tokjhph d.kl au; ska

tkupkjh] Ocopkjh 1952 e/; s v l a ej oku dk<.; k l kBh 'krdjh xMh o ck; kauk jkst xkj kuaur gkrs R; k dkGkr xM; kyk fnol kyk jkst xkj 8 vk.ksfdøk 6 vk.ksgkrk- vkf.k ck; kauk j kst xkj 3 fdøk 4 vk.ksgkrk-

, dsfno'kh dkl kvkDdk ekbz k vkbZyk Eg.kkyh] n nkjdk] ?kjkr cl w dk; djrh\ n(jdkG gk; - rok eqioku dk<kyk n(j &; kP; k 'krkr jkst xkjkuatk- ro<p i kYki girai S a; &; ky * *

vkbluabipkj dsyk]^?kj[kpigh Hkkxsy vku dkogh issf'kYyd jkáy] rj roik; nok[kkU; kr uhV djrkuk misch ; k; kya f'kok; nqdkGh ifjfLFkfr vIY; keqGstoGikl IoZ 'krd&; k0; k ck; dk eqoku dk<k; yk jkstskjkuatkr gkk; k-*

 $xYyhrhy \lor uxd ck; dk \lor ki yh ckjdh yxdjadqkki kI h rjh I kMuu fnoI Hkj dkekyk t kr gkR; k- xYyhrhy ekgukckbJyk \lor kbZ Eg.kkyh]^^e0g.kk \lor kDdk] Ekh ch ek>a ckjda yxd#a f?kÅu dkekyk rÆgP; kc#cj; rh- <math>\lor$ kBM; kyk jkst xkjkoj r \mathbf{p} r \mathbf{p} feB&fejpwrj Hkkxhy f'kok; FkMMai\$ a ekxajkgyarj r \mathbf{p} l ki Vpaik; uhV djkP; k Vk; ekyk mi xh; R; kya**

 $\label{eq:continuous} \begin{array}{ll} & \text{ekgukckbZEg.kyh] $$^0g;] \text{ nkjdk] FkkMaiS sekxaiMyarj rq; kikiVpaik; uhV djkP; kVk; ekyk mixh; k; kya! ybZck; k ckjdhirh yxdjaf?kÅu dkekyk; k; kR; k-ckjhd vOph xkGh yxdjkP; k VkG; kyk ykoyh] rj yxd# yodj mBr UgkbZ Ekh ch rl p djrh- ek>avakkojpayxd# f?kowp dkekyk tkrh; k- yxdjkyk ikW Hk#u iktw vOw?kkryh dh yxdjanku nku rkl $m djr ukbT dh $$^djr UgkbTh^** \end{array}$

VkbZeyk Eg.ktsckGkyk i kBhyk ckilku rhu&rhu] pkj&pkj e\$y f'kokjkr dkekyk tkÅ ykxyh- I dkGh xsyadh] rh ckGkyk i kb/ Hk#u vakoj i ktk; ph-ex R; kyk ygku I h vQmph xkGh ckGkP; k VkG; kyk Vdok; ph- vQmph xkGh VdY; kcjkcj 5&10 fefuVkr vQm; k u'kr ckG >kMk[kkyh ckGn; kr fuifpr i Mk; pa o vkbZbrj ck; dkcjkcj dkekyk ykxr vI s >kMk[kkyh vud ygku ygku ckydkuk, df=r I kMystkr vI s R; km; koj y{k Bm.; kI kBh, [kknh tk.krh i kjxh fdmok, [kknai kjxaFkkcr vI s fdmok nq jadqkhrjh 'krekydkP; k ?kjkryaFkkcr vI s ckGa mByh dh ckGkm; k vkbyk gkdk ek#u cksyor vI r-rh ekrk i ligk vki Y; k ckGkyk vakoj i ktuu >ki or vI so ckG >ki Y; koj dkekyk ykxr vI s

vkblusvI sckGkyk?kvÅu efgukHkj dke dsys

jkstxkjkuadke djr vI rkuk], dsfno'kh, d fcdV i il ak ?kMyk-vI p ugehiæk.ks ckGkyk >kMk[kkyh Vkdu vkbZdkekyk ykxyh o vpkud, d ekBk dkGk ukx >kMk[kkyh vkyk o ftFksckGkyk Eg.ktseyk >ki foyagkra frFkarksukx vkyk- R; k >kMk[kkyh nq jh nku ckGaVkdyh gkrh- ijarqrh ek÷; ki kI u nji gkrh- fyrokps>kM ekBagkra R; k >kMkP; k pkScktual koyh i Myh gkrh- vkbZuackGkyk urdrip >ki oyagkra I dkGpk vdjk] I kMsvdjkpk VkbZe >kysyk gkrk- dkGk ukx Q.kk dk<u ekbz k vxnh cktnyk toG; Åu Fkhcyk vkf.k bZMsfrdMsi kgnykxyk-

∨kbius undrip i ktuu ∨Quph xkGh VkG; kyk ykÅu eyk >ki foya gkra R; keGs eh ckGN; kr fui fpr i Myksgkrks ukx Qkjp toG toG ∨kyk o ∨xnh ekb; k MkD; kP; k 'kstkjh QMh dk<uu mHkk Vkdyk gkrk-

 $gsl \times Ga \ frFka \lor l \ y \forall ; k \ 9\&10 \ o''kkP; k \ , \ dk \ ety huaikfgyao \ rh \ ?kkc \#u \ ^ukx! \ Ukx!!$ Eg.kuu \lor kgi Mr ck; dkudMsi Gr l \lor yh- \gt kMki kl uu ck; dk \lor bZ \gt kyarj 4&5 dkl &; kP; k \lor arj koj gkR; k- Eg.kts l k/kkj.k 250&300 Q \lor koj- R; k i kgi hpk \lor kokt , tduu l oZck; dk \gt kMkdMai Gr \lor kY; k- fo'kSkr%T; kuph ckGafrFka \gt ksi foyh gkrh R; k ck; dk Qkj p ?kkcj Y; k gkR; k-

 $ek>h\ vkbgh\ Qkj\ ?kkcjyh-ek>h\ vkbghjMrjMr ; kg; kcjkcj frFkavkyh-rksukx vtwgh ekb; k MkG; koj QMh/k#u frFkap Fkkcysyk gkrk-rs I xGaikgwu I xG; k ck; dk, dne ojMY; k] ^^vx ck; ! nkjdkP; k ydjkP; k vakkoj ukxkuaQMh/kjyh; kdh! vkrk ukx dk; djrwdkkI BkÅd **$

gs, cdY; koj ekb; k \lor kbP; k \lor kbP; k dkGtkpaik.kh i k.kh > kya frP; k gn; kpk Bkcdk pqdyk- frpa \lor ax FkMxkj i Mya rh tehuhoj ejj Nk; Åu dkl Gyh- I oZck; dkauk oʻkrekydkyk dk; dj koars uædadGsuk \ tj ukxkyk frFkmu gil dkoyarj rsygku ckGkyk Eg.ktseyk nák dj hy- \lor ′kh Hkhrh I okluk okVnykxyh-

gkr tkMnu 'krekyd Eg.kkyk] ^ukxuckjk; k! np vkepk drkdjfork-rwnokguu ekBk gk; - I xGh fijrheh rw MkD; koj ?kryh; k- rw'kadjkP; k xG; kryk rkbir gkbil - rp vkekyk rkj.kkjk vu vkekyk ekj.kkjk gkbil - vkepadk; pqdy&okdyavl yarj vkekyk ekQ dj-ij, o<; k doG; k yadjkyk ek# uxI ckck! R; k yadjkuadqkkpadk; okbil daya \ rh yad# vkrk rj 4&5 efgua>kyagstxkr vkya -ák yadjkua dqkkpaokbil dayauk; vu QMatYeHkj dqkkpaokbil vkeh ril; k gkruagkså nskkj ligkbil j rwvkyk rl k tk- vkeph pad injkr ?kh-ij rw yadjkikl ua ro<anij tk-

 $ukxkua'krdjh'kkenrkR; kph fourh cgnrd, xdyh-ukx vkY; k okVauafu?kuu xsyk-l okipk \\ tho HkkM; kr i Myk-vkbZusi Gr tkÅup eyk mpynu Nkrhyk doVkGya ek>k tho okpyk Eg.kuu rh vkunkus vkDl kckDl h j Mnykxyh-cjkcjP; k l oZck; dkaukgh MkG; kr vkunkJ nvkys$

rksEgkrkjk 'krekyd Eg.kyk] ^^ nkjdk] rpayd# HkkX; oku gk;] Eg.kw rj okpya ukxkckjk; k ásyk vk'khokh nsåu áP; k MkD; koj QMh/k#u vkY; k okVæafu?kw xsyk-**

I al; kdkGh?kjh vkY; kuarj vkbZnal okiluk?kMysyk i dkj l klixryk- n(j j k fnol l keokj gkrk- dkekyk l k/Vh gkrh- Eg.knu vkbZo n(j &; k nku xYyhrY; k ck; k HkVthdMsc?kk; yk x¥; k-HkVthyk?kMyk i dkj l klixryk-

 $\label{thm:likelihood} HkV thusuko] t Vekphood right[k] I oZfopkjyao i pokxke/; si kfgyao I kfxrya^^i kjh] rek i kjixk i fI /n 0; Drh gkskkj vkgs rks Kkuoar] ca(nhoar o fdrhōar gkskkj vkgs ; kyk rw'kkGk f'kdo o fuf'pri.ksreauko ekBadj.kkj vkgs ykd R; kyk ukoktrhy **$

 $\begin{tabular}{l} $$ $$ $$ Vkum > kyk-R; &poGh VkbLuseukeu Bjoyl^ekb; &ckGkpadk; chd#uik; uhV djk; pp-; &yk i kacGk j kgw|k; paukgh-?kjkr fdrhgh bljkdk tjh > kyk rjh R; &paik; uhV djk; pp o; &yk I kGk f'kdok; php-* \end{tabular}$

 $i_{i_i}sefgU; k_i n_k u_i efgU; k_i p_k_i d_k y_k o_k h_i x_i y_k - v_k b_i u_i x_i h_i v_i t_i h_i v_i h_i$

∨kbZ∨kiY; k FkkgiY; k fnjkyk Eg.kkyh] ^^ Hkkoth] i kgikpsik; doGsgkbZr- rksi ruj uhV dsyaQkthy-, dnk dkik; fucj >kyadh]dk; ch bZykt pkyk; pk ukgh **

 $foBkcknknk] ^^ \vee xankjdk] r_Pk uojk rjdVh gk;] rks dk; r_yk tkÅ nr Ugk; -r_b; kl kj [; k l kl _ijokl hu ckbłyk R; kstkÅ | k; yk r; kj Ugkbł Ekh rjh dk; d#**$

 $dkl \ k \lor k D dk] ^ nkj \ dk] \lor ki Y; \ k?kj ph x jh ch gk; - \lor l \ yk gk \lor konnk \ ekBk n ph G \ i \ Myk; - yk dkuk b d \ [kk; yk i S k \ l gkb Z \lor k f u d r w á syk d pa ?ks u t krh\ <math>\lor$ ki Y; k d Ma t k; yk ; k; yk gfl ykyk i S dk ch U gkb Z á syk n o k [kkU; kr dk; rj [kp Z; b Zy] R; ksi S dk d pu a Hkj .kkj **

vkb] ^^vkR; kckb] gfl ykijira i\$ a eh tefoY; krh- nok[kkuk QqdV gk; - oj vk8kh/kik.; kyk; skkjk [kpZek>h vkbZHkjrh Eg.kyh; k- eyk rp<ayydjkyk uhV d#u vk.kw|k** dkl kvDdk]^^ c?k ck;] ro⊳k uojk dk; Eq.krwrh-vkepadk; rw, sdr UgkbZ**

^^eh R; kyk nok[kkU; kr usÅu uhV dj.kkj gk; - eh dqkkpach , sd.kkj uk; - dqkhch \vee kMoa \vee kyarj R; syk cktnyk I k#u eh ekÖ; k ysdjkyk nok[kkU; kr ?ksÅu tk.kkjp- ; kr ek>k rfigh tho tjh?kryk rjh eh , o<; kckcrhr , sd.kkj Ugkb $\tilde{t}^* \vee$ kbł

HWX I gk

bidMsckHkGxkoykfttkvkthyk vklikxk; dokMxkokrhyipeMGhiqs [kMnrwEg.kwudcny>kyk gkrk-ijarquarjvklik cnyyk gkrk-vklikuafttkbiyk 10, dj tehuhrhy fpiVMkj Tokjhl qnk | k; paukdkjyagkra vkthpk nhjvklikuavkthph okV.khyk; skkjh tehu cGdkoyh gkrh-vklikuavkthyk okV.kh d#u fnyhp Ugkbł IxG; k xkokrhy tk.kR; kwh] i i ikgq; kwhvklikyk Iektkow Ikixryaijarqvklik dqkkpp, drugrk-

R; k dkGkr fo/kosyk ofMyki kftir ekyeRrs okV.kh fnyh tkr uûgrh- QDr fo/kosyk i kVxh ns; kpk dk; nk gkrk-

tehu cGdkoY; kuarj vklikP; k fo#/n vkth ek<; kP; k dkYkIr xsyh o rfkhy , dk ofdykyk vkthual oldeldgk.kh l klixryh-R; koGh vkthcjkcj dkerhpk ujgjhdkdk] vkepk Fkkjyk pyrk foBBy nknk o <kd ckHkGxkoe/khy j ke dladkNh vl sfr?kst.k vkthcjkcj xsysgkrs

 $\label{eq:continuity} \mbox{ujgjhdkdkuaofdykyk fopkjy] $$ $$ \circ dyl kgc] gh $$ \times ehg kg kg - fgP; k okV.khyk ckxk; r tehu 10 , dj ; skkj gkrh- i j fgP; k nhj kuafgyk tehu okVuu fnyh ukgh-** $$$

ofdy]^^gsc?kk QkSth] dk; nk \lor l k \lor kgsdh] fo/kosyk okVuu u ns*k i k\$/xh ns*k ; s*s** uj gj hdkdk]^^i .k fryk rhu i k§h gk; R; k**

ofdy] $^{\prime}$ tj ák ckbyk , [kknk eyxk \lor I rk rj] fgyk o fg $^{\rm P}$; k eykyk ok \lor .kh ekx.; kpk gDd gkr k^{**}

 $nknk]^{\ \ } gsc?kk] \ of dylkc] e yxktjhulykvkf.knRrd?krykrjokV.khekxrk; rsdk \^**$

ofdy] h t#j] nRrd eyxk \lor I y rj okV.kh ekx.; kpk gDd \lor kg**

rs pk3kst.k frFknu FkV I ksyki jiyk pkaxnodkdkdMs xsys frFks pkaxnodkdkIR; ksps nksu IkkÅ I o I; ksps IkkÅ I o I o I cketyk gkrs pkaxnops of I of

 $frFks \lor keps nknk] \ ujgjhckkdk] \ I \ k6hkxj \ \lor ktkck]R; \ kpk \ Fkkjyk \ egyxk \ \lor klik] \ jkek \ dkdkMh \lor kf.k \lor kth; \ kauh \ cl \ uu \ Bjfoysdh] \ `fttkph tehu okpo.; kI \ kBh fttkP; k oVhr \ dqkkyk rjh nRrd ?; k; pa*$

I klákxjP; k ekB; k egykpk egyxk Eg.ktsvklik p0gk.kpk egyxk Eg.ktsl klákxjpk ekBk ukruvkRekjke R; koSh 16&17 o″klýbk gkrk-R; kykfttkckbP; k oVhr nRrd ?k; k; paBjya

rks nRrd ?ks; kpk dk; bte fr Fkp I ksyki ji yk >kyk- nRrd ?krY; kpk Qkb/ks dk<.; kr vkyk- dkxni = a r; kj dj.; kr vkyh- o rks Qkb/ks dkxni = a ?ksÅu i kp&l gk t.k ek<; kyk R; k ofdykdMsxsys R; kuh ofdykyk nRrdi = $\frac{1}{2}$ Qkb/ksI x Gank [koya

ofdy Eg.kky $\S^{^*}$ vkrk dke I ki a > kya - vkrk vki .k fttkckbP; k o vkRekj keP; k orhuadkVkT nkok nk[ky d# 'kdrk \S^*

nk0; kph fQ Bjyh- R; krys \lor M0gkUI i\$ sofdykyk fnys \lor kf.k I xGst.k \lor ki \lor ki \lor ki Y; k xkoh fu?kuu x\$ys

i qsgk nkok nk[ky >kyk- nk0; kpk fudky gkb]; ir fttkbP; k ofdykuafttkbJyk vklik xk; dokM; kpcdMu tx.; kl kBh rkRi qirh i kVxhph ekx.kh dsyh-rh ekx.kh dkYkJuaekU; dsyh-

vklik xk; dokM Okjp vMp.khr vkyk-rksfuoRrhyk, dnk Eg.kyk] ^^ fuoRrh] dk; ch Eg.k fttkckbZfcymj gk; - ekÖ; kp i \$kkuarh ekÖ; k b#/n dkYkir y<rh; k- fruankO; kpk fudky ykxi; ir ekÖ; koj i kVxh cl oyh; k- i kVxh nj efgU; kyk dkVkir Hkjkoh ykx.kkj gk; - dkVkipk [kpZ vku i kVxhpk [kpZvl k Mcy [kpZeyk Hkjkok ykx.kkj gk; **

fuoRrh I etwrnkji .ks Eg.kkyk] $^{^*}$ \vee klik] fruarnyk I xGh ftehu ekfxryh u0grhfuEehpftehu ekfxryh qrh-rw| k; yk Qkthy qrh**

fuoRrh]^^ ex dk?kkcjyk; \ **

vklik]^^ vkjafuoRrh! fttkua, dybZHkkjhMko ekÖ; koj Vkdyk; **

fuoRrh]^^ dk; dya **

 $\label{eq:likelik} $$ Vkiik]^^ \lor kiid + Vkiik + Vki$

 $fuoRrh]^{n}ghjMdhck;gk;]fgyk,o< k'kgk.ki.kkdqkhf'kdoyk**$

 $\begin{tabular}{l} $$ $$ $$ Vklik] ^* rksdkerhpk ujgjh Hkkl ysfrpk e lig. kk $$ Vku ext[M]; kpk rpk 'kgk. kk eko I HkkÅ fo Bksck] $$ Vki Y; k $$ xkokryk d lidMh ; k I $$ xG_7 kuuh fryk 'kgk. ki .kk f'kdfo yk; - rpo I kax fu o Rrh] gh ftehu $$ k; dokMkph $$ k; dokMkyk j kgk. kapkaxyh d k R; k I kS| k p ligk. kdMatk. kapkaxyk; $$ $$$

 $fuoRrh]^{\ }R;\ k\ plgk.\ kkyk\ gh\ ftehu\ n\mathring{A}u\ dk;\ mi\ x\ gqkkj\ gk;\ \ R;\ ks I\ kh;\ k\ plgk.\ k\ Egath\ uq\ rk\ cxGk\ gk;\ -\ xi\ cl\ yk\ roj\ xi\ cl\ yk-\ vku\ fttkph\ I\ xGh\ ftehu\ ukrokyk\ nRrd\ n\mathring{A}u\ fxGk;\ ph\ [kViV\ djrw\ -**$

fuoRrh] ^^ex vkrk dk; djri) vklik rik**

 $fuoRrh]^{\ } c?k \ \lor kf.k \ \lor ki\ Y;\ k \ xkokryajkE;\ k \ d\&dkMh \ ybp \ R;\ k \ ftthyk \ i \ kBhck \ nra\]R;\ pk \ dk; \ rjh \ cnkcLr \ dj \ **$

vklik]^^R; kpk cmkcLr l kodj] 'kkgwvkeP; k vkEgh djrw Eg.kY; krh**

 $fuoRrh]^{\ \ }R;\ k\ ijkl\ \ rrpk\ ekol\ HkkÅ\ \ ijY;\ kyk\ l\ kax\ dh]\ R;\ k\ jkE;\ k\ d\ kdkM;\ kpk\ cmkcLr\ djkyk^{**}$

 $fuoRrh]^{-} \ rsch \ [kj agk; \] \ dk; \ rjh \ ofdykyk \ bjpk\#up \ bikr \ dk<-R; \ kf'kok; \\ ftthP; k ekxph ek.kl axkj \ 0gkph ukghr **$

vklikpk fttkbjöh tehu gMi dj.; kpk Qkj i; Ru gkrk-tlj; k eG; kr ekb; k vkthl g pk9kkuk pkj pkj, dj ckxk; r tehu okVw feGkysyh gkrh-; k l kGk, djkr, d fofgj gkrh-fofgjhpaik.kh d/khp vkVr u0gra; k fofgjhoj iR; sdkyk pkj pkj fnol kph ekVph ikGh gkrh-; k eG; kP; k oj ekGkP; k ?kl kjhyk, d fofgj gkrh-frFkgh iR; sdkyk nku nku, dj ckxk; r gkrh o ekgGokM; kyk 4, dj v′kh feGw vkthyk uo&; kdMua10, dj tehu feGkysyh gkrh-gh tehu dl w mRillu dk<k; yk ek.kw gh frrdkp tgky gok gkrk-dkj.k frFkackgjpk ek.kw; ; Åp | k; pk ukgh-vl k px rhu pyr vkT; kwho R; kP; k i kjkwh Eg.ktspyr ekekwh ckdkysyk gkrk-

, dsfno'kh \lor klik R; kP; k ek<; kP; k ofdykdMstkÅu \lor kyk o fuoRrhyk I kær gkrk]^^ fuoRrh]ofdykua, d ukeh bær I kæryh gk; **

fuoRrh] $^{^{^{^{^{^{^{^{1}}}}}}}}$ dkskrh**

 $\mbox{$Vklik]^$^$ ofdy Eg.krwk] rw, do"klixk; cgwoekxP; kek.kl kauk ikfyl LVskue/; srdkj djk; ykl kax**$

fuoRrh] ^^dk; rdkj djk; ph**

vklik]^eaxMi; kparhu HkkÅ foBkck] cGh] rnG'khjke vkf.k dkerhpk ujgjh Hkkd ys; kuh feGu vklik xk; dokMkpk [ku jkE; k dkdkM; kP; k ik0g.; kdjoh dsyk; - I ksykijiP; k ckG; kP; k fjYoh i nykP; k [kkyh vklik xk; dokM ; kuk ek#u Vkdya - v'kh rdkj | k; ph vku eh xk; c 0gk; pa vladsyarj fttkP; k ekxato<h ek.klagkbih] R; kuk ikfyl idMu urhy vkf.k r#akr Vkdrhy-tkirij ek>air lkiM.kkj Ugkbi rkirij R; kuk r#akru lkMyatk.kkj Ugkbi

R; kuuk tkirnji re#akkr Boyatk.kkj gk;] rkirnji EkhijxV vftckr gq kpallgkbł vladsyaEgath] eakM; kph ek.kl] dkerhpk ujgjh Hkkl y] lkjk pûgk.k vku gh vkiY; k xkokpk jkE; k dâdkMh c#cj oB.khoj; rhy-Ekh esyksvlal etw dkb/kryk nkokgh dkb/ZQb/kGw ykohy-fttkP; k ekxph ek.kl ach xkj ûgrhy-v'kh ybZHkkjh bær djk; yk ofdykual kfixryagk; **

 $fuoRrh]^{h} b x r p k x y h g k; -i j r w f d r h f n l c k g h j n M w c l .k k j \ **$

vklik] ^^ft thpk dkVk dk<hi rij**

fuoRrh]^^Egath**

fuoRrh]^^vklik] gh bxr pkaxyh gk; - ij , [kknaochr Mko vkiY; kojp myVkpk- ; kpk chuhV bjþkj dj]eakjh; kph ek.kl avku dkerhpk ujgjh Qkj gqlktj ek.kl agkbīrh**

 $vklik]^{\n}$ $vki.k.chR; \n}; ki.k.k., d.dkd.k.p < <math>vkgur-R; kauk.dk; ?kkcjk; pagk; \ **$ $vkgur-R; kauk.dk; ?kkcjk; pagk; \ **$

∨kb2fttkb3yk Eg.kkyh]^^ ∨k; a] ek>k uojk ikiVpaik; uhV dj.; kl kBh l ksykinjyk ikBok; yk r; kj Ugkb2 ek>k uojk Egrnn] rksrl kp ikakGk jkfgyk rjh pkyay- ekBk >kY; koj eh R; kyk, [kknanqdku ?kkynu nhu-R; ksnqdku pkyohy **

fttkb] ^^ gsc?k] vki w nknkyk bjbk#; k] nknk dk; Egarwrh c?kf*

nknkyk fujki fnyk- nknk vkeP; k ?kjh vkyk- nknkP; k ekxækx vkeph dkl kvkDdk]cGhukuk gh vky] nknk fttkb]k Eg. kyk]^ fttkckb] dok vkyh**

 $ft\,tk]^{\wedge} \lor kRrkp\, \lor kyh^{**}$

nknk]^^dk cksyoyagqrà**

fttkb]^^ nknk] r@gh ikM0; kP; k Vk; ekyk eyk ; k Eg.kw I kbxryagwa eh ekb; k ydhyk o ukrokyk I kykijiyk Ugrh- ekÖ; k ukrokpaik; uhV d#u vk.krh] r@gh eyk , d i\$ k ch nså udk rok eh ák ikjkyk I kykijiyk Ugrh- frFkaMkxnkj dk; Eg.krw rh c?krh] tj ik; uhV gkR; kr Eguyarj rl ar@gkyk dkxm /kkMw dGorh- vu ik; uhV UgkbZgkr Eguyarj yxhp nkw&rhu fnl kr ydjkyk o ydjkP; k vkbJyk ikBÅu nrh**

dki kvkDdkP; k vakr vpkudp noh vkyh-dki kvkDdk tkjitkjkr ?kew ykxyh]^^vga vga vga vkbZjkitk mna mna gsikjxayaxMpjkgw|k---r@pP; k·- ?kgys?kjk.; kr··ckjkgh efgusek>h i witk&vpkZdkskp djhr UgkbZ-rok gsikjxayaxMaijh vi ya rjh ekb; k i payk i kMk-akikjkyk ekb; k i payk i kMya rj?kgys?kjk.; kpadY; k.k g\p3y·-ikjkP; k ck-pach pkayyag\p3y·**

 $\label{eq:continuity} fttkblxkdkGw Eg.kkyh]^^ gsc?kk nknk] \'ak yıdjkpaeh i k; uhV d#u vk.krh- vu ex \'asyk dk; djk; parsdjk**$

nknk dkl kvDdkyk Eg.kyk]^^nøk 'kkr ûgk- ák ydjkpaFkkMadk gkbluk ik; uhV d#u vk.krhfttkEg.krh; k- rokfgyk ik; uhV djkyk mtok dk\$y | k**

 $\label{eq:continuity} \text{dkl kvkDdk?kpr?kprEg.kyh]$^^$ $$ $$ $$ \text{dk nokpk}$$ $$ \text{figh nokpk}$$ $$ \text{chinckpk}$$ $$ \text{chinckpk}$$ $$ \text{chinckpk}$$ $$ \text{chinckpk}$$ $$ \text{chinckpk}$$ $$ \text{chinckpk}$$$ $$ \text{chi$

 $nknk]^{\ } \lor gksnok] \ uhV \ , sdu \ rj \ ?; k- \'ak ysdjkyk I \ /; k mHkk jkgk. kach \lor o?kM gk; - \'asyk mHkk rj jkgkrk \lor kyai kfgthy dk ukbł exp rh rfgph I ok d# 'kdy- **$

 $\label{limited} $$ dkl kVDdk]^{\ vga vga vga rfgh nok[kkU; kr usyarj R; kpk dk; ch mi sc gqkkj UgkbZ ápai k; dok ch uhV 0gkpaukgh- nokyk l kMrwEg.kk- ápai k; vki nvki p cjagR; kya**$

fttkb/Eg.kkyh]^^ nok dk; u djrk ik; uhV dl agil; kyà **

dkl kvkDdk]^^ vga vga vga vxal Vo] fttsrwnokyk tkLr 'kgk.ki.kk f'kdÅ uxa] rwno ekur UgkbZEg.kw rj rb; k i kYkyk yd tYekyk vkyk UgkbZ rpk uojk yodj eykrph Fkkjyh yd Egath fgjd.kh rG'kkph i fgyh ck; di] yodj eyh- vkrk rwnokpaukgh, dyarj no rpadok ch pkacyadj.kkj UgkbZ - **

nknk] ^^nok] eh rÆgph rÆ'khjke o fttkckbP; k orhuaekOh ekxrw ek>k rÆ'khjke l k/kk]ljG] gk; - R; kP; k l å kjkyk l j ki nå udk **

nknk] ^^rhfttk \lor keP; k?kjkr i kgqkh Eg.kwu \lor kyh; k-i kgqkh ckbJyk rÆgh 'kk&ljki nsÅ udk nok-**

 $ukuk]^{\smallfrown} \, nok] \, \lor krk \, \'kkr \, 0gk] \, \lor kEgh \, I \, \, xGht \, .k \, \lor ki \, yh \, ekQh \, ekxrw^{\star\star}$

 $\label{eq:continuity} $$ dkl kvDdkP; k vakr ; k; paFkkncya nknk] fttkbJyk Eg.kyk] ^ vkepadk; p Eg.kua Ugk; - rG'khjke I kB; kyk 'krkruavkyk dh] R; kyk vkEgh I xGht.k I etkow I kakrw** $$$

 $I \ \textit{kB}; \ \textit{kyk} \ \textit{vkepk ck-'krkruanew Hkkxw vkyk- ?kjhfttkbZvkyh; k]} \ gsc?kw \ \textit{ck- P; k} \\ dikGkyk vVV; k i MY; k-$

dMn ai MY; koj 8 oktrk nknk] ukuk] ckinjfttkbZl xGh ek.kl al kl; kr cksyr cl yhcktnyk jkWblsyph fpe.kh <.k<.kr gkrh-∨kbP; k ∨ku fttkbP; k eukr ch bjokjkph T; kr <.k<.kr gkrh-dgkP; kp psp&; kojpsHkko Li″V fnl r uûgrs

nknk Eg.kyk]^^ r@fkhjke] rwek>k/kkdVk Hkko gk; - eh røyk gkr tkMwu I kærw i kjkyk I køyki ji yk usÅu nk[komu vk.kwnh-, d vkBopM; kph rj dFkk gk; - , o<; kI kBh i kjkpaokV@ad#uxI - fttk Egrh; k rFkal køyki ji yk pkænnoP; k ukokoj blykt QapV garw k- rj gaph dh] røp; k dk; ck- ph ckHkG caprh; k**

cki ji^^ i j nknk] eyk dk; Eg.kk; pagk;] dk; rj bijkt djrkuk ek>ayd# esyafcya rj\gh ik; Igtk Igth uhV glij; ky dk\ ák ik; kuk vki jh' ku djkoaykxy] vI ampxkodj Mkxnkj ásyk tyeY; k tyeY; k Igk efgU; k[kkyh Eguyk gurk- ex nknk ák i kjikpankligh i k; dki yavu uhV uk; >kyarj dkBhoj th pkyk; pā rh ch cm glujy fd-**

nknk] ^^ gsc?k fttk] R; k Mkxnkj kyk I i LV bjokj- i k; kpavki j h' ku dsyavu uhV UgkbZ >kyarják i kj kpai k; rkMko& fcMko ykxR; kyh dk; \ **

fttkb]^^ eh I xGaMkxnkjkyk bpkjY; kf'kok; ák i kjkP; k i k; kyk gkr ch ykow|k; ph ukgh**

ckilj^^ gs c?kk] fttkekeh] rfigh ekb; k yxdjkyk f?kÅu pkyyk; - R; kyk dk; >ky&fcyarj eh rfigkyk ftRr l kM.kkj UgkbZ nok[kkU; kr uY; koj ák yxdjkpaik; kpavkijh′ku djrkukik; dkiyarj yxd#ftorjkfgy dk\ ek>ayxd#jMmujMmu eyva&fcyarj\ **

ukuk]^^ gks,] r(G'khjke Eg.krv, rh.ch.c#cj gk; **

fttkb] ^^ gsc?kk] nknk] eyk ysdjkph e; k UgkbZ0g; \ **

eh yrdjkyk dk; ch rdyhQ gkrå |k; ph Ugkbł I xGa MkDVjyk bipk#up QMa \vee ki jh'ku djkpadk Ugkbł rh \vee kEgh Bjorw nok[kkU; kr pkænnoyk c#cj \vee kEgh ?kråu tkrw R; kyk I xGaMkxVjyk fopkjk; yk ykorw eh ch bipkjrh- goarj reh ch \vee keP; k c#cj pyk-

 $\label{eq:ckinj} $$ ckinj^* fttkekeh] $$ reght, o<aHkkhhuu Hkkhhuu ekÖ; k ysdjkpadY; k.k djk; yk dladk; fu?kkyko**$

 $fttkb]^{n} gsc?kk] eh ekb; kl kBh fdøk ek>h foPNk gk; Eg.kw ykdjkyk nok[kkU; kr U; k; yk HkkMr UgkbZrj ek>h ykd rGl k fgph ybZfoPNk gk;] gpai k; uhV djkoaEg.kw **$

nknk]^0gk; nkjdk] ák yxdjkyk nok[kkU; kr U; k; paeukr dqkkP; k gk; \ r\p; k dk r\p; k\vkbP; k\v**

vkb]^^ ekb; k eukr gk;] Hkkoth- **

 $nknk]^{n} rG'khjkepk, o< kb#/k <math>\lor$ I rkukl $(nk \ **$

 $$$ $\hline \hline \hl$

 $nknk]^{-} \ rG'khjke]ikjkP; k \lor kbjbh , o<h foPNk gk; \ rj \ uÅ nh dh , dnk nok[kkU; kr] \\ \lor u nk[kounh dh- \lor kepa, td ckck! , o<a^{**}$

cki ij\^ c?k nknk] rayk dk; cjaokVra rladj-eh; klk gk; -eyk dk; dGr Ugkb] ák fttkckbLuaekb; k?kjkoj bLrwfBoyk; -rh dk; b?tk; pk Ugk; ** \vee l aEg.kw cki wj kxkuamBw ckgj xsyk-

n() &; k fno'kh ckiwugeh i æk.kaHkkdjh ?kaÅu 'krkyk fu?kwu xsyk- fttkb] ckckl kc] vkbZeyk ?ksÅu l ksyki jiyk tk.; kl kBh dMkoj xsys

I ksyki ji yk i ksykpy; kurj nij &; k fno'kh vkb] vkth vkf.k pkaxno nok [kkU; kr xsys nok [kkU; kr tkÅu yodj dsi i sij dk<k; pk Eg.kwu vkbZdkgh u [kkrk eyk ?ksÅu nok [kkU; kr xsysyh gkrh-MkDVj yk nk [kfoya ofj"B MkDVj kuh i k; kph uhV ri kl.kh dsyh

 $\label{thm:ckykow} fttkblo pkannoyk vkr ckykow ?krya MkDVj Eg.kky}^^ ; k ckGkph I i wkltckcnkjh clksk ?kskkj vkg\.^*$

pkacno]^^ eh- MkDVj-**]

^^ vki .k; k ckGkpsdksk ykxrk**

pkacno]^^ eh; k ckGkpk i kyd gk; **

MkDVj Eg.kky}^^ r@gpauko dk; **

pkacno]^^ ek>auko pkacno p0gk.k] eh ujfl ac feye/; sdi Mk [kkR; kr dke dj rks**

MkDVj]^^ r@gpafrfdV vkgsdk\ **

pkacno] ^^ gks **

MkDVj]^^ r@gh dk; e dkexkj vkgkr dk cnyh\ **

pkacno]^ dk; e- **

MkMDVj]^^fBcl vkgs; k.ckGkpsik; uhV gkrhy ijarq; k.ckGkP; k.nkblghik; kpsvkWjskUl cljkoh ykxrhy- uarj ik; kyk rhu rhu efgU; kyk rhu iVV; k.ck#k0; k.ykxrhy- R; k.ckMow pky.kkj ukghr-ifgyh, clp iVVh ck#kyh vkf.k.iq;P; k.iVV; k.ck#foY; k.rjik; uhV gkskkj ukghrik; kpsVkclsrNyi; ir nok[kkU; krp ngk fnol Fkkckosykxsy- vki yh r; kjh vkgsclk\ **

pkxno]^^ vkephr; kjhgk; **

 $\label{eq:mkmbvj} $$ $$ \ Mkmbvj]^^ gsc?kk] \lor ktp; k ckGkP; k dkgh pkp.; k d#u ?; k0; k ykxrhy-jDr] y?koh ; kpk fjikkV, d nksu fnol kr feGsy-; k; k x\psi okjh ckGkP; k nklgh i k; kpa \text{kWj}$kUl d#; kr pkysy**$

pkano]^^gkš**

 $fttkb]^{n} \lor kifj s ku djrkuk i kj xayb Zj Mhy dk; \\ \lor u R; kP; k thokyk dk; nxk / kki k 0gk; pk Ugk; dk\^**$

MkDVj]^^ ák ckbldksk\ **
fttkbl/^ eh ; k ckGkph vkth gk; **

 $\label{eq:mkmpvj} $$ $$ Mkmpvj] ^^ gsc?kk ckb] \lor klljśku djrkuk ydjkyk Hkmy gh | kohp ykxsy- yd#'kl/nhoj $$ VkY; kuarj jM.kkj- rp<k = kl rfigkyk l gu djkokp ykxsy- Qkj jMwykxyarj $$ vki.k R; koj dk; rjh b}ykt d#; kr] pkysy\ $$ Vkf.k ek.kl kpatx.k&ej.ka'kpVh ijeśojkP; k gkrkr $$ rsvki.k dkgh l kxw'kdr ukgh] i Vra dk $$ kth rfigkyk**$

vkth]^^0g; -**

 $I \times G_7^* \ k \ pkp.; \ k \ ?krY; \ k- \ x\# okjpk \ fnol \ \lor kW j s \ kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ Bjyk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ byk- \ x\# okjh \ l \ dkGh \ \lor kW j s kupk \ byk- \ kW j s kupk \ byk- \ x\# okjh \ byk- \ kW j s kupk \ byk- \ byk-$

jk=hP; k l kMsvdjk oktrk vkbLackGkyk , dnk vakoj iktya o ckGkyk [kkVkoj VkdyajkrHkj vkbZo vkth >ki yh UgbT- igkVaigkVackG mByao jMmykxya ckGkyk iktk; yk ijokuxh u0grh- ckG tkj tkjkrjMr gkra vkbP; k thokph dkl kohl gkr gkrh- ijarqul Lih vkbZyk ckGkyk vakoj iktk; yk euk dayayh gkrh- ckG jMk; paFkkrr u0gra ul Lih dl yarjh vkbZyk vk.kyao iktya ckG jMmu jMmu Fkdyao >ki h xaya vkbZckGkdMac?kmu jMr gkrh-

ul ZvkbJyk I kar gkrh]^^ gsc?kk ckb] vkWjskuP; k vxknj dehr deh I gk rjh rkI ydjkpai kV fjdkeav I koaykxra ckGkP; k HkY; kI kBhp MkDVj I kar vI rkr **

I dkGh I gk okti; ir vkbZo vkth ckGkP; k toG cluu gkrh- I gk oktrk ckGkyk vkWjsku fFk, Vje/; sus; kr vkys ckGkyk vkWjsku fFk, Vje/; susr vI rkuk ckG Hkqbua0; kdqG gksÅu jMr gkra vkf.k ckGkph vkbghjMr gkrh-

I dkGh 9-00 oktrk ckGkyk Eg.ktseyk vkWjsku fFk, VjP; k ckgj vk.k.; kr vkya ckGkP; k nkMgh i k; kph vkWjsku >kysyh gkrh- nkMgh i k; kP; k ?kkV; k [kkyh 9&10]9&10 Vkds i Mysys gkrs i k; kyk i VV; k ckdkyY; k gkR; k- ckG fuifpr i Mysya gkra ckGkyk vkWjsku fFk, Vje/; suY; ki kl w ckgj vk.ki; ir vkbP; k MkG; kP; k vJpok fVi N Fkkcysyk u0grk-

ngk I kMsngk oktrk ckG fuEe v/kl'kqnhoj vkyao gkypky d# ykxya vdjk I kMs vdjk oktrk cjp 'kqnhoj vkya ckjk oktrk ckGkuajMk; yk I ϕ okr dyh- I yx nku rkI ckG jMr qkra vkblckGkpagky c?kw i vkl[kpysyh qkrh-

, d oktrk ckGkyk rikl.; kl kBh MkDVj okMkr vkys egy jMr gkravkf.k vkbgh jMw jMw vkbP; k vækryh 'kDrh l i yh gkrh- MkDVj ckGkyk rikl r gkrsvkf.k vkbyk vpkud Xykuh vkyh o vkbZMkDVjP; k l ekjp /kkM·-- fn'kh [kkyh tehuhoj i Myh-

> ul Zo dá kMjyk MkDDV j kuh l ktíxry j^^; k ckbžyk rikl k; P; k [kksyhr ?ksÅu pyk-** vkbžyk LVjojojoj ?kkyw rikl k; P; k [kksyhr us; kr vkys

fttkblo pkaxno i jirs?kkcjy] MkDDVjkuh u lilyk lipouk fnY; k o ckGkyk dksk dkskrh vkSk/ka | k; ph rs l kūxrya vkf.k MkDDVj yxcxhua rikl k; P; k [kksyhr xsys pkaxno ysdjktoG Fkbcys fttkbl vkbčjkcj vxkojp rikl k; P; k [kksyhr xsysyh gksch- MkDDVjkuh frFka xsy; koj vkbpk ch-ih- cf?kryk- vkbpk ch-ih- FkkMkl k ok<yk gksck- vkbl/kqnhoj vkyh gksch-

 $\label{lem:liker_loop} $$ MKDVj kuh fopkjya^^ ckb] r \ park = h to.kkr dk; ?krya vkf.kl dkGh dk; [kkYya^* fttkb] ^^ MkDVj] gh ek>h yxd gk;] fguajkrhikl u rkblkr ik.; kpk Fkx ch?kryk Ugk; -$

 $\label{eq:mkmbvjvkr} $$ Mkmbvj vkrP; pfdr >kysvkf.k Eg.kky]^^ ckb]; kuh ikb/kr dk; u ?krY; kerGso vrh rk.kkerGa; k ckbJyk pDdj vkysyh vkgs gh i koMj esMdye/knu vk.kk o fgyk i k.; ke/knu | k- urj v/kkZrkl kuafgyk Hkkr&oj.k ox$s[kk; yk | k** $$$

fttkb]^^ MkDVj]ckGkyk oj panvlk i ktw|k dk\ **

MkDVj]^^ vkRrkp udk]ul ZI karhy R; koGh R; kyk nv/k | k**

 $i\,k.\,;\,kruu\,i\,koMj\,fnY;\,ke\hspace{-0.1cm}/Gs\hspace{-0.1cm}Fk\hspace{-0.1cm}/Ml;\,kp\,o\hspace{-0.1cm}/Gkr\,\,\vee\hspace{-0.1cm}/kb\hspace{-0.1cm}/Jy\hspace{-0.1cm}/k\,\,cj\,a\,o\hspace{-0.1cm}/k\hspace{-0.1cm}/My\hspace{-0.1cm}/k\hspace{-0.1cm}/gs\hspace{-0.1cm}Fk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}/Gk\hspace{-0.1cm}/Ml;\,ko\hspace{-0.1cm}$

9&10 fnol \vee kblo ckG nok[kkl]; kr Fkkæys ; k e/kY; k dkGkr fttkbluapkænødMw I foLrj i = fyfgya o eaxM; kyk /kkMya

10 fnol kurrj i k; kpsVkdsl kMys i k; kyk i VV; k ck/kY; k- xkG; k vkSk/ksfyguu fnyh

 $\label{linear_model} $$ MKDDV j ku h l k fixry a^* ckb j v k l j s k u ; 'k l o h > k y s v k g s V k d s o k G y s f u ? k k y s v k g s V k d s o k G y s f u ? k k y s v k g s V k d s o k G y s f u ? k k y s v k g s V k d s o k G y s f u ? k k y s v k g s V k d s o k G y s f u k k g s v k g k g k g k s k e f g l ; k r i V v ; k c n y k ; k v k s k / k g l ; o f l F k r | k - l g k e f g l ; k r c k G i w k l c j a g k b l y - **$

fttkblyk vR; kum >kyk-fruaMkDDVjkpsik; /kjys

 $\label{eq:mkmpvj} $$ Mkmpvj Eg.kky] ^ckb] rfgh gsdk; djrk; \vgkseh rfgP; ki {kk ygku <math>vkgs R; kijes ojkpsvkHkkj ekuk**}$

frFkseakM; kps, d MkMDVj undrp vki yaif'k{k.k i wkZdj.; kI kBh vkysgkrs R; kauk gs enG eakM; kpsvkgr gsdGY; kunrj rsfrFkavkys rsMkMDVj ek/ko xkfkysgkrs R; kauh I oZpk&d'kh dsyh-unrj vkbJfttkbZvkf.k ckG nok[kkU; kruu vkejkbir vkys

15 fnol kuarj \vee kb] \vee kth o ckG xkokdMs \vee kys i k; uhV >kY; kpac?kuu l xG; kauk \vee kum >kyk- cki nykgh \vee kum >kyk- cki nph Hkhrh fujk/kkj Bjyh-

 $fttkbZEg.kkyh] ^*i \ e^p; \ k \ efgU; \ kr \ i \ VVh \ cnyk; \ yk \ , \ dnk \ I \ ksyki \ yk \ tk; \ pagk; - \ VkMowudk-i \ e^p; \ k \ efgU; \ kuarj \ nksu \ efgU; \ kua \ , \ d \ i \ VVh \ gk; - \ R; \ kuarj \ 3 \ efgU; \ kua \ , \ d \ i \ VVh- \ I \ gk \ efgU; \ kr \ rhu \ i \ VV; \ k \ ckdkY; \ koj \ ex \ i \ k; \ pkaxyavki Y; \ k \ i \ k; \ kI \ kj \ [kagk]; \ kya**$

I okluh I V/dpk fu% okl Vkdyk- ifgY; k nku i VV; k oGr cnyY; k- ek= frl jh i VVh cnyyh xsyh ukgh- dkgh vMp.kheGsfrl jh i VVh cnyk; ph r'khp j kfgyh- R; keGsek>si k; 100 VDdscjs>kysukghr- 50 VDdp i k; cjsgks; kr; 'k feGkys 50 VDdsi k; okdMp j kfgys

Hkkx I kr

eh nku o"kkipk >kyksrjh gh eyk ekö; k i k; koj uhV mHkk j kgkrk; sr u0grs mHkk dsyarjh eh , dk cktnyk dksyeMr gksrks vkrk MkDV jyk nk[konu dkghgh mi; ks u0grk- oG fu?knu xsyh gksrh- 50 VDdseh cj k >kyksgksrks 50 VDdsek>s i k; rl pookdMsjkfgysgksrs R; kenGsi k; kpsrGos tehuhoj Vdr u0grs mHka dsya rjh eh ?kkV; koj mHkk j kgkr gksrks rGosvkrY; k cktnyk eMi ysys gksrs

vkbłyk vkthyk Okj okbł/ okVr gkrs vkiY; k gkyxthł. kke@sikjkpsik; iwkłcjs>kys ukghr-rhu efgll; kurj iVIh cnyyh vI rh rj dnkfpr 80&90 VDdsik; cjs>kysvI rł vI s brj MkMDVj I kar gkrs vkrk oG fu?ku xsyh gkrh-vkrk dqkkykp nkšk nsåu mi; ks ulgrk-vkbłus fu; rhykp nkšk fnyk-

pkj o"kkipk gkbil; ir eh mHkk j kgk; pksvkf.k tehuhoj [kkyh dksyeMuu i Mk; pks fHkrhpk fdæk [kkækpk vk/kkj ?ksåu dkgh ?kVdk eh mHkk j kgw'kdr gkrks f'kok; eyk poM; kojgh cl rk; rulgra l Mkl yk xsyadh ek>h ybži pk; r lgk; ph-

, d fno'kh cki w∨kbłyk Eg.kyk]^^ vk; yk] i kj kph fri jh i VVh prployh ul rh rji klyi i qklzja>kyavi ra vki yh prpl Qkj ekBh egkxkr i Myh-rweyk u bpkjrk usyavi rarjeh dk; rfqkyk Qkl koj p<or gkrkslg; $\$ **

vkb]^^fttkb/vkyhukgheh, dVhd'khtk.kkj 0grh**

cki ij^^r\p; k \lor kbīyk \lor I yhp I o; p gk; - d\particle yach dke dMoj U; kpaUgkbł ák ckbl²; k gkruagkrh?krysyadke i ji aUgk; paUgkbłeyk ekfgr gkra**

ehikpo"kkipk >kyki] ringk eyk FkkinaFkkinamBuu mHkk jkgkrk; rgkra eh tkLr; G mHkk jkgw'kdr uûgrks o eyk iskaiskaikoyaVkdrk; ruûgrh- eyk pkyrk; rul Y; keGseh, dk tkxpjcluujkgkrgkrks ygkuikgikreyk [kGrk; ruûgra ekü; ko; kphygkuygkuikgiatingk mM; k ekjk; phringk rsc?knu eyk Qkjp okbl/ okVk; pa vkeP; k okM; krp d™.knp gk ek>k l [[kkpyr Hkkå Qkj pqkndnkj gkrk- rksfnol Hkjkr xYyhriGk; pk] [kGk; pk] ijrqeyk R; kP; kc#cj [kGrk; k; paukqh- ek>h qh viax volFkk c?knu vkblvkf.k ckinyk y; okbl/ okVk; pa

 $Fkkj yk HkkÅ \ ckckl \ kc \ R; \ kyk \ eh \ ckcMackcMa^{k}. \ kk^* \ Eg.kr \ vl \ \ vk. \ kk \ ek>k \ l \ kj \ [kk jkx jkx djk; pk- ^yaxMå \ Eg.ku fpMok; pk] ^i kaxGå \ Eg.ku fpMok; pk] \ vk. \ kk \ eyk ^i kaxGå \ Eg.kr \ vl Y; kerGs l xGh xYyhp eyk ^i kaxGå ; k ukokua gkdk ekjk; ph- ykdkuh ^i kaxGå \ Eg.kyadh eyk jMw; k; pa eh c&; kp orGk ^i kaxGa* Eg.kY; koj jMk; pks vkf.k eyk okVk; panokuaeyk gh f'k{kk dk cj fnyh vl ay\ vkb]vkth vkf.k cki wek= eyk ^i ki V*; k ukokuacksyk; ps$

ukuk vkf.k vkEgh , dk okM; kr jkgkr vl Y; kenGs ek>h vkf.k d*.knoph ekb; k rkMkojp ukuk rgyuk djk; pk- eh i kaxGk vl Y; kph ukukyk l gkuthkrh d/kh okVk; ph ukgh- ukuk vfr'k; rtNrusekÖ; kdMac?kk; pk vku Eg.kk; pk]^^ áð; k vkbðyk--- rG'khjkeP; k ák i kaxG; kyk tYeHkj l hkkGk; ph i kGh; rh dh dk; \ eh l kaxr gkrkj^ áðyk nok [kkU; kyk usÅ udk] dk; mi sx gqkkj ukgh-* ij ek>a, sdr; dksk\ eh l i "V cksyrwEg.kwu rG'kkyk jkx; rw ij eh cksyrwR; kpk bjþkj rG'kk djr Ugkbł vkepk fdl uno dl k gk; c?kk] ok?kkokuh!, dk tkxh i kjxaßjr Ugkbł l kj [kafpR; kl kj [kagdMwu rdMavku rdMwu gdMamM; k ekjra - vku gs ut rp Hkki G; kokuh fnl ra - ápk dk; ch mi x gqkkj Ugkbł ^/kj.khyk Hkkj vu [kk; yk dkj* tYeHkj rG'kkyk ásyk l khkkGrk l khkkGrk ukdh uÅ; skkj gkbłrh**

ukukpagscky.ka, idw \vee kbZl kj [kh j Mk; ph \vee ku Eg.kk; ph ekb; k i ki Vpad l a0gk; pa\dkl k \vee kDdk ch ekb; kdMa \vee fr'k; frjLdkjkua c?kk; ph-fdl ukyk ybZ uVk; ph-fdl ukP; k \vee akko#u rkMko#u ek; suagkr fQjok; ph-

 $i.k.\,dkl\,\,kvkDdk\,\,ri\,dhj\,\,y;\,\,oMk;\,\,ph-\,\,R;\,\,ke(GsvkDdk);\,\,k.\,\,gkrkyk\,\,ri\,dhj\,hpk\,\,okl\,\,ybl\,\,;\,\,k;\,\,pk-\,\,rlsokl\,\,fdl\,\,ukyk\,\,d/kh\,\,l\,\,gu\,\,0gk;\,\,pk\,\,Ugkbl\,\,eyk\,\,ekruj\,\,vkthuad/khp\,\,i.ekuatoG\,\,?krya\,\,Ugkbl\,\,d/kh\,\,ekb;\,\,k\,\,\,vakkoj\,\,uai\,\,ekuagkr\,\,fQjoyk\,\,Ugkbl\,\,i.ekuaek>k\,\,ukrwEg.\,kwu\,\,d/kh\,\,eqdk\,\,?kryk\,\,Ugkbl\,\,\,vkDdk\,\,l\,\,xG;\,\,kpk\,\,ykM\,\,djk;\,\,ph-\,\,vk...kkpk\,\,rj\,\,yblp\,\,ykM\,\,djk;\,\,ph-\,\,vk...kkyk]^ek>k\,\,ok?k^*\,\,Eg.\,k;\,\,ph]\,\,ij\,\,eyk\,\,ekruj\,\,^i\,\,kaxGk^*\,\,Eg.\,kwu\,\,fg.\,kok;\,\,ph-\,\,vk...kky\,\,ph-\,\,vk...kkyk]^ek>k\,\,ok?k^*\,\,Eg.\,ky$

dkl kvkth] ukuk]vk..kk gseyk Okjp frjLdkjkusokxok; ps eyk Okjjkx; k; pkfdl ukl kj[kavki.k i Gkoa mM; k ekjk0; kr Eg.kwu eh cGacGafHkrkMkyk /k#u mHka jkgk.; kpklk; Ru djk; pw i jørgek>k c&; kp oGk dikGek{k Qgk; pk-

?kjh cl Y; kurrj ?kjk i e;a j kst oscos:Gs dykor dkaghuk dkagh ekx.; kl kBh ; k; ps rs dykor o R; kaph dyk c?kk; yk eyk Qkj vkoMk; ph-

eh i kp o "kkipk v l su] r figk v ke P; k ?kj ki i sa Mkock&; k pk [kG v ky k girk- R; ks [kG ey k y; v ko Mk; pk- R; k [kGkrhy d l j r h c?kuu eh v kG; k oktok; pkso t kgit kgi kusoj Mk; pks ek > h dyscn nyph thoar n kn c?kuu Mkockj h Qkj [kqi k 0g k; pk o R; kuax kG k dsysy; k i skkryk, d Qwdk i s k ekb; k gkrkoj fBok; pk- eh R; k, dk i skkP; k x kG; k fd l u ky k v k. kk; y k l kakk; pks r ksey k x kG; k v k. kuu | k; pk- eh v i ax gkrksey k pkyrk; s r UgkbZ; k pafd l u ky kgh okbJ/ okVk; pa R; ky k

okVk; paj ^i kaj Vyk pkyrk \vee kya \vee kl raj rj \vee ki Y; kyk ?kjkr [kGk; yk , d pkaxyk fe= feGkyk \vee l rk-* ukuk ek>kfrjLdkj djk; pk i jarafdl ukyk ekb; kcnny usjehp l gkuHkarh okVk; ph-

vkeP; k nkjkr, d e/; e o; kpa dykor tkMia; k; pa ckbli Vhoktok; pho frpk uojk nokph xk.kh] xoG.kh Eg.kk; pk- eyk R; kpokgh gk dk; Zhe Qkj vkoMk; pk- rs vkys dh eh tehuho#u I jdr I jdr nkjkr tk; pkso R; kpoh xk.kh, zdk; pks c&; kp oGk eyk dqkhrjh [kk; yk fnysyk, [kknk i S k eh R; k dykorkuk nsÅu Vkdk; pks i Vhokto.kk&; k ckbipauko I kukckblif kms gkril o xk.kh Eg.k.kk&; k frP; k uo&; kpauko Hkxoku f kmsgkra R; k o; krgh eh R; kph uko y{kkr Boyh gkrh- R; kph xk.kh, zdY; koj eh ekb; kdMpk, d i S k R; kauk | k; pks ; kpadkfnd R; k nkýkkauk Qkj okVk; pa ekb; k dyß; k nkn ns; kcnnypk xqk nkýkkaukgh Qkj vkoMk; pk- ekb; kl kBh Eg.ku rh nkýkavkeP; k nkjkr 2&3 xk.kh Eg.ku nk[kok; ph- brj fBdk.kh rs, [kknadMosEg.kr vI r- ck; k R; kuk I i kuank.kaok<k; P; k-R; kpk egyxk i i/gkn f kmsgk gh xkr gkrk-

I kukckbZEg.kk; ph]^^ nkjdkvkDdk] rp-k yd i kacGk gk; ij R; kyk cq(n; k ybZgk; c?kk-do<aygku gk; - ij vkepaxk.kay{k nsÅu ,dr; - vkepaxk.ka,dY; koj R; kyk ybZybZ vkum gqrwk-R; kP; ko; kpadByach i kgi xa[kk; kyk fnysysis a nq &; kyk dok fny dk\ ij gsi kgi xa R; kyk [kk; kyk fnysysis svkepaxk.ka,dY; koj vkEgkyk nsa - ásyk ygku o; krp xk.; kph] oktok; ph Qkj vkoM gk; c?kk**

 $\label{eq:hkxoku} $$Hkxoku Eg.kk; pk]^^\kDdk] r \ paikj xagqkkj gk; -ikakGadk \kl hukij gqkkj gk; -ikakGadk \kl hukij gk; -ikakGadk \kl$

rok vkeph ptyrh dkdnEg.kk; ph] ^^vol gh rji kaxGagk; dh**

Hkxoku]^^ vDdk] i kakGhp ybldjkerh vkl R; kr c?kk-**

 $\label{eq:likepowk} Ikkpo''kkip look vl rkukp] eh ckckl kcP; k ekxaykxwu eyk ch fl uwek c?kk; yk Ugh Eg.kwu j Mk; pks$

ij ckckl kc Eg.kk; pk]^^eh i kakG; kyk [kka| koj ?ksÅu tk.kkj UgkbZ**

ckck i kc i kj [kk i kj [kk fi uæk nær c?kk; yk tk; pk- eh i kj [kai kj [kai; kip; k ekxa ykxk; pks , dnk oMhy ek>h fi uæk i kgk.; kph r GeG c?kwu eyk [kkaj koj ?ksåu fi uæk c?kk; yk ?ksåu xsys eyk pkæyavkBor; a e.kj hpk næwnkekthip; k næGkekxagkrk-jk=h i kMsuå ngk oktrk fi uæk pkyw>kyk-, d okti; ir eh fi uæk c?kr gkrks eyk vftckr >ksi ykxyh Ugkb?

ek>hfl usek c?kk; ph \lor koM c?kwu cki wFkDd >kyk- o?kjh; Åu \lor kb³yk I kaxwykxyk]^^ dk; ch Egu] i kj xa i kaxGa dk \lor I huka ij rph cqnh yb² pkyrh; k- fl uqek I kyhi; ir MkG; kph i ki .khl qnk gkyoyh Ugkb² c?k- dk; Eg.kkoa; k i kj kyk\ , o<h \lor koM ák o; kr fl uqekph! dk; Eg.kkoaá \aleph ; k cqnhyk!**

 $\begin{tabular}{ll} $$ $$ VkD_1^* ikj xaikaxGagk; ij gqlklj gk; -asyk deh o; kr ybldGra - ckckl kc ikp o"klipk grk rok R; syk fl urek dl yk vkl rughdGr ch ulgra** \end{tabular}$

gGogGook<R; ko; kcjkcj ek>h dycnnyph vkoM?kjP; kuuk vkG[kn; så ykxyh-

ek>h dycnnyph \lor koM dGY; kurj ukuk Eg.kkyk]^\ \lor kiY; k 'krd&; kB; k i kjkyk xk.; kph \lor u fl uękph \lor koM ybI \lor kl uaybIpkaxyaUgkbI ^Eg.kR; krh dh cke.kkP; k ?kjkr fyou] gfj tukP; k ?kjkr xk.ka \lor ku ejkB; kP; k ?kjkr nkua**

nknk Eg.kyk]^^ cGh] ikaxGa gk; Eg.kwu nokua \vee ki Y; k ijhl rsyk , d cq|k \vee kxko fnyh; k**

vkrk eh xYyhr ?kjkr I xGhdMaikax(GxkM; kP; k I kákuagGogGwpkyk; yk f'kdr grpw ek>s I rr pky.; kpsi z Ru c?kwu vkbZo cki wyk dk&rd okVr grna

cki waxkokrY; kʻkodj ekupaʻkr 5 oʻ'kkP; k cksyhoj [kMkuadsysyh?kjkr ppkZl # >kyh gkrh-cgeigh okVsyk i fgyh vkeph l kMsi kp, dj tehu ofMyksi kftir gkrh-R; kP; kʻkstkjhpʻkodj ekusukokP; k UgkO; kph l Ook rhu, dj tehu cki wa5 oʻ'kkP; k cksyhoj [kMkuadsysyh gkrh-

, d fnol vkeP; k?kjkrvkumkph?kVuk?kMyh-ekÖ; k i kBhoj vkbiyk egyxh > kyh gkrheyk o ckckl kgckyk cfg.k feGkyh gkrh-ckHkQxkoko#u fttkbigh vkbipackGri.k dj.; kl kBhvkyh gkrh-xhlhikM0; kP; k egrkbj vkeP; k?kjh, dk ygku cfg.khpavkxeu > kyagkra vkf.k frpsvkxeu 'khlk Bjyagkra frP; k vkxeukpsvxknj l Ook rhu, dj tehu cki nyk [khlkuai kp o"kkl kBhfeGkyh gkrh-cki nyk okVnu vo?kh 15, dj tehu feGkyh gkrh-vkrk R; kr l Ook rhu, djkph Hkji Myh gkrh-ikM0; kP; k urj cfg.khpauko i k#Bbya i k#pk pgjk cki nl kj [kk fnl r gkrk-eh vkf.k ckckl kcekreq[kh gkrksrj i k# fi req[kh gkrh-

 $igkVsl\ kMsrhuyk\ ,\ dsfno'kh\lor keP;\ k?kjhfiaxGk\ tkskh\ dyleylaoktor\lor kyk-\ rkso"kkyk\ ,\ dnk\ ;\ r\lor l\ s\ rks\lor kY;\ kuarj\ \lor kEgh\ l\ xGht.k\ tkxa>kyks\ i\ k\#\ \lor krk\ nku&rhu\ efgU;\ kph\ > kyh\ gkrh-$

fiaxGk tkskkuaygku ikgihyk iqs; kr ?kryafryk vaxkjk ykoyk o ckinyk Eg.kkyk]^^
rG'khjke] rq>h ikgixh rq; k rkMkoG; koj xsyh; k c?k- HkkX; oku fu?kay- frP; k ?kjkr ckjk cSył ckjk
xkbZ vkf.k ckjk Eg'kh nko.khyk vI rhy- y; HkkX; kph gk; rq>h ikgixh] rG'khjke! ** ekÖ; kdMa
c?kwu tkskh Eg.kkyk] ^^ gsi kgixai kaxGagk; ij djkerh gk; - qqkkj gk; - rsyk 'kkGk f'kdho-**

ckckl kgcdMac?knu Eg.kky** gk i kjxk rq; k gkrk[kkyh 'krh djay- ij rG'khjke gk FkkMp fnol 'krh djay- ásyk/ka|kph∨koM tkLrh∨klay-

i kol kGk l a yk gkrk-jCchP; k i j .; k oxjs>kY; k gkR; k vkf.k , dsfno'kh dkl kvkthP; k vakr vkya vkth?kep gkrh] ^^ vga --vga ---vga --- vkbZjktk mnamnamna! vga --vga ---vga ---vjs eh rGtki ij ph vkckckbZgk; -**

vkthP; k leji vkEgh lxGh clywgkrw eyk ek>auDdh o; vkBor UgkbZij eh vly 5&6 o"kkpk-vkth EgkgiaFkkjyk pgyrk nknk] dkdwFkkjyh pgyrh] ntjh dkdwe/kyh pgyrh] vklik Fkkjyk pgyrHkkÅ&I blkk] ofguh vklikph ck; dk]ukuk e/kyk pgyrk] nxMwvklikP; k ikBpk Fkkjyk pgyr HkkÅ] vk..kk ek>k Fkkjyk hkkÅ] ckiwoMhy vkf.k vkbZl xGsclysgkrs

∨kth]^^ ∨øa• --∨øa• --- ∨kbZjktk mnk¶mnksmnks-- **

nknk]^^ cksyk nok] dk; Eg.k.kagk; \ dk; pqdyaokdyarj | kaxk- \vee kEgh | $(k\#u\ f?kA- \vee ki\ yaEg.k.kadk;\ gk; \ ^**$

 $vkth]^{\wedge} vjsHkDrk] \ rweyk \ bil \ jykl - fdrh \ rjh \ fnol \ rwek0; \ k n' kizkyk v kyk u kghl - ryyk \ dk; \ y; \ vfHkeku okVry, \ dk; \ l kax rweyk HkVk; \ yk \ dk v kyk u kghl \ **$

nknk]^^ nøk]eh rfgpk Hkxr gk; - ekö; k eukr rfpP; kcnny yb
% HkDrh gk; - eh rfgkyk bl j hu d l k\i u rfgh dksk gk; \ **

 $\label{eq:linear_continuity} $$ \sqrt{kth}^{\circ} eh rGtkijiph \sqrt{kkckblgk}; - ; \&; k i quohyk rGtkijikyk I xGa?kjckj ekÖ; k $$ HkVhyk ; k-rfigh okMoMykikI uaek>aHkxr gko ** $$$

nknk]^^ ; **r**w; **r**w~kb**]** ; **ry**k Hk**y**/k; yk! ~kEgh ?kj ckj ; **r**wHk**y**/k; yk **

∨laEgVY; kurj]∨kth FkMl>kyh-∨kthP; kloZt.kik; kiMys ehi.kik; kiMyw ∨kthP; k∨akrusgehp∨/kmue/kmunp; rgkma

 $i\,\psi ohP;\,k\,\vee xmj\,\,pkj\,\,fnol\,\,rGtki\,\psi yk\,\,tk;\,kph\,?kkbl?kj\,kr\,\,pkyw>kyh-\,rGtki\,\psi yk\,\,dksk\,\,dksk\,\,tk;\,pa;\,koj\,\,ppkll\,\,\#\,>kyh-$

nknk Eg.kyk]^^ cGh] rw]rph ck; dŵ rG'khjkeph ck; dŵl Mkk]R; kph ck; dw∨u Egkrkjh, ogk; -rp<hp ekstdh ek.kl a?ksÅu rGtkiøjyk tkok-**

ukuk]^^ ifgyk epake ekMhłyk i May- vku noj &; k epakekyk vkEgh roGtki ji yk tkÅ - ykcpk i jokl gk; - I xG; kuk uhV cI kyk vkyaQkthy-**

 $nknk]^{-1} l klk] \times klkhyk rVV; k ckak] oj.k 2&4 fnolkph ?kh- oj.khoj nku ?kkakMh Vkd-Egath ck; kuyk rh l xG; kauk uhV cl rk biy- vu gsc?k cSykyk 'k6; k ?kky- cSyapkaxyh ?kh- f'kjl; k vku jkE; kyk ?kh- rh plaxyh cSyagk; rh- vku c#cj i MHkh ?kh- xkMhyk oaxku pkaxyadj- /kkok$

rikl w ?kh-cSykP; k i k; kauk i r&; k ekj-cSyarGkoyh \lor l rhy-pkj fnolcSykauk pkaxya [kkÅ fiÅ ?kky-clGokyk tij wuxw fu?krkuk cSya/kqÅu ?kh**

i quohP; k vxmj nksu fnol vkEgh fu?kkyw r@tki jiyk vkeP; k c#cj, d nksu deh ch vkyh-jkrP; kyk tkxw tkxw nksu dkdwh vu vkbluacjpl aQjkGkpal keku d#u ?krya vkepa ?kj ekBa vkEgh uqlrpaoxGajkfgywgkrw i j vtwch ckjnkuk, dp gk; vlaykdkuk okVr gra

nknkph ck; dwxxkdkdi) frpackjdaikjxa'kidj- l blkk] ofguh] e/kyk pyyrk ukuk] R; kph ck; dweiDrk dkdi) frpackjdaikjxafdluk] ∨kbi] eh]ek>h cfg.k , o<ht.k ∨kEgh tk.kj qrks

Fkký yk psyrHkkÅ I blkk \vee klik; kpa yXu usplrp >kyagkra R; keGaR; kphgh okoj t=k djk; ph gkrh- ckG; kpk [kbhck] ekWhjoh \vee ckckb] \vee u rGtki jiph rGtkb $I \vee \vee$ kh gh t=k gkrh-

eyk rVV; kP; k xkMhr xY; kpa vkBor; ao frFkar@tkijih dYyk@kr vax@ dY; kpa vkBor; - tkrkuk r@tkijiP; k ik; F; kyk xkMh fl alkQG ; &ks FkkacoY; kpa vkBor; - frFkyh xyyekgj >kMavtwugh fol # 'kdr Ugkbł iqtkjh dneps?kj ik; F; kyk fppcukr gkra toG fofgj gkrh-dkBkclkB rh Hk#u okgr gkrh- iqtk&; kpa?kj l k/kagkra ekxP; k cktwyk Mkwj ik[kjyyyh fHkr gkrh- frFkanku fnol jkfgyw xkMk fuon][kkjk fuon >kyk- l xG; kpanon'klu iqtk&; kua?kMow vk.kya uohu uojk&uojh vklik o ofguh [kqk gkrs

rGtki \dot{y} ; k=k d#u \lor kEgh; rkuk \lor keP; k \lor ktkGh ckHkGxkoyk \lor kyw frFkax \dot{y} ; koj tjk ekclGaokVya I xGs \lor kyysc?kuu fttkb \dot{y} k \lor kum >kyk-

rh cGhukukyk Eg.kkyh]^^ vkrk vkyk; rj nku fnol jkgkok-tok.ka[kk.kad#u tkok **

ukuk Eg.kyk]^^ c?kw k dl adl aterar%**

ukuk vkyr Eg.kY; koj vkthpsnhj ukukyk HkVk; yk vkys ukukyk vkf.k vklikyk eG; kr ?kÅu xsys vkthpk ,d psyr nhj vkeP; k ofMykpk ekol HkkÅ gkrk- R; pa uko fuojrhukuk-

fuojrhukukuavkEgh vkyks - d/kh u0garh cGh ukuk gk ekol HkkÅ vkyk; Eg.kmu ckdM dki ya vkthpk l [[kk nhj vklik vktkck ; kmhgh ukukyk] vklikyk tok; yk ckykoya vkepsnkmu fnol Qkjp vkmnkr xsys e/kyk psyrk ukuk cksyk; yk Qkj gqkkj gkrk- d/kh d/kh nknkyk cksyk; yk ter u0gra rh ukuk cksys cki nyk rj cksyk; yk vftckr ter u0gra

vklik vkf.k ofguh uosuojk uojh R; kpadkånpl I xGht.k djhr gkrh-vklikph f'k&; kj ijdrh c?kwu I xGst.k dkånpl djhr gkrs frFks vklikP; k o; kpos pryrekek cjp gkrs 'kkgnekek] I kodjekek] fHkekekek] f'kjekekek] /kkhMhckekek gh I xGh eMGh vklikP; kokjxhryhp gkrh-gsI ožt.k vklik'kh [kmp xIIkk ekjk; ps vklikpauohu yXu >kY; kenGsI okžuk vinj okVk; pa ek>k Fkknjyk HkkÅ vk..kk frFknp vkthtoG jkgkr gkrk-vkbZ vkY; kenGsR; kykgh Qkj vkun >kyk gkrk-

frl &; k fno'kh vkEgh tk.kkj gkrks l kå; kyk dMM a i MY; koj vklik&vktkck] cGhukuk]l klkk vklik l xGht.k xlik ekjr cl ysgkrs e/; p [kjaEgath fo"k; dk<k; yk udks gkrk- ij fttkbZusfrP; k ftehuhpk fo"k; dk<yk-vkthuaek<k dkb/kår tehu] ?kj okVnu feGkos Eg.knu fnok.kh nkok ?kkryk-rksnkok xsys3&4 o"kådkb/kår pkyngnrk- R; kp nk0; kl makh R; k fno'kh ukuk vkf.k vklik vktkck cl Y; kurj fo"k; dk<yk-

vklik vktkck]^^ eh rgyk ftehu nskkj Ugkb2 rh ekÖ; k ck-ph gk; - rgyk yd vl rk rj fnyh vl rh-rq; ki kjhuk eh pkGh dkd.kadjrw rgyk l bkGrw rgyk ekÖ; ktoG j kgk; paul yarj efgU; kyk i kYxh nrw**

 $fttkblvkth]^{n} \ eyk\ rl\ auxa\ eyk\ ek\"{0};\ k\ uo\&;\ kph\ gDdkph\ ftehu\ i\ kfgth-\ ex\ rh\ deh\ vl\ yh\ rjh\ pkyay-\ eyk\ ek\"{0};\ k\ gDdkpaQkfgth\ ekxwu\ Hkhd\ udw\ vu\ r\ fgP;\ k\ ek?kkjh\ eyk\ dksk\ l\ khlkkG.kkj\ **$

 $cGhukuk]^{\wedge} \vee klik] \ rh \ fttk \ Eg.krh; \ rj \vee ki \ l \ kr \ d\#u \ ?; \ k \ dh-dk; \ gjdr \ gk; \ \ rh \ Eg.krh; \ rj \ fryk \ fr \ p; \ k \ uo \&; \ kph \ fu \ Eeh \ ftehu \ ns \ uhkth. k \ fe \ Vok**$

 $vklikvktkck]^{m}gFka; Auekö; k?kjkrrkfgheyknenrk; dk; <math>v^{**}$

 $ukuk]^{n} gsc?kk \lor klik] \lor kEgh r ffgkyk ne \mid k; yk \lor kyks Ugkb? fo"k; fu?kkyk Eg.kwu cksyyw \lor kepk dk; I fc#k gkb%. R; kft ehuhpk <math>\lor$ u \lor kepk \lor **

vklik vktkck]^^r@gh gFka; sÅu fttkyk HkMdkork 0g; \ vkRrkP; k vkrk gFkuapkyra 0gk- ukghrj r@gkyk ek>h i kgja?kj krw /kDdafnÅu gkdyw nsrhy-tkok gFkua xkMh tojk- tkok ek÷; k l eyj fn[kny FkNcnuxk-vkRrkp fu?kk-FkNcnuxk**

fuojrhukuk]^^ gsc?k vklik] jkrP; kyk gh ek.kl ad@atk; kph\ **

cGhukuk]^^ fuojrhukuk] rwdk; dkGth d# ux- \lor kEgh jkrP; kyk gFkua tkrw \lor kEgkyk dk; Hkura[kkr UgkbIr**

fuojrhukuk] /kkMckekek] nRmekek o xkokrhy brj eMGh cGhukukyk Fkkic.; kpk vkxho d#ykxyscGhukek, idk; ykr; kj ulgrk-

rksEg.kkyk]^^ ásavkepk?kjh cykow \vee i eku dyk;] Eg.kw \vee kEgkyk Fkkck; pallgkbl py jsl hlkk tŵ xkMh- \vee krkP; k \vee krk fu?kk; pk; -**

I xGh ek.kI al kaxwykxyh]^^ygku ydjagk; rh] yXu >kysyauohu tkMiagk; -jkrP; k Vk; ekyk tkÅ uxk-igkVayodj tkok- pkikuh u djrk tkok-ij vkrkjkrhpa9&10 oktY; kra rfigh tkÅ uxk-**

 $fuoj rhukuk]^{\wedge} Qkj rj cGh rwpy- vki w eG; kr > ki w k py- gFkargyk Fkkæk; paul sy rj- py eG; kdMatkÅu > ki w i gkVayodj; sÅ- rgyk eh yodj okVaykorw**$

fuoj rhukukpac Ghukukua, sdya ck; k o i k
gʻa?kj h >ksi ys xMh ek.kl ae Gʻ; kr >ksi k; yk xsyh-

i gkVayodj mBwu cGhukukua∨kli kyk xkMh tik; yk l kfixrya i gkVa3-00 ok ∨kEgkyk mBoya ∨kEgh mByw UgkbZ ∨kEgkyk >ki hrp xkMhr usÅu Vkdya l dkGh mtMY; kuarj tkx ∨kyh rj ∨kEgh cSyxkMhr grks

 $eh \lor kblyk \ bpkj \ y \ j^{^{\wedge}} \lor ki \ .k \ ft \ tkbl?; \ k \ ?kjh > ki \ yw \ gr \ ks \lor u \ fg \ dMad \ l \ a \lor kyhk \ **$

vkb]/^ vki .k i gkVayodj fu?kkyw**

eh] ^^dkcjà**

vkb]^^ rpk vkli kvkTtk ukukc#cj HkkMyk Eg.kw **

eh]^^ dk HkkMyk\ **

ukuk]^^, ikiV;k] ybZ pk&d'kk d# ux-xIi cI cjac?kw**

eh ukukP; k Hkhrhuaxli clyw okVsr cyxkMh bpxkoyk Fkkcyh- frFkavkeph vkR; k grh- cSyxkMhruu mrjY; k mrjY; k vkEgkyk cRku vkR; kyk Qkjvkun >kyk- fruarkMikpk; yk i k.kh

fnya pgk dyk- I xG; kuk pgk fnyk- vâkkGhpai k.kh xje >kyagqra I xG; kuk vâkkGhyk xje i k.kh d#u fnya I xG; kP; k vâkkGh >kY; k- I dkGps8&9 oktysgqrs I xG; kph to.ka>kyh vu vkEgh frFkuafu?kkyw vkR; k jkrP; k jkr jkgkok Eg.kw Qkj vkxbo djhr gqrh- i u ukuk jkgk; yk r; kj u0grk-

 $\mbox{$\lor$kEgh I o2t.k xkokdManijkjirij} \mbox{\lorky# ?kMy$yk I xGk oRrkar ukukuanknkyk o ckinyk I klixryk-}$

 $nknk \ Eg.kyk]^{R} \ k \lor klikP; k \lor akkr yb ZukV dagk; rh-[kja Egath cGh] \ r Egh m'khj > kyk rjh btxkoyk e pdke kyk; k; pagra ul yarj dkerhyk e pdke djk; pk- < kcd ckHkl Gxkokyk e pdke djk; pk Ugkb ZR; k \lor klikuafttkckb ph ftehu cGdkoyh gk; - fryk e aklyl; kph ek.kl a Hkjhoj ?kyR; krh- Eg.kuu rh rladjrh; k] <math>\lor$ la \lor klik ugeh fttkckb yk Vke-kaekjr \lor lrw cGh] fttkckb pk \lor u \lor klikpk nkok pkywgkb Zgsryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k \lor klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k V klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k V klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k V klikP; k uknkyk rwykxk; pallgkb Z sryyk e kfgr gra R; k Z sryyk e k

cGhukuk]^^ vkxk! nknk] vki yk ekol HkkÅ fuoj rhukuk frFkagırık Eg.kuu xsyksgırıks fttkckbluaR; kB; k tehuhpk o nk0; kpk fo"k; vkeP; kl ekij dk<k; yk udwgırık- rh fo"k; fttkua dk<Y; ke@avklik [koGyk-**

15 fnol xsys vkf.k vpkud ikfyl vkeP; k nkjkr mHkk- nknkyk tkjkr ikfyl Eg.kkyj^^ foBkck?kgyj cGh?kgyj vkf.k rG'khjke?kgys; kuuk l kgykijiP; k QkStnkjkuacksykoyavkgs**

I xGs?kkcjys nknkua ckinyk o ukukyk ekxP; k nkjkruatk; yk I kūxrya i kfyl kuuk vkr ckyoyao pgki k.kh dya xkM ckynu QkStnkjkuadk ckykoya; kpadkj.k fopkjya

i kfyl Eg.kky]^^ekgkG rky(p); krhy <kcl ckHkGxko; fkhy vkli k xk; dokM; kpk [kw >kyk vkgs Eg.kw pkG/khl kBh l kgckwarfgkyk l kyki ij yk ckyoyavkgš*

nknk Eg.kyk] ^^Fkknck vkepaHkko gkblr dk c?knu; srw**

 $\label{eq:likelihood} \begin{tabular}{ll} $\tt Ikkfyl Eg.kky]^* $ fBd \lor kg] regh rep; k Hkkokauk cksyok- \lor ki.kkyk yodj fu?kkoa ykxsy** \end{tabular}$

i kfyl nknkyk i kyki ji yk ?kåu xys Bk.; kr Qkstnkj kusnknkyk fopkj k; yk i # dya Qkstnkj]^^ r@gpauko foBkck fpek ?kysuk** nknk]^^ 0g;]ek>auko foBkck-** Qkstnkj]^^ r@gpsHkkå r@'khj ke d@agkbir\ ** nknk]^^ rsxkokyk xyyr-m|k; rhy **

QkStnkj]^^ gsc?kk foBkck] <kd ckHkQxko; Fkhy Vklik xk; dokM xsys8&10 fnol xk; c Vkgr-R; k0; k ukrokbölkouh Eg.ktsR; k0; k egykouh ekgkG; Fksrdkj fnyh Vkgsdh] ^foBkck] cGh Vkf.k rQ'khjke; k rhu Hkkokouh tehuhP; k i k; kr VkeP; k oMhykpk [kou dsyk; Vkf.k [kou d#u MM ckMh I ksyki jiyk ckGs; Fkhy j¥osi gyk[kkyh Vkdyh Vkgs VkEgh I xGhdMs'kksk ?kryk i jrqMM ckMh Vtou I ki Myh ukgh-tki; ir MMckMh I ki Mr ukgh-rki; ir rEgkyk VkEgh VVd d#'kdr ukgh-ek= VkEgkyk pk6d'khl kBh rEgkyk rkC; kr ?krk; ra rj x¥; k 15 fnol k[kkyh rEgpk HkkÅ cGh Vu rEgpk egyxk I blkk <kdckHkQxkoyk VkI kyk nenkVhgh dj.; kI kBh xsysgkrs [kja Vkgsdk**

nknk]^^ ukgh I kgc] rsfrFkaxsysu0grs rGtkijko#u n'klu ?ksÅu; srk; srk frFkaFkkcys girs fuojrh xk; dokM gk ek>k ekol HkkÅ gkblo ekö; k Hkkot; ps rs ekgj gk; - fttkckbl xk; dokM gh ekö; k Hkkokph I kl wgk; - f'kok; ekö; k Hkkokpk i kj xk ckckl kc frFkip girk-; srk; srk R; kyk ch cjkcj?; koao fuoRrhukukyk HkVkpaEg.kwu ek>k HkkÅ frFkaxsyk girk- fuojrhukukuaQkj vkxho db; keqGal xGsfrFkanksu fnol Fkkicysgirs HkkM.k oxhjadk; ch >kyaUgk; - cja[kwu >kyk vl rk rj vkep; k 'kstkjph R; kiph ydek.kwl rdMaxsyh vl ra rh ydek.kwl vtwch vkep; k xkohp gkbł vkEgkyk rjkl ns; kl kBh vkf.k dkVkł pkywvl yb; kftehuhp; k nk0; kyk; scGa oGk.k ykxkoaEg.kwu vkli kuagsukVd dsyagk; - R; syk dqkh ekj yaUgkbł rksuDdh; bly- rksQkj l kackM; k gk; - eyk Bkmd gk; - vkEgkyk vkMdkoY; koj fttkckbł?kkc#u dkb/kiryk nkok dk<w/> klyv vl a R; syk okVra **

Okstnkjkuanknkpk toko ?kryk vu nknkyk l klixrył]^^ tj dk MMockWh feGkyh rj vkEgh rEgkyk i dMw tki; ir MMockWh feGr ukgh- rki; ir gh dd fefl ac Eg.kwp dkxnkoj jkfgy**

nknk]^^ ybZmidkj >kyalkgc] vkepk x\lflgk dk; ch uk; - vkEgh [k&; kuaokx.kkjh ek.klagkor-vklikuavkeP; k ekxa>akkV yko.; klkBhoftehu gMi.; klkBhgsdsysyaukVd gk; ** ikfylkuhnknkyk lkMnufnya

urj 2&3 efgU; kurj vklik vktkck R; kB; k xkoh i xV >kyk- vu nknk] ukuk vkf.k cki pok tho HkkBI; kr i Myk- vklikuaemnke rjkl ns; kl kBh gk cgk.kk dsysyk grpk- rksm?kMdhyk

vkyk- i esFkkkM; k fnol krp ftehuhP; k nk0; kpk fudky fttkb1 kj [kk ykxyk- fttkb3yk uo&; kP; k okV.khph 10 , dj ftehu dkykdMnu feGkyh-

 $\label{eq:continuous} $$ rh tehu dI.; kI kBh fttkblvkeP; k cki nyk xG ?kkyr gnrh-cki wEg.kkyk]^^ gsc?kk ekeh] vkEgkyk rhightehu ch uxw vu vkepadqkh nRrd ch 0g.kkj Ugkbl rhigh rh tehu blakukgh rj nokyk nku d#u Vkdk-ij R; k xkokyk vkEgh dokp; skkj Ugkbl eyk R; k < kdckHknGxkopa RokM fn[kmy c?kk; paUgkbl***$

HIKX VIB

1955 P; k fnokGhP; k Vk; ekyk uxjikfyclph fuoM.kwd >kyh- rl aEgVyarj eaxNj; kph gh fuoM.kwd vfr'k; o6'k"B; iwkZBjyh- ifgyh xksV Eg.kts; k fuoM.kwdhP; k vxksj uxjk/; {k gk useyk tkr gkrk- R; keqGs 1945 rs 1955 ; k ngk o"kkir Jhear ckiwl kgc i Vo/kiu gs infl /n uxjk/; {k gkrs 1955 P; k fuoM.kwdhr i fgY; kmk uxjk/; {k gk u userk uxjl odkæ/kwu fuoMyk xsyk-

; k fuoM.kuchr cki w kgc i Vo/kū ; kph i kVhl vkf.k nd jh fojkdkh i kVhl; kps l e l eku uxjl od fuoMwu vkysgkrs Jheir cki w kgckps vfr'k; fo'okl w l od Jh; r foBBy; d wrkM; kuk cki w kgckuch uxjk/; {ki nkl kBh mHksdsys foBBy rkM; kpsfojkdkr nknkl kgc mHksgkrs nkgkkuck l e l eku ersi Myh- fuoM.kud vf/kdk&; kus nkgkki; k ukokp; k nku fpBB; k r; kj db; k o, dk ygku egykyk R; k mpyk; yk l klixry; k-; koxk; koxkus Jh; r foBBy rkM; kii; k ukokph fpBBh mpyyh xsyh- vkf.k foBBy rkM gs uxjk/; {k cuys cgqtu l ektkrhy rs exky; kps i fgys uxjk/; {k gkrs 1955 rs1958 v l srhu o"kirsuxjk/; {k jkfgys

Ekk>sik; okdMp grps vtruljG u0grp-eyk uhV pkyrk; ru0grs, dsfno'kh ckgikGsod; Fks, dfyakk; regkjkt vkyk grpk-rsegkjkt vuod peRdkj d#u nk[kor grpk-rks vkxhuavk[kMk cuor vl so R; k vkxhP; k vk[kMM; ko#u m?kM; k i koykusl gt pkyr tkr vl s

njjkst IkB; kyk rksvkxhu vk[kkMk r; kj djhr vIs njjkst rks8&9 QW vkxhP; k vk[kkM; ko#u gIr gIr pkyr vIs gk iz ks I e# 0gk; P; k vxknj R; kopsf'k"; frFkateys'; k yksdkauk I kar vIr dh] ^^gFkaf'kork f'kor pkyr ukg- bWkG'; k ck; kauh gFkaFkkacauh- R; kauk vkEgh bWarh djrw R; kauh ne#up egkjktkopan'kW ?; koa** eh R; koGh dGrk gmpks eh egkjkt vkxhr pkyr vIrkuk i kgkr gmpks QDr egkjktp vXuhrua pkyk; pa/kkMI djhr gmpk-ckdhP; ki kGh dqkhgh vkxhojua pkyk; pa/kkMI djhr u0grs

dkl kvkth eyk r
Fka?kvÅu xsyh vkf.k r FkaegkjktkP; k i k; koj eyk MkcdaVcdok; yk l
 kfxrya eh egkjktkP; k i k; koj MkcdaVcdoya

egkjkt Eg.ky3^^ cksyk vkb1 i kjkl kBh dk; ekx.kagk; **

egkjkt Eg.kky $\]^{\}$ vkb $\]$ vkeP; kcjkcj 100&200 ek.kl agkb $\]^{\}$ R; kuk njjkst 4 i k; Y; k Tokjh $\]$ pV.kh $\]$ ehB $\]$ bi $\]$ MkG ykxrs r $\[$ r $\]$ qf fnol kpk t $\[$ s.kkpk $\]$ xGk $\]$ jkatkek $\]$ k- Egath ák i kýkpai k; cjaq $\]$; kyaEg.ku eh vk'khok $\]$ fnr $\]$

 $\begin{tabular}{ll} $$ $$ vkpk ck-ckiwEg.kyk]^* vkDdk] ek>kvIY; kxksVhoj blokI Ugkbl rok rwdk; $$ vIyad#uxa-ek>aek>aikjxarFkua?ks^Au; h-** \end{tabular}$

 $\label{eq:ckij} $$ ckij^^ \lor kDdk] $$ eh R; k egkjktkdMa; skkj UgkbZ\lor kf.k R; kyk pkj ik; Y; k Tokjh nskkj UgkbZ^* $$$

vkthyk Hk; odjjkx vkyk- vkth egkjktkodMavkyh o Eg.kyh]^egkjkt; kikjkpk ck ybłOnkM gk; - dokp dk; nonoj'khi.k c?kr Ugkbł jkgw|k-R; kP; kikjkyk vl p yakMa ãB; k vk; ck-yk ikjkcnny dk; p okVr Ugkbł rj vkEgh dk; djk; pàk**

vktheykjkxajkxa?kjkdMaf?kÅuvkyh-

n() &; k fno'kh vkepk ck- eyk <oGI dj ofdykdMa?ksÅu xsyk- rsvkeP; k ?kjkP; k toGp i fydMP; k xYyhr j kgkr girs

<oGldj ofdy Eg.ky}^^ dk; r@'khjke dk; dke dk<ya\ dk vkykl \ **
cki wEg.kkyk]^^ r@gph /ke&koo okVP; k 'krkph [kkrh | k; ph gk; Eg.kou letyaEg.kou
vkyv**</pre>

of dy Eg.kky $\S^{^*}$ gks | k; ph \lor kgs d \mathfrak{p} <; kyk $\S^{^*}$ ks **

cki ij\^ gsc?kk ofdy l kgc] \lor kEgh l k \rlap{B} ; kyk \lor kepk Hkk \r{A} \lor ku \lor kEgh ; \r{r} w rok \lor ki .k cksykpkyh d $\#^{**}$

ofdy Eg.kky]^^ fBd vkgs; k-r@p; k FkkjY; k Hkkokyk ?ks^u**

eh cki posgkr /k#u yaxMr yaxMr QxMaQxMapkyr grpks eyk cf?krY; koj ofdy Eq.kky]^^ rrG^khjke qsi kj xadqkkpà. **

cki i)/^ ek>pa/kkdValokW gk; **

ofdy]^^; kyk pkyrk; \$\mu \underset \underset \tag{**}

ofMy]^^ ghikjxatYetkrpikaxGagk;-áß;kik;kojlkykiyjykbyktdy;kiklua FkkMaFkkMaVkcnrvkcnrdqkkpkrjhvk/kkjf?kÅupkyra-R;kfyaxk;rykckB;keBkr,degkjktvkyk;rksvkxhuvk[kkM;kruapkyrvkEg.kwllxGxkoc?kk;ykykyya-vkephvk;chikjkykegkjktkdMaf?kÅuxyhgrh-egkjktápaik;uhVdjrvEg.kyk;ijek>kvlY;kxksVhojbZoklUgkbŽ*

ofdy]^^ rG'khjke] rwvkMk.kh vlwvlY; k xksVhoj fo'okl Bør ukgh-; kcnny eyk ropsdkord okVrs rop; k?kgydaiuhr valkJ/nk u eku.kkjk rw, dVkp vkgsl-gsek0; k dkukoj vkysvkgs noj jh xksV rksegkjkt vXuh vk[kkM; krw m?kM; k i koykuapkyrks gk dkghgh peRdkj ukgh-lk; Ul vlal karadh] ^20 l dmki{kk deh oG i k; vkXuhr ?kkrysrj vftckr Hkktr ukghr fdøk i k; kyk i kGr ukgh-gk egkjkt n{khy 20 l dmki{kk tkLr oG i k; vXuhr Bør ul yk i kfgts R; keGsR; k egkjktky i kGr ukgh-rw; k egkjktkP; k uknh ukgh ykxyk rscja>kyå*

, d fn'kh eh xYyhr i kax(GxkMk f?kÅu pkyr gyrw ek>ao; 1 k/kkj.k 5&6 o"kkpav1 ayeyk vkBora - ek>k Fkkjyk pyr HkkÅ] 1 klkl] ekÖ; ktoG vkyk-R; kyk eh vkli k Eg.kk; pks vkli k ch i Vdk] /kkrj ?kkyk; pk-R; kpaf'k&; kj pkaxyacGdV gyra R; kseyk QxMaQxMaEg.kw fpMok; pk-

R; kseyk Eg.kyk]^^, QxM; k! \vee I afdrh fnI i kax(GxkMk f?kAu pkyk; p] ja tjk xkMk I kMu I kfrk pky dhj<math>a enkz c?kwr ϕ k xkMk-**

Eg. kuu R; kua xkMk ekö; kdMua fgl dkonu ?kryk \vee u 'kstkjP; k y{ke.k jk; ckuP; k ekGonkoj Qxdnu fnyk- ekö; k Qt/lai'u fuekl/k >kyk \vee krk eh dl k pky.kkj \setminus 'ksoVh eh rl kp \vee kcnr \vee kbidMaxsyks

 \lor u \lor kbłyk Eg.kyłj^ $^{\lor}$ k; ł \lor k; ! \lor kli kuaek>k \times klli k ek $^{\circ}$; k ek $^{\circ}$ 6 vkli k ek $^{\circ}$ 6; k Egk \times ke $^{\circ}$ 8 vkykp-

 $\verb|VkbUab||pkjy||^* | dkjal | blkk||ydjkpk|| xkMk|| dk | Egilu|| ekGonkoj | fQdilu|| fnyk**$

 $\label{link} $$I$ $$ I $$I$ $$ I$ $$K^* \vee xadkd $$I$ $$ayk i kax $GxkM;$ kpk $\lor k/kkj$ f?k Au pkyk; ph $Io;$ ykxyh rj $R;$ $$I$ $$K^* \vee xxirh dok pkyk;$ pk $$Eg. kuu eh xkMk ek Gonkoj Vkdyk;$ - dk<uu fnrw Fkkuc-**$$

ij R; k ekGonkoj tk; yk ik; &; kp u0gR; k-R; kekGarksxkMk dkgh fnol frFkpaiMykeh jkst gGwgGwvkcnr&vkcnr vaxirh pkyk; yk f'kdyw vklikuaekÖ; kil uaxkMkafgl dkow ?kryk Egwku cja>kya dkj.k eh FkkM; kp fnl kr xkM; kfcxj pkyk; yk f'kdyw

OlijagGwgGwpkyk; yk ch ykxY; kuarj eyk ; xkr pkyrk ; Å ykxya Eg.kw fttkbla vkuavkbla, d yk[kmlh /kkoi VVhpapDdkj fnya rh pDdkj i ka
dy.; kl kBh , dk rkjpk vkdMk d#u fnyk- rh rkjpkavkdMk ckjD; k dkBhyk ckikwu fnyk- eh rh dkBh ?ksÅu yk[kmlh /kkoi VVhpa pDdkj i kai ka
dyhr grwgGwgGwrspDdkj eh ; xkr <dywykxyw

 $eh \ 6\&7 \ o''klipk > kY; \ kojch \ rh \ pDdkj \ i \ Gowykxyw \ \lor kf.k \ R; \ k \ pdker Gaeh \ gG gG wpkyw \ ch ykxyw \ \lor ku-i \ Gwch ykxyw \ eh \ i kaxGk \ grijQxxMk \ griyQxxMk \ griyQxxMk \ griyQxxMk \ griyQxxMk \ griyQxxMk \ griyQxxMk \ gri$

ykod eyk ^QxMå Eg.kk; ps.cm >kys vu vkrk ykodaeyk ^ikiV; k* Eg.kwykxys fttkbZuaek>auko ikG.; kr ^ukjk; .k* fBoyagma vkbZekrmi ikiVpaEg.kk; ph- ek>k Fkkjyk HkkÅ vk..kkekrmi eyk ^ikiV; k*] ^QxM; k*]^yaxM; k*] ^ikaxG; k* Eg.kmup gkdk ekjk; pk- eyk R; ks d/kh uhV ckyk; pkp UgkbZ ekö; k ikBhoj , d cfg.k gmh- frpauko ik# gma vk..kk Egath ckckl kc eyk vu-ik#yk I kj [kk I kj [kk ik.; kr c?kk; pk- ?kjh [kk; yk vk.kyarjhch R; ks , dVkp [kk; pk- eyk vu ik#yk d/khch | k; pk UgkbZ vk; ch ekö; k ijkl R; kpkp ykM ybZdjk; ph- dkj.k R; ks ekö; k ijkl /kVVkdVVk gmk- 'krhyk /kVVkdVVk ek.kl kph xjt gmh- R; ke@ai@atkÅu f'krhr dkckM d"V djk; yk ek>k mix gqkkj u@grk-

, dnk dk; >kyavkbipao cki poafdjdkG HkkM.k >kya vku vkbl ckckl kc vkufttkà eyk vkf.k i k#yk l Muu dkerh; k xkoh #l w xyh-tk; P; k vxmj vkbleyk Eg.kyh] ^i ki V rw vuik#cki N; k Hkkdjh f?kÅu xkomjhr tkok-**

eh vku i k# xkomjh xsyks roj vkbijvkth vu ckckl kc xkokyk fu?kw xsys eyk dGyarok eh y; jMyw dkl kvkDdk Eg. kyhj^^xli ckckj rq; kvkbipadkGht y; ?kV nxMkokuh qk; - ygku ysdjkwk l kMw ekB; k ysdjkyk c#cj f?kÅu xsyh; k-**

 $\label{eq:likelihood} \begin{picture}(200,0) \put(0,0){$\mathbb{Z}_{k}(k) = 0$} \pu$

 $\begin{tabular}{ll} $$ \sqrt{Ddk}^*frph \begin{tabular}{ll} $$ rok rh. & $$ \sqrt{kDdk}^*frph \begin{tabular}{ll} $$ rok rh. & $$ kY; krh] frpk jkx dok FkM glpJy rok rh. & $$ is $$ rok rh. & $$ rok$

 $\lor \texttt{kEgh}\,\texttt{Eg.ky} \textbf{i} \texttt{J}^{\land} \lor \texttt{kDdk} \texttt{J} \lor \texttt{kEgkyk}\,\texttt{y}; \; \textbf{Hknd}\,\, \texttt{ykxyh}; \; \texttt{k}^{\star\star}$

Eg. kw dkl kvkDdkuaHkkdjhpk tkM nkeVk cuow fnyk- R; ks[kkYyk vku vkeh R; k fn′kh >ki yw

n() &; k fn'kh \lor kDdk cki nyk Eg.kyh]^^r(G'khjke rq; kck; dnyk f?kÅu; h ckck- gh nku ydjay; ; M; kokuh djrr- \lor kb \overline{t} 'kok; jkgkr ukghr**

cki wEg.kyk]^^Ekh dk; f?kÅu; rUgk; fruadok eukua ydjkph Ek; k v'khy rj; hy**
Ekh xkomjh tk; kpks frFkuajkst I kyki ji okVyk c?kk; pks R; koGh, I Vh cI uûgrh, [kknh Hkkxorph blituxkMh; k; ph-, dknh blitu xkMh vkyh dh eyk okVk; pa; kr ek>h vkbZ uDdh vkyh vI ay- Ekh i Gr i Gr nkekth pkldkr tk; kpks ij vkbZR; k xkMhr fnI k; ph Ukkgheyk y; okbW okVk; pa Ekh jMk; pks dkI kvkTthpk nkeVk [kkÅu [kkÅu eyk y; dVkG vkyk grk-f'kok; dkI kvkth feuhVkfeuhVyk ri dhj oMk; ph]vku R; k rifdjhpk okI R; k nkeV; kyk

ykxk; pk- eyk R; ksnkeVk [kkÅ okVk; pk Ukkgh- vkbZ?kjh u I Y; keGaEkh ?kjkr d/kh Fkkck; pksUkkgh- ckghj i kjkr [kGkyk tk; kpks o i kjkr ch [kGkyk eu ykxkpaUkkgh-

 $\label{eq:ckin} \text{ckin}; \ k \ \text{eukr} \ \ \ \text{vkeP}; \ k \ \text{cnny} \ [\text{kii} \ \text{ek}; \ k \lor l \ k; \ ph-ij \ \text{ckii} \ \ \ \ \text{vkeph ek}; \ k \ \text{m?kM} \ \text{m?kM} \ \text{m?kM} \ \text{d/kh}$ $\ \text{djk}; \ pk \ \text{Ukkgh-fl} \ \ \text{upkyk} \ \ \text{tk} \ \text{EgVyarj i} \ \text{s} \ \text{afeGru} \ \text{ugra} \ \ \ \ \text{vkuikgh-fl} \ \ \text{upkyk} \ \ \text{tk} \ \ \text{EgVyarj i} \ \text{s} \ \text{afeGru} \ \text{ugra} \ \ \ \ \text{vkuikgh-fl} \ \ \text{upkyk} \ \ \text{koj iMyw}$ $\ \text{gnw}$

, d fn'kh nkjkr dkl k \vee kDdk]nknk]ukuk] \vee kli k cjhp ek.kl acl yh grh- R; kph ppkZpkyw qrh- \vee u eh , dr qrw

dkl kvkDdk Eg.kyh]^^vkjar@'khjke] rwtk-vu ck; dnyk f?kÅu; h ckck-**

cki wEg.kyk]^^Ekh tkr Ugk; fruadok; k; parok; Å nh**

ukuk Eg.kyk]^^dkI k vkDdk] nohyk rj bpkj nkjdk d/kh; hy Eg.ku **

 $\label{eq:continuity} dkl kvkDdkualMkGa>kdyadk; rj rkMkrY; k rkMkr i Vi Vyh vu vpkud vkDdk ?kmew ykxyh-^^vga· vga·---**$

vkDdkP; k vakkr rødkbZvkyhgøfh-

 $nknk Eg.kyk]^{^c} cksyk \lor kb]dk \lor kykr \lor kt \lor keP; k x j hckP; k ?kj h**$

nknk Eg.kyk]^^ex vkEgh dk; djkoaEg.krh**

vkDclk]^^ gh yaxMaikjixaikiV; k] nnokyk ok?; k Eg.kuu IkMY; kfcxj r(G'khjkeP; k I al kjkph?kMh uhV cl kph Ugk;] gh ikjixatYekyk vkY; kikl uaR; kP; k I al kjkph?kMh ikj b I dVyh gk; - rok ák yaxM; kyk vkrkP; k vkRrk [kMnckyk ok?; k Eg.kuu IkMk-**

 $nknk\ cki\ nyk\ Eg.kyk]^noh\ ck;\ Eg.krh;\ k\ rh\ ,\ clrv\ uk\ \'ak\ yakM;\ k\ i\ kj\ kyk\ ok?;\ kEg.kuu \ [kMnckyk\ I\ kMk\ Eg.krh;\ k\ noh]ro-k\ bpkj\ clk;\ gk;\ \ ^**$

 $\label{eq:ckiwEg.kyk} $$ ckiwEg.kyk]^{ek}=ikjxayaxMavIyavku vkakGavIyajrjhch Ekh R; kyk day; knokyk IkM.kki Uqk; ** $$ nokyk IkM.kki Uqk; ** $$$

vkDdk Eg.kytj^^ rG'ktjke] ghikjxaik; kuavknwvkdke gk;] ásyk 'krkryadke gq kpallgk;] rok ápaikW gwadlaHkjk; paápayxhuch Ogkpallgk; - ex ekBa>kY; koj ásyk dqkh I blkkGkpj rok ásyk nokyk ok?; k Eg.kw I kM Egath no ásyk vki nvki p I blkkGrw **

 $\label{eq:ckiwEg.kyk]^^vkDdk] ek>aikgixaeh mik'kh e# |k; pk Ugk;] asyk , [kknackj dq a npku&fcdku dk<u fnrw**$

 $nknk \ Eg.kyk]^{ ^{ }} \ \lor kb] \ gsi \ kj \ xaf' \ k\{kk.k \ f' \ kdhy \ dk \backslash ^{**}$

 $\$ vkDdk Eg.kyh]^^ $\$ aa- $\$ ga- $\$ gh i kj xadk; ch 'kkGk f'kdk; pallgk;] $\$ vkcnr $\$ vkcnr $\$ vl paejk; pa ásyk dk; p dke tek; pallgk; **

ukuk Eg.kyk]^^npk] ek>kfdI unp I kGkf'kdy dk**

vkDdk Eg.kyh]^^vaa—vaa—fd I unok y; 'kkGk f'kdhy**

r(G'khjke Eg.kyk]^^vkjacGh] ryvk dk; ; kM&fcM ykxy; dk; \ I kbj; kI kj [; k ydjkyk nokyk I kM Eg.krv k] ryvk dk; dGr; dk\ rq; k rq; k ydjkparqc?k] ekö; k ydjkpa ek>h eh c?krv*

nknk Eg.kyk]^^ \vee kjarG'khjke mxP; k mxaR; k cGhoj dk [koGrul \R; wadk; R; kP; k eukual kar; 0g;]no Eg.krw Eg.kw I kar; **

rG'khjke Eg.kyk]^^nøkP; k vkblyk ykoyk----**

cki wj kxkuackohj xsyk-

 $nknk \; Eg.kyk]^{nok} \; R; \; k \; rG' kkP; \; korhusekOh \; ekxrw \; rksek>k / kkdVk \; Hkko \; gk; \; - \; rj \; dVh \; gk; \;] \; R; \; kpadk; \; eukoj \; f?kÅ \; udk-**$

 $\begin{tabular}{ll} $$ $$ \begin{tabular}{ll} $$ $$ \begin{tabular}{ll} $$ $$ \begin{t$

 $ukuk \ Eg.kyk]^{nknk} \ \lor I \ ad\#; \ k \ dk \ rG' k k \ ák \ yakM; \ kyk \ nokyk \ I \ kMr \ uI \ yarj \ \lor ki \ uu \ nokyk \ I \ kakw k \ dk \ I \ Mr uEg.kuu **$

 $nknk \ Eg.kyk]^{\ }uxwuxwrl \ and \ \&; \ kpafyd\# \ R; \ kP; \ k \ ijokuxhf' kok; \ nokyk \ l \ kM.kapqdhpa \ qk; **$

 $brD; kr ?kjkr dqkhrjh ukx fu?kkY; kpacf?krya ?kjkr ukx vkyk gqrk- e/kyh dkdw^ukx! Ukx!* Eg.kw oj Mr gqrh- dqkkyk dqai Gkoadk; p dGuk\$

ukuk o\$rkxwu Eg.kyk]^^vkxaHkoku3] d\Baukx fu?kkyk; I kav'khy dk Ugk; **

e/kyh dkdwEg.kyh]^^R; ksc?kk] frFkaUgk.khr ukx gk; **

nknkjukuk I xGh i kjaUgk.khdMaiGkyh-rj [k#[kjp Ugk.khr ukx QMh dk<www.mHkk.gmgk-?kjkrykxyxk,chwxYyhryh ykdach i Gr vkyh-?kjkr,dp xnhZ>kyh gmh- ukxkyk ekj.;kl kBh dksk Eg.krgmaykdM vk.kk] dksk Eg.krgmaykdM vk.kk] dksk Eg.krgmaj ukxyk ekjk;paul ra] tlk vkyk;rlkR;kykR;kP;k okVuatkÅ [k] R;kyk ek# uxk-;klxG;k xkdkGkr vkeP;k vkDdkP;k vakr vkysyk nodkeU;k i Gw xsyk- vkDdk ukxkyk y; ?kkcjr vlY;kenGadok ek; ckghj i Gw xsy;kpadkkykpdGyaUgk;-

dksk rj Eg.ky $\$ ^^ vkjafrdMadkl kvkDdkP; k vækr no vkyk;] R; knokyk bpk#; k-gh ukx dkskR; k nokpk gk; \ vku fgFka?kj kr dk cj avkyk; **

I xGh ek.kl a nokyk bpkjkoaEg.kw vkDdk ftFkacl yh grh R; k fBdk.kkdMaxsyh-ij frFkavkDdk tkxojp u0grh-vkDdk ?kkc#u ?kjkruadok i Gw fxyh gh dqkkykp ekfgr u0gra vækr no vkysyk vl rkuk l k6rkpk tho okpo.; kl kBh Egkrkjh ckgġ i Gw fxyh grh- {k.kki ohl vækr; sÅu i ki V; kyk nokyk l kMk; pk grþæ nr grh] vku ukx fu?kky; koj nokyk l kMk; pk bþkj v/; kbjp l kMw i Gw fxyh grh- [kjarj vkeP; k ?kjkr ukx vkyk Eg.kwp eyk nokyk l kMk; pk bpkj frFkp ckjxGyk- ukgh rj ukx fu?kkyk ul rk] rj dnkfpr l xG; kwh ekö; k ck- oj ncko vk.kw eyk nokyk l kMyavl ra Ekh vákJ/noj bł okl fBor u0grw ij tok tok Ekh l adVkr grw rok rok eyk ukx enrhyk /kkÅu; r grk-gk dk; ; kxk; kx grk dk dk; gseyk l etr u0gra

 $eyk \ nokyk \ I \ kMk; ph \ ckreh \ ckHkGxkoyk \ vkthyk o \ vkbJyk \ dGyh \ vkth o \ vkbJ \\ rkcMrkc extM; kyk vkyh-$

rok ukuk Eg.kyk]^fttkckb] rfigh uûgrk rok vkDckP; k vækr vkyagr] vku vækr vkyY; k nokual klixryai ki V; kyk nokyk ok?; k Eg.kw l klik**

 $fttkbZEg.kyh]^{ek\"0}; k ukrokyk Ekh nokyk <math>\checkmark ftckr \ l \ kMwnskkj \ Ugk; - d'kki k; \ ek\"0; k ukrokyk r figh nokyk l \ kMrko<math>\ ^{**}$

nknk Eg.kyk]^fttk] gh i kj xayaxMagk;] áph dk; p mi x 'krhP; k dkekyk ûgk; pk lgk;] R; paR; syk I (nd txrk ; k; pallgk;] R; k i j kl ásyk nokyk I kMysyacja \vee I a \vee kEgkyk I xG; kyk ok \forall r; **

 $ek>h\ fttkbZgh\ okjdjh\ i\ Fkkph\ grph-rh\ foBBykph\ fuLl\ he\ HkDr\ grph-fruapkjk/kke; k=k\ i\ gh\ dynyh\ grph-frpk\ valkJ/npj\ vftckr\ bZokl\ u0grk-ygkui.kh\ Ekh\ pkj\ i\ kp\ efgU; kpk\ vl\ rkuk\ frual\ xG-; kP; k\ bjk/kkyk\ rkM \ fnÅu\ eyk\ nok[kkU; kr\ unyao\ ek>aokdMaik;\ ljG\ dj.; kph [kViV\ dnyh-'kpVphiVVh\ prplyh\ Eg.kwu\ eh\ FkkMMk\ FkkMk okdMapkyr\ grpw$

'koVh vkbilfttkbi vu ckiw; kil; k bj kilke Ga eyk nokyk i kil.; kpk cr ckj x Gykdki kvkDdk i tilgk i tilgk vakr; såu i kak; phj ásyk nokyk i kilki ji ek > s vkā offly dki kvkDdkpavftckr, drugrwroki ki ua dki kvkDdkp; k tok tok vakr; k; parok rok eh niji i Guu tk; kpks dki kvkDdkp; k i koyhykch mHkk j kgk; kpksUkkgh-vakr vky; koj dki kvkDdk rkilkyk; hy rh i kak; ph-ij vkepk dki kvkDdkp; k vakry; k nokoj vftckr bi oki ugrkvkepk cki wd/khp dlipy; k nokp; k t=ayk tk; pk Ukkgh; kvakry; k nokyk dkocMi cdjadki k; pk Ukkgh-vockbilyk fuon&ukj Gdjk; yk tk; kpk Ukkgh-ekriji a; jhp; k i kilijakoj R; kpk Hkyrkp bi oki grk-R; ksd/kh i a; jhph okjh podok; pk Ugkbi Fkkild); kr rks valkJ/nk tjh ekur ul yk rjh ofj "B nokuk ekur grk- ofj "B no Eg.ktsjke]d".kjfo".kijfo".kijf kodj]i a; jhpk folkkck bR; knh-

Hlkx uÅ

eh tkLrhr tkLr dkG vkthdMa vktkG ckHkGxkoyk vu vkthP; k ekgjh I qkbP; k xkoh jkgkr gqrw vkthykgh dksk u0gra vual qkbBykch dksk u0gra I qkbZgh vkthph pgyrh gqrhrhch vkthI kj [khp fo/kok gqrh] frykch fyd#ckGau0gra R; keGaek>k ckyi .kkpk cgqrkakh dkG; k nku vkT; kdMp xsyk gqrk- ek>h /kkdyh eko'kh vu-pkaxnodkdk I ksykijyyk jkgkr gqrs pkaxnodkdk ujfI ax fxjth feye/; sdkekyk gqrs I ksykijykr rsvkejkbir jkgkr gqrs d/kh d/kh eh vkthcjkcj I ksykijyykch tk; pks

VkthP; k xkokojua pkyr pkyr eMlokMh fjyoh Vskuyk i kp&I gk fd-eh pkyr tk; pks o rFkual kyki jiyk fjyohuatk; pks eMlokMh Vskuoj i Watj Fkkor goph-vkthojkoj nku rhu rkl vxojp eMlokMh Vskuyk tk; pks R; k Vskuoj p<.kkjsvkf.k mrj.kkjsijok′kh ybZdeh gops ij nvík f?kÅu tk.kkjkph vu~; skkjkph xnhZ ek; mkG vI k; ph-eMlokMh xkokP; k vkl i kl I k; dyoj dbMke/kuu nvíkokysnvík vk.kk; ps rsnvík fjyohual kyki jiyk U; k; ps frFkagkVsykr nvík ?kkyuu ijr xkokdMa fjdkeh dbMa f?kÅu ; k; ps R; koph Vskuoj xnhZ c?knu y; etk okVk; ph- fjyohr cl Y; kojch y; etk okVk; ph-

 $eko'khph\ , d\ eyxh\ ekö;\ kp\ o;\ kph\ gyrh\ frpauko\ bey\ gyra\ rh\ vu-eh\ , d\ exdkakph\ ybZHkkMk;\ pks\ vkejkbP;\ k\ Hkorkypk\ ifjlj\ fgjokxkj\ gyrk]\ eko'khpa?kj\ l\ k/kpp\ gyra\ i=;\ kP;\ k\ nksu\ [kkY;\ k]\ QMaekcdGh\ tkxk\ vu-R;\ R;\ k\ iskajLrk-jLR;\ kP;\ k\ ifydMaik.;\ kpk\ okgrk\ nMn&dMukkMy\ gyrk-eko'khP;\ k\ nkjkr\ fujxMhpa>kM\ ybZgyrh-R;\ k\ >kMkP;\ k\ ikukyk\ ,\ d\ ijdkjpk\ ;\ sxGkp\ okl\ ;\ r\ gyrk-dyrMhua vMh\ ?kkryh]\ vu-dxpMh\ [kMnd\ cuyh\ dh]\ 20&25\ vM;\ koj\ [kMnd\ dkxcMhyk\ c'khoya\ tk;\ kpa\ R;\ koGh\ ;\ k\ fujxMhpk\ ikyk\ dxpMhP;\ k\ vM;\ k[kkyh\ eko'kh\ ?kkyk;\ ph-fujxMhpk\ nfjk\ mixch\ gyrk-R;\ k\ >kMkP;\ k\ Qkxdk\ dkdkMh\ ykxd\ dk-hr\ vl\ r-R;\ k\ Qkxdkil\ uaygku\ ygku\ cb/V;\ k\ ekB;\ k\ syk]\ duxh]\ ngiM;\ k]\ l\ ijM;\ k\ cufo.;\ kpadke\ dkdkMh\ ykxdadjk;\ ps$

ekoʻkhP; k?kjh nkGhpaoj ku vku Hkkr [kk; kyk feGkpk-I dkGh ngk oktrk dkdkyk Mck ns; kI kBh eh vu-vkth vkej kbruauj fl ax fxj th feydMatk; kpks ej hvkbZpkkdkruai «axsyadh fjyohpk i ny ykxk; pk-R; k i nyko#u [kkyh fjyoh tkrkuk c?kk; yk y; etk okVk; ph-R; k i nykP; k i fydMaxsyadh] uj fl ax fxj th feyP; k nkj kr i kpk; pks c#cj ngk oktrk tok; kph I nyVh 0gk; ph-feypk ckok oktyk dh xsvoj Mca?ks; kI kBh dkexkj kph, dp > npM mMk; ph-I xGh dkexkj [kkdh v/; kZpMMhrysfnI k; ps d/kh d/kh Mck | kyk xsvP; k vkr ch vkEgh tk; kpks vkr ekrnji okQpk ybb vkokt; kpk- vkr okrkoj kuch ybb neV vI k; pa vkreakh ftdMafrdMank&; kP; k ckc.kh] dki I kpaxBBa dki ni Mysyk fnI k; pk-, dnk eh fxj.ktP; k vkr dkdk c#cj fe'khu c?kkyk xsyks

rj , dk , dk fe'kuhoj gtkjksnkk; kP; k ckc.kh fQjr gk; k- \vee kokt ekruj brdk ; k; pk dh dksk dqkkyk dk; cksyra rs \vee ftckr , dp ; k; palkgh-

ckHkuGxkokr vkthpk eGk xkokikl uatoGp gmrk-vkthpk, d I xG; k Hkkodhr okMk gmrk-R; k okM; kr vkthyk vkr nku [k.k vu ckghj i Mohr nku [k.k vu I ekj dk; ekdGh tkxk okVu vkysyh gmrh-R; k okM; kr vkthP; k rhu&pkj fnjkph fcjkMajkgkr gmrh-gh okMk bBBy&#fDe.kh npGkyk ykxwp gmrk-xkokP; k mRrjsyk Egk#rhpansÅG gmra R; k npGkyk ykxwp nxMh rkfye gmrh-R; k rkyehoj i=agmra rkfye o npGkP; k i kraekBaiVkax.k gmra npGkP; k Egkxa ybZekBh ckjo gmrh-; k ckjoyk ckj geskk ybZik.kh gmra; k ckjoP; k rGkyk i orkuk dqkhp i kpr u0gra ij xkokryk, d xkl k0; kpk ek.ku ckjoP; k i k.; kr c\nu rGkpk xkG vk.khr gmrk-

vkthP; k okM; kP; k i &a, d cke.kkpk okMk grpk- vku ; k cke.kkP; k okM; kP; k i fydMa nku pryr vktkckuh uohu okMackalkyagrpa

, dsfno'kh vkEgh eG; kr cl ywgqrwdkgh dk0; driffuGk i k5kk[k?kkywuelphokMhfjyoh Vskuyk pkyysgqrs rstkrk tkrk vkeP; k vkT; kP; k eG; kr i k.kh l; kyk FkkMk oG Fkkcys R; k oGayk ek>k pyr vktwck vkck R; byk Eg.kyk]^^r@gh d\@apkyyko vku d\@wuvkyko**

rs dk0; ZirłEg.kył^^vkEgh eebłyk ckckl kgckP; k 'koVP; k n'klukl kBh pkyywgkmrurprp R; kpaegkfuoklk >ky; a**

vkck Eg.kyk]^^rephfrfdVafcfdVa**

vkck Eg.kyk]^^vu gsfuGsi ks kk[k dok f'koys**

rsEg.ky3^^ dky vkEgkyk e0gGr vkeP; k eki kpsi k\$ kk[k fEkGky\$*

 $\begin{tabular}{ll} $$ \sqrt{kck} ^^* eebbjua; rkuk $eG_7^* kr ; k$] $$ \sqrt{ku} $ ckckl $ kgckP; k 'koVP; k n'klukph ekfgrh $$ \sqrt{kEgkyk} | k-** $$ $$$

rsEg.ky]^^t#j; **r**ko-**

rsxys eh \lor kckyk bpkjya^gh ckckl kgc dksk gkbr \lor kal \lor kckl**

roki kl uaeků; k eukr ckckl kgc vkcMdjcnny ekfgrh feGfo.; kpadrgy fuekžk >kya eh Bjoya vki.k xkoh x¥; kurj Kkukck x#thdMu ybł ekfgrh ckckl kgckcnny feGok; ph-ckHkGxkokr pQgk.k x#th grs rsvkeP; k dkdkP; k QMkrY; k eG; kr dok dok; åu vkthcjkcj xli k ekj k; ps vkeP; k vkthyk j kek; .k&egkHkkj rkcnny cjhp ekfgrh grh-dkj.k rh dBajkek; .k ykxyadh ge[kkl , sdkyk tk; kph-c&; kp oGk ckHkGxkokr ek#rhP; k npGkr nku nku efguaj kek; .k ykxk; pa R; koGh eh vkthcj kcj j kek; .k , sdkyk tk; kpks rsjkek; .k l kækpa dke pQgk.k x#thdjk; psjkek; .kke/kY; k x4Vh eyk , sdkyk ybłXokM XokM okVk; P; k-

eh pûgk.k x#thyk fopkjy}^^x#th] gh ckckl kgc vkcMdj dksk gf] vk3**

pûgk.k ekLrj]^^vkjackck! rsgjhtukpsno g\$r-ifgY; k t\|j; k dkGkr ckeu\] ejkBh ykxd] gjhtukyk ybZokbW okx.kxd |k; ps ckckl kgckuarh pky ekMhr dk<yh-ckckl kgc ybZ f'kdysysg\r**

eyk chokVk; pa vki ruch ckckl kgrckl kj [kaybZf' kdkoa

fttkbZdk; fnl ckHknGxkoyk]dk; fnl frP; k ekgjhlokbdM] dk; fnl lkykijyk] dkgh fnl eaxM; kyk jkgk; kph-ehgh frP; k c#cj dok dok fQjk; pks dok dok frP; k c#cj lokbP; k xkoh tk; kpkslokb>k ybZykM djk; ph-vkf.k Eg.kw ehlokbP; k xkoh ybZjek; pks

I ϕ kbP; k xkoh y; djek; pa \vee krk n ϕ ja, d dkj.k g ϕ a rh Eg.kts I ϕ kbP; k 'kstkjh okM; kr, d \wedge vk'kk* ukokph I ϕ j fookfgr r#.khjkgkr g ϕ h- frpa d ϕ 0 'krdjhp g ϕ 0 g ϕ 1 ektkph g ϕ 1. I ektkph g ϕ 2. I ektkph g ϕ 3. I ektkph g ϕ 4. I ektkph g ϕ 6. I ektkph g ϕ 8. I ektkph g ϕ 9. I ekBag ϕ 9. I ektkph ϕ 9. I ekBag ϕ 9. I ekBag ϕ 9. I ekBag ϕ 9. I ekBag ϕ 9. I ektkph ϕ 9. I ektkph ϕ 9. I ektkph ϕ 9. I ekBag ϕ 9. I ektkph ekag ϕ 9. I ekBag ϕ 9. I ekB

eh ch ygku i .kki l uaxkji k xpVk] \vee akkuaxkMkG gpks i ki Vk l kj [kaxkM xkM cksyk; pks R; kpepGa eyk ykda ^i ksi V*]^i ksi V* Eg.kk; ps \vee kf.k ekÖ; k cksy.; kepGa eh \vee k' kkyk Qkj \vee koMk; pks rh ek>k Qkj ykM dj k; ph-dok dok eyk nulkkoj ph l k; ppFu \vee k.kuu | k; ph-dok dok gkrkyk /k#u xkokr fQj k; yk U; k; ph-

 $\begin{tabular}{ll} $$ $ \end{tabular} $$$ $ \end{tabular} $$ $ \end{tabular} $$$ $ \end{tabular} $$ $ \end{tabular} $$$ $ \end{tabular} $$$ $ \end{tabular} $$ $ \end{tabular} $$$ $$

R; kipk oklik ekBk girk-okM; kr ekBa \vee ax.k gira okM; kr R; kB; kp ukR; krhy 4&5 dlylipa j kgkr girh- eh mUgkG I kyVhr xsyksdh R; kP; k \vee ax.kkrp >ki k; yk t k; pks ekÖ; k 'kstkjh \vee k' kk nksu rhu QwVkoj \vee Ek#.k Vkduu >ki k; ph- I xG $_{7}$ k \vee ax.kkr ck; dk] i kija >ki ysyh \vee I k; ph- xMh ek.kI a eG $_{7}$ kr >ki k; ph] dkj.k R; k dkGkr eG $_{7}$ kr ybZpkAk; k 0gk; P; k] cSyaI kMuu U; k; ph] ekVk pks#u U; k; ps R; keGaxMh ek.kI aeG $_{7}$ krp >ki k; ps

eh jkrP; kyk >ki rkuk \lor k'kkcjkcj y; xlik ekjk; pks pšVk djk; pkj f[knGk; pkj fuE; kjkrP; ki rij \lor keP; k xlik pkyk; P; k- 'kstkjP; k ck; k Eg.kk; P; k]^^ \lor krk >ki k dh] jkrHkj xlikp ekjrko dk; **

eyk ekrij \vee k'kkcjkcj xlik ekjrkuk >kip; k; ph Ukkgh-jkrHkj eh tkxk jkgk; pks \vee kf.k ekő; keGa \vee k'kk ch tkxh jkgk; kph- \vee k'kk ekő; kl kj[; k ygku ikjkcjkcj brdh d'kh dk; jerx rsokM; krY; k ck; kuk dkMp gyra \vee k'kkpk uojk ijeh'kjnknk l nku-dnk eG; krp Fkkck; pk-R; ks \vee ku \vee k'kk dok cksyk; ph UgkbT- dok , d=; k; ph UgkbT-

nk8kch cDdG f'kdY; kyh grh- ijeh'kjnknk l kykinjyk dkyht f'kdmu vkysyk grk- vk'kk ch frP; k ^ck- * P; k ?kjh dkyht f'kdmu vkysyh grh- ij nk8kkr dok cksy.kaul k; pa rsdk cj λ gsek $\ddot{0}$; ki $\dot{\phi}$ auspehp dkMai Mysyavl k; pa

, dnk R; kB; k?kj xrph dk; Zbj ekP; k fuerkuaeh cSyxkMhr R; kB; k dlyrpkcj kcj \vee k' kWP; k ekgj h xsyksgrw \vee k' kWP; k ekgj h ek; nG f' kj erh grph- frpsoMhy ekBsi rk kj h grps- frph \vee kbJ HkkÅ] I xGsf' kdY; kyh grph- \vee k' kWP; k \vee akkoj Hkkj h&Hkkj h I kM; k \vee u cDdG I kbJ; kpankfxua \vee I k; pa \vee k' kWP; k \vee akkoj gh Hkkj h&Hkkj h I kM; k \vee u cDdG I kbJa \vee I k; pa \vee k' kWP; k nkj kr o eG; kr y; okguamHkk dsysyh \vee I k; ph- \vee k' kWP; k ?kj h thi] VDVj] ekVj I k; dy grph-

eyk vkBor; aeh ygku vI rkuk frpayXu >kyagıra frP; k yXukyk I çkbZeyk ?ksÅu xsyh qırh- frP; k yXukryaeyk FkkMaFkkMavkBora]

 $\label{eq:continuity} $$ rh ek>h efijh.k girh-tjh frP; k vkf.k ekÖ; k o; kr y; vrj vl yarjh ch] vkeph efijh y; ?kVV girh-vknu&e/kua l kVVhr eh fryk HkVk; yk tk; pkp-vkeph efijh c?kuu frP; k l kl jP; k vkf.k ekgjP; k ykdkuk dirugy okVk; pa$

vkt vk'kkP; k ?kjh dk; rjh dk; 'de grk- vk'kkP; k dk/rpkryh I xGh ek.kl a; k dk0; idekyk vkysyh grh- eh I okjok i fjPk; kpk o oG[khpk grks I okjojkcj eh xI i k ekjk; pk]

I okibuk xEer okVk; ph-R; k fno'kh \lor kepk e ϕ dke \lor k'kkP; k ?kj hp i Myk-I k θ ; kyk t ϕ rkuk eh \lor u \lor k'kk , dkp rkVkr t ϕ k; yk cI yw eh ugeh \lor k'kkyk I k θ hu o ϕ c θ 5 k rkVkr d/kh t ϕ k; pkslgkbZ

vk'kkph vkbZEg.kyh]^^vxavk'kk] rw; k i kg kpk brdk ykM djrsdh] gsi kg xa ykMkua; Ma gkr pkyya] tok; yk cl yarjhch rph i kB l kMr ukgh-; k i kg k fcxj rwjkgkr ukgh \ dk i kg xa rp; kfcxj jkgkr ukgh gp vkEgkyk dGr ukgh**

 $rseyk \ Eg.kyi]^{dk} jsikjk]dk; 'kkGroxistkrvIrksdk ukgh]^**vk'kkyk \ Eg.kkyi]^^; kyk'kkGr?kkryaukghdk\^**$

vk'kk frP; k ofMykuk Eg.kkyh]^^vklik]; k ikjkpauko ^ikiV* vkgs gsukokiek.kpekö; k'khugeh ikiVkiek.kscksyra Eg.kw eyk; kP; k'khe\$h djk; yk Qkj vkoMrs ikiVyk vktw'kkGr ?kkryaukgh dkj.k R; kpsvkbZoMhy vkMk.kh vkgr- rs'kkGr; kyk ?kkyrhy dh ukgh eyk ekfgrukgh-**

vklik Eg.kky]^^ dkjsikiv] ryk 'kkGyk tk; yk vkoMrsdk**

 $eh \ Eg.\ kkyk]^{\ } \ \lor kli\ k] \ eyk\ l\ kGayk\ t\ k;\ kyk\ Qkj\ \lor koMra\] \ eh\ l\ kGayk\ t\ k.kkj\ gk;\ - \lor ku \ eh\ \lor k'\ kkl\ kj\ [kh\ cDdG\ l\ kGk\ f'\ kd.kkj\ gk;\ ^**$

 $\label{eq:continuous} $$ v'' k h \ v'' k h \$

R; ksdk; be mj dw \lor kEgh n() &; k fno'kh \lor k'kMP; k l kl jh \lor kyw; rkuk \lor kf.k tkrkuk eh \lor k'kMP; kc#cjp xMMhr q(rw eh \lor k'kMph i kBp l kMyh Ukgh-

 $x k M h r y h \ e k. k l \ a \lor k' k k y k \ E g. k k; \ p h]^{ } g h \ i \ k j \ x a E g a t h \ \lor k' k k P; \ k \ x G_{\tilde{\tau}} \ k r \ c k a' k y s y k \ u (l \ r k \ y k G. k k g k; **$

 $\label{eq:final_final} FMMI; kp fnolkrek>h bPNk ulrkuk] fttkbleyk cGcGa ckHkGxkoykijr?ks^Auxsyh-$

HWx ngk

 $\label{eq:ckHkG} $$ \text{ckHkG} \times \text{kor} \ \text{fttk vkthP}; \ k eG$; \ kr \ l ekb2d \ fgj \ grh-; \ k \ fgjhoj \ njjkst , dt.kkyk ekb2ph i kGh grh- fgjhyk Hkjiji i k.kh gra ckHkG \times kokr eh vkthdMadeh o ckghj eG$; kr o pgyr ekekP; k c#cj tkLr jkgkr grw eyk l [[kk ekek u0grk ij pgyr ekeaek0; koj l [[; k ekek birdh ek; k djk; ps$

vkepanijki pato.k /kkoykl/oj >kMk[kkyhp ekekP; k c#cj 0gk; pa nijkjh ekl/k l kVY; k Egath pkj i kp ekeaR; kB; k ck; dk] eG; krysxMh] i kjil l xGht.ka/kkoykl/oj >kMk[kkyh cl w to.k djk; pks

ekekP; k ck; dk, dk MkyruaedP; k o Tokj hP; k Hkkdjh] pV.; k] i krG dkyo.k f?kÅu; k; P; k-ckHkQxkokr I xGh dkyo, d=p j kgkr grh-eyya I quk] ck; dk] ukroMal xGh, d=p j kgk; ph-xkokr R; kpaekBaekBaokMagraeG; krchekBrekBaxkBackakysyavIk; pa, dk, dk vktkckdMa20&25 tukojavIk; ph-, dk, dk vktkckyk 4&4]5&5 i kgagrh-rh I o i kgavu-R; kP; k ck; dk o ukroMaxq; k xkSomkua, d=j kgk; kph-?kj kpsdkj Hkkjh vktkckp grsrsnj j fookj h cSyxkMh?kBaue0gGyk rkypp; kP; k vkBpMk cktkj yk tk; kps tkrkuk vkB&vkBik; Y; k Tokj h vuedpanGk.k] cktkj kr fod.; kI kBh HkkT; k] 'kG; kph ckdMaf?kÅu tk; kph-; srkuk I kP; kyk y; eV.k vk.kk; ps I kP; kyk I okl kBh eV.kkpatp.k vI k; pa eG; kr xM; kaukch eV.kkpatp.k i kBoyatk; kpa nku vktokdMapkj pkj xMh tsÅu o"kkP; k cksyhoj vI k; ps, d xMh ekvl kBh], d xjkl kBh], d nkja/kj.; kI kBh], [kknk xMh xks/; kryh >kMyks/o brj dkekI kBh vI sfdrhrjh xMh R; kP; kdMadkekyk vI r-

 $tukoj kuk ml kpk i kyk \lor k.kwu ?kkryk tk; pk-o"kkP; k 'ksoVh ml kpsx&gkG dsystk; psefguk efguk x&gkG pkyk; pa$

mlkikluajl pj[kkr?kkywu feGoyk tk; pk-, d r\formalli'; kP; k?kk.; kgwu ekBk pjd \lor lk; pk- R; kspjd fQjo.; kl kBh pkj pkj] \lor kB \lor kB \lor Syatq ysys \lor lk; ps pjdkr ekG $\dot{\gamma}$ kP; k ekG $\dot{\gamma}$ k Ål?kkryk tk; pk]pjdkP; k Hkkorkyh cSy xksy xksy fQjk; ps FkkMD; kr rsykP; k?kk.khe/; s, d cSy fdokjMk?kk.khP; k Hkkorkyh fQjr \lor l rk] r'khp gh cSykph \gt All R; k pjdkHkorh fQjk; ph- \lor u R; k pjdkruajl , dk uGhrwu cknY; ke/; s?; k; pk \lor ku cknY; k dk; yhr \lor krk; P; k-

x (k) (k) k (k)

mdGw mdGw xje dyk tk; pk- dk; yhryk xjejl ykdMh fdøk yk{kMh QkoM; kus^xG0; k* ukokpk ek.kli gkyorjgk; pk-jl mdGw mdGw ?kV gkbī; ir xG0; k jl kyk QkoM; kuagkyorjkgk; pk-R; kjl kr xG0; k V/kw&e/kw dk; rjh i koMj ch Vkdk; pk- dk; yhrykjl ?kë >kyk dh rksjl yk{kMh cknY; kr Vkryk tk; pk- o urj FkkM; k oGkuajl ?kVV >kY; koj] yk{kMh cknY; k Ål kP; k i kpk/; koj i kyF; k Vkkyk; P; k- Vkk i Dkj sVgkyHMMd xVg-sVgh hcuoY; k tk; P; k- Vkk i Dkj sVgkyHMMd xVg-sVgh hcuoY; k tk; P; k-

R; k dkGkr l k[kj dkj [kkusu0grs R; keGaxkok&xkoh Ål ckxk; rnkj x&gkGkoj xGr; kj djhr \lor l r- xGkP; k <i h cfyxkMhr ?kkyw \lor kMrhoj ufy; k tk; P; k- \lor kMrsxGkph fdær d#u xG \lor ki Y; k rkC; kr ?; k; ps \lor u-xGkph i VVh 'krd&; kyk | k; ps R; k i VVhr xGkpsotu] dMrk] gekyh] rkykb] \lor kMr dfe'ku] xGkpk nj] \lor kf.k 'krd&; kyk | k; ps i \$ s ; kpk | xGkri 'khy fyghysyk \lor l k; pk- ekekP; k ?kjkr fyfg.kkjso okp.kkjsdqkhp u0grs R; keGsR; k xGkP; k i VV; k \lor ktkck ekÖ; kdMw okpw ?; k; ps

nijkjh tok; P; k vxmj vkEgh fgjhr rkl urkl iok; pks eG; kr HkVdk; pks gp vkepadke grarhu vktockph feGou 30&35, dj tehu, dkp fBdk.kh, dkp fgjhoj ckxk; r grh- R; ke/kou vkyY; k mRi Uukrou R; kP; k ?kj dN/nckpk [kpZHkkxfoyk tk; kpk- i\$ ay; f'kYyd jkgk; kpaR; keGavktockph ?kjal /ku grh-

 $ek\"{0}; k \ vkthyk \ 10 \ , dj \ ckxk; r \ tehu \ dj .ka'kD; \ ulgra \ dkj.k \ vkthyk \ egyxk \ ulgrk] \ nku \ egyhp \ gkj; k] \ , d \ ek>h \ vkb\r{2}rGl \ k \ vku \ l \ kyki jiph \ eko'kh fdl \ uk- \ vkth \ ckhkGxkokr \ , dVhp j kgk; kph- R; keGavkth eGk \ dqkkyk rjh cVb\r{1}uaykok; ph- pgyr \ vktuck c#cj \ dk\ vkr \ l gk \ o''k nkok ykow \ vkthuagh \ eGk \ feGoysyk grk- ij \ vkthrh \ eGk \ Lor%dl \ w'kdr \ ulgrh-$

pkaxno dkdk Eg.kyk]^^gsc?kk ekeh] eh fxj.khr dkekyk gk; - gh uk&djh djr eh ræph tehu d'kh dl.kkj\ ræghp lkaxk] xko ch vkMoG.kh gk;] tkÅu ; Åu tehu dlk; yk vMp.khpa gk; - rok rægh vladjk] ekÖ; k FkkgY; k Hkkokpk rægh th nRrd ?krysyk i kj xk $^{\text{vkRekjke}^{*}}$; kykp ckHk@xkoyk U; k- $^{\text{vu}}$ R; kyk tehu dlk; yk ykok**

vkthua?krysyk nRrd vkRekjke 20&22 o″kkpk grk-R; ksikjxk l ksykijikr ybZpSuhrjkgkr grk-R; kP; k ck-yk l kaxw vkthuavkRekjkeyk ckHkGxkoyk f?kÅu xsyh-vkRekjke, drhu&pkj fnol frFkajkfgyk-urj R; k [kMxkokr R; kyk djesuk >kya Eg.kw rksl ksykijiyk fuÄw xsyk-

v'kk fjrhuavkthigatehu dlk; yk dqkkyk | k; kpk gk ekBk iłu ggk-, d fno'kh vkthpsnku nhj Egath ek>spgyr vktkck vkthdMavkyso vkthyk Eg.kyg\^gsc?kfttk] ghftehu vkeP; k vkT; k&iatkph gk; - vkEgh gh ftehu nh &; k dqkkyk fnÅ nskkj Ukkgh-rwvladj-rh ftehu \lor ki Y; kp ?kjkr jkgk.; kl kBh \lor keP; k xk; dokM ?kjk.kkrY; k dqkkP; k rjh i kjkP; k fdøk ukrkP; k ukokoj ftehu yko- ru \lor l adsyarj R; k tehuhoj \lor keP; k Hkkokpich ukø jkfgy \lor u-ry \lor k \lor kEgh i yakkoj cl u l \lor lkkGh*

vkthyk ekfgr grag gsnkligh nhj yckM gr-; ki lidh , dk nhjkuavki yh ftehu gMi dysyh grh-rh ftehu dkVkiruafeGokoh ykxyh- I xGk i kBhekxavuljko grk- R; kelGavkth xIi cl yh-

vu R; kauk Eg.kkyh] ^^ekÖ; k gkrua Ugk; dl.ka>kyarj c?kw**

vkth Qkj djkjh grph- okjdjh link; fopkjkph grph- iæinjP; k pkj ok&; k rh dok prplok; ph Ukkgh- fruapkjk&/kke ; k=k dsysyh grph- ukf/kd&f=cdsojP; k dlykesG; kykgh rh tkr grph- fruajkek; .k &egkHkkjr , dysyagra rh gqkkj grph- rh l gtkl gth dqkkoj bZ okl fBor uQqrh-

 $\begin{tabular}{ll} $$ \sqrt{kkdY}; k tkok; $kdMaxsyh o Eg.kyh] ^gsc?kk pkaxno] rfighting the properties of the propert$

pkaxno Eg.kyk]^^ eh frFka ekö; k xkoh ; Åu ræph tehu dl k; ykxyksrj ræp; k Hkkodhyk rs \vee koMk; paukgh- ek>h rj tehu ekGkph gk;] ræp; k Hkkodhuaeyk eG; kr ; k; yk eTtko døyk rj *

 $\begin{tabular}{ll} $$ vkth Eg.kkyh]^$ vkola pkaxno] $$ vla?kkc#u dla0gk; pak rep?; k ekxadqkh ek.kla fc.klag& dk Ugkbr\ rh repaxko gk;] reph Hkkodh ek.Bh gk;] regkyk vkeP; k Hkkodhuarjkl fnyk rj reph Hkkodh d'kh.xli c'khy-vu 'koVh dk; nk g$ dh-regh d'kkyk?kkcjrk; ** $$ $$$

vkthpacky.kapkxnoyk i Vyavu pkxnouafxj.khrhy ukfdjh I kt/Mu ckHkiGxkoyk I gdt/vc i; k.k dsyapkxno I gdt/vc vkth?; k okM; kr jkfgyk-

pkaxnodkdk, d dykdkj grps rsi [kokt y; Hkkjhoktok; ps frFkaek#rhP; k noGkr o foBkockP; k noGkr jkst Hktu pkyk; pa R; k Hktukr pkaxno i [kokt oktok; pk- f'kok; frFkY; k ; YykekbP; k t=r pkaxnoP; k ?kjkyk fdpkr i M.; kpk eku grk- pkaxno t=r fdpkr i Mwykxyk-R; kerGapkaxnoP; k ekxa R; kph I xGh Hkkodh \vee kf.k Hktuh eMGh mHkaj kfgya

 $\label{eq:chikg} $$rI a<ksd ckHkGxko gsrkyP; kr , d xMkpaxko Eg.kw vkG[kyatkr gqa fttkbP; k Hkkodhuapkaxnpyk i Gow yko.; kph y; [kViV dsyh-$

, dnk emmke gksåu fttkbP; k i m.; kua fttkbZyk ekjya Egath plaxno HkkM.kkr Hkkx ?kbZy vI aR; kuk okVya i .k pkaxno ua HkkM.kkr Hkkx u ?krk R; k i m.; koj QkStnkjh dsyh vkf.k R; k i m.; kyk 'kj.k vk.kya pkaxno gk MkD; kuapky.kkjk ek.kwl gmk- Eg.kwp pkaxnopk fuHkko frFka

ykxyk-plaxnoph Hkkoch plaxnop; k ekxagrhp-vkf.k dk; nk plaxnocjkcj grk-R; kerGavkthP; k HkkochrY; k xhlkpavkftckr Qkoyaukgh-

eh vkthdMp jkgkr grks vtrol ek>a uko lkGr ?kkrya u0gra eko'kh vkthdMa vkY; koj ek>k jkxjkx d# ykxyh- r'kh ek>h eko'kh FkkMh'kh HkkM[kkg]jkxhV]rkiVp grheko'kh frFkavkY; kil uaeh tkLrhr tkLr oG pryr ekek] pryr ekol HkkÅ; kå; k c#cjp jkgw ykxyw jkrP; kyk vkEgh pryr ekol HkkokP; k ekGonkoj fdook pryr ekekP; k okM; kr >kir vl w ldkG vkf.k lkat toku dkY; kch ekekdMadjk; pks eG; kr vku xkokr HkVdk; pks frFkaek>a lxGackyi.k x¥; kekGaeyk ekÖ; k xkokdMa; xÅp okVk; p lgk; - f'kok; oMykpk lkHkko ch FkkMkl k jkxhVp grk- R; kekGaoMykph FkkMh Hkhrh okVk; ph-ex urj eh vkthyk lkMnu l ¢kbdMa tkLr dkGjkgwykxyw vkthi {kkl ¢kb/tkLr iekGokVr grh-

eh 8&9 o"kkipk >kY; koj ekö; k xkoh eyk l kGr ?kkrya ij ek>al kGr y{k ykxr u0gra l kGk chlow l kyhe/; s tkLrhr tkLr oGk eh l çkbizMatkr grw xkokdMich vkeph y; vkckG grh- pkj i kp vkEgh HkkoMagrw?kjph xjhch] HkkoMkph l {; k tkLr] R; kenGa eyk tkLrhr tkLr dkG l çkbizMp jkgwokVr gra l çkbizykgh dksk u0gra d/kh d/kh fryk okVk; padh] Ekh dk; e frP; kdMp jkgwoa Eg.kwu fruaekö; k vkthyk , dnk Eg.kyh] ^fttk] i ki Vyk jkgwnhdh ekö; kdMp- eh R; kyk l kGr ?kkyrh] pkaxya f'kdorh- vku ygkukpk ekBk djrh- rGl kykch e-l i kp&l qk yzdjagk; rh-, d ekö; ki k'kh jkfgyarj dk; fc?kMra **

fttkb]^^vkxal çkb] R; kpk ck· y; rkyokj gk; - rh dk; R; payd# vkiY; kik'kh fBok; pk uk; - eh vxqjp rGl kyk uko dk-w cf?kry; a ij R; B; k ck· ual i "V l kfixrya dh] ^ekÖ; k dBY; kch ydjkyk frdMpk yGk ykok; pk Ugk; - tj ykoyk rj cjh xk\$V 0gk; ph Ugk; **

 $fnokGhpk\ I.k > kyk]\ I\ qkh > kyh]\ i\ kMok\ vkyk-\ rjhch\ nknk]\ cki wo\ ukukP;\ k\ ukokoj\ pk\langle kkk;\ k\ oBk&;\ krhy\ ykxul\ kgckph\ Ärysyh\ ftehu\ d\#u\ |k;\ yk\ r;\ kj\ uQgrk-\ gjhck\ 'kMthuh\ I\ qhd\ nknkyk\ y;\ oGk\ I\ kfixrya\ ij\ nknkuac?kwc?kwd#u\ fnÅ\ dh-\ Eg.kuu\ cjhp\ fnoI\ uknkyk\ ykoya\ [kjaeath\ nknkP;\ k\ eukr\ [kkV]\ fueklk > kyh\ qrh\ dh\ dk;\ vI\ aokVr\ qra$

nknkyk c
Ghukukuabpkjya]^^vkxk! nknk] vkekyk ftehu vkkeP; k ukokoj fnrweuyk gr
k- ex dok d#u nskkj gk; **

nknk]^gh c?k cGh] gh ftehu eh ykxw k; ckdMuabdr ?kryh; k- rlarj ; k ftehuhoj repk dk; ch gkd i kpr Ugk; - \vee ki Y; k okV.; k fpekth \vee kli kup d#u fnY; k głł; k- \vee krk rfigkyk gh ftehu y; h tkj d#u ekxk; pk gkd j kfgyk uk; - rjhi.k ek>k thokr tho \vee 'khi r j qh ftehu rfiqk nk²kk Hkkokuk eh nskkj gk; **

 ekxk; p \vee l yð rjhch l kæ- eh fnrwij ek>h ftehu eyk nh- ykxwl k; ckdMuagh ftehu ?kråu l krojhl >kya rwR; k ftehuhr l krojhl , dVkp fid [kkrw k- \vee kekyk R; kryk , d nkukch nruk; - rok rhftehu \vee kekyk dok fnrwrh , d rh , d l kæ **

 $nknk]^{\sim} V kjacGh] \ tjk \ Fkknck] \ ek\"{0}; \ k \ l \ blkkpa, \ dnk \ uhV \ jknc \ ykonu \ fnrw \ ex \ r\ ftehuhrykfgLl \ kfnrw \ l \ blkk \ cktnyk \ jkgk; \ kpaEg.krw \ k**$

ukuk ofrkxwu Eg.kyk ^^ dok | kparok nh- uk; rj uk; ch nh- HkkokuaHkkokpk \times Gk dki yk Eg.kwu xi cl rw**

- Lalkkyk ?kkc#u nknk dBykp ; Ogkj d#u |k; yk r; kj u0grk- nknkua Lalkkyk ?kkc#up <oGL okVph 3&3 , dj ftehu cki nyk nku oGk bidyh gn-h-

, d fnl h nknk l \(\text{blkkyk Eg.kyk} \)^qsc?\(\text{l \text{blkk}} \) pk\(\text{blkk}_{\circ}; \) k oBk\(\circ_{\circ}; \) k rjh ch rh ftehu ek\(\text{0}; \) k , dV; kph \(\text{lgk}; - \) R; kryh 10\(\circ_{\circ} 10 \) 4 dj ftehu \(\text{kiV}; \) k ok\(\text{V.khr} / \text{k# uxw**} \)

I blk]^^ eh , $dk \lor kbpk gk$; $\lor u rph ckdhph yrdjaek$ 0; $k l ko = \lor kbph gkbr- rok nksu <math>\lor k$; $kpanksu fqLl al kj [kaljk; pa ?kjkr <math>\lor ku ftehuhr l find-**$

nknkdMa fpekth vkli kuath 15 , dj ftehu fnyh gr
h- R; kryh vkrk QDr uÅ I kMs uÅ , dj ftehu jkfgyh gr
h-

nknk l blkkyk Eg.kyk]^^9 , dj
kr nku fg Ll ad#u l kMspkj , dj ftehu \lor ku fu Ee ?kj r
yk fnrw**

'koVh cki ysdkph HkkM.kagjhck 'kMthdMaxsyh-

 $\label{eq:continuity} $$ vu , d fno'kh gjhck 'kMth Eg.kyk]^$ foBkck] rw ykxwlk; ckdMua?kryY; k ftehuhryh rq; kokV.khph ngk , dj ftehu rq; kp ukokoj j kgwnh- vu fpekth vklikph uÅ l kMs uÅ , dj ftehu l klkkyk nåu Vkd- vu ?kj ch v/kl nåu Vkd-**$

nknkua'kMthpa, sdyao oMykikftir IkMsuÅ, dj ftehu vku v/kI?kj Iblkkyk nsåu Vkdya vkrk nknki qand jk i zu gqrk dh] ykxndMua?krysyh 30, dj ftehu fr?kkr okVnu/; k; phgk i zu xsyh Ikr oʻkijakGr gqrk-

; k njE; kuP; k dkGkr nknkP; k MkD; kr , d dYi uk vkyh- vu nknk gjhck 'kMthyk Eg.kyk]^^/kMth]eh pk%k&; k oBk&; kryh ftehu ekÖ; k ukokoj [kjnh dsyh; k- ; k nksu Hkkokps 400&400#i; seh; ktkl fgrek?kkjhnsåu Vkdrks**

'kMth]^^vkjabBrck] rlad# uxa rh nk8ka rq>al [[k Hkko gkbi- R; kauk /kkclk nsÅ uxl-gkoarj vtw tknk i s aekxw ?kho R; kauk R; kph ftehu fnÅu Vkd**

nknk Eg.kyk]^^^kBth] eyk I kMsi ákjk, dj ftehu ekÖ; k ck- dMuaokVnu vkyh grh-R; ki kh I kMsuÅ, dj ftehu I kikkyk fnyh- vu 6, dj ftehu rG'khj keyk bDdyh- vkrk 10&10, dj ftehu Hkkoknuk fnY; koj j kfgyY; k 10, dj koj ek>a dVr, dI a Hkkxk; pA eyk ekxP; k ck; dVr, dikj avu 4 i kj h gk; R; k- 4 i kj hVr, koj d'kh d#\ rVr, kVr k

nknkpacky.karGeGhpagra ghʻkMthyk oG[kwvkya gjhckʻkMthuh, dekxldk<yk $^{\prime\prime}$ vlad#; k bBrck] vkeph ckjkG okVphjktekU; kryh 12, dj ftehu bldk; ph gk; - R; k 12, dj ftehuhpai\$ acGhyk vu rrGʻkhjkeyk Hkjkyk ykow k- vu gk I xGk; &gkj, dkp fnoʻkh d#; k-Eqath pk8k&; kryh 10 vu vkeph 12 vʻkh 22, dj ftehu rryk qrh; k-**

gjhck 'kMthpuh frUgh Hkkokuuk , d= ckykowu ?krya vku lkfixry}^^ gsc?kk cGh]rG'khjke rfigh fr?kgh HkkÅ eyk lkj[kpp gko- Ekh vkRrkirji fr?kkuykch lkj[kpp /kjy; - rj eh lkaxrwrh , sdk-bBuckua rfigkyk pk%k&; k oBk&; kryh ftehu rpP; k ukokoj d#u fnY; koj bBuckyk QDr ngkp , dj ftehu jkgkrh; k-R; k ngk , djkr R; kua; p<k ekBk i ji pk dlk pkyok; pk\ rfighp lkaxk-**

cGh]^^ ex 'kMth vkEgh dk; dj koavl ar ϵ gkyk okVr; **

'kMth Eg.kyk]^^ gsc?kk cGh vu rG'khjke rEgh bBrckyk n(j jhdMph 10 , dj ftehu f?kÅu |k-Ugk; rj ; kryhp 5&5 , dj rEgh?; k vu bBrckyk 20 , dj jkgw|k-**

cGh]^^/kMth \lor l adjk] oBk&; kryhryh 10&10 , dj \lor kEgkyk BjY; ki æk.kansÅ | kurj dBjch 10&12 , dj ftehu bidk; yk fu?kw| k- rh \lor kEgh \lor keP; k bBjck nknkyk \lor kEkP; k [kpkLia f?kÅu fnr#*

 $\label{eq:condition} $$ \ky_{^cGh} r_G'khjke eh l kaxrwrh , sdk-nq \&; kph ftehu gq/d.; ki {kkek>hpjktekU; kryh 12 , dj ftehu eh bBuskP; k ukokoj d#u fnrwR; k 12 , dj kps <math>\lor$ Mhp \lor Mhp gtkj #i; srqgh eyk | k-c?kk dl aokVr; **

cGh Eg. kyk]^^ ex rj >kdpa>kyadh- \lor kEgh \lor Mhp & \lor Mhp gtkj #i; snk9kafnrw** \lor Mth Eg. kyk]^^rG' khj ke r $_$ Padk; er gk; \lor **

'kMthpk i Lrko fr?kk Hkkokuk i Vyk- \vee u pk%k&; k oBk&; krY; k ftehuhryh okV.kh \vee kf.k 'kMthP; k 12 , djkph [kjnh , dkp fno'kh >kyh- nk%k Hkkokuh 'kMthyk 2500&2500 # i ; sfnys

Vu okv.khryk dk; epk fr<k 'kMthua I kMoyk- Eg.kwup gsrhu HkkÅ gjhck 'kMthyk nokl eku ekur grs gjhck 'kMthpk dipykp I cm gs [kkyh i Mwnsr uûgrs 'kMthp; k 900, djke/khy i j.kh&i kGhi kI w rh I rkhi ruj I xGh dkeagsfr?kad#u ?kr grh- 'kMth 900, djkP; k [kkB; k; k fr?kkwukp nsr grk- R; kerGa; k fr?kkpk Qk; nk y; gr grk- gh fr?kat.k dMcach bidr grh-rh dMca ykr ykr fuÅu bidk; ph- R; krch; k fr?kkwuk Qk; nk j kgkr grk j krP; kyk 'kMthpa?kj j k[kk; padke ch gh fr?kat.k djhr grs; k fr?kkroj 'kMthpk y; fo'okl grk-

xkokr 'kMthpa, d dki M nqdku gqarh nqdku 'kMthpk ikjxk xakijke pkyor gqfk-xakijkeP; k gkrk[kkyh nku&rhu xMh gqrs ckj geskk gjhck 'kMth dki M nqdkukr ykMkyk Vxduu clysysvlk; ps R; ko.Gh i qal rjathoj vkepk ck· vku vkepapqyrao brj 'kmdjh xlik ekjr clysysvlk; ps 'kMthauk iku [kk; kph y; lo; gqrh- 'kmdjh 'kMthyk iku [kk; kyk | k; ps d/kh d/kh 'kMth P; k ch ekxok; ps vu lkB; kyk dMulai MY; koj 'kMth okM; kP; k ik; &; koj clysys vlk; ps 'kMthyk nq jh ch pkj i kja gqrh- ij rh i kjai a; ji yjyk 0; ki kj djhr gqrh-

eh dok dok i a ji ji yk 'kMthc#cj okjhyk tk; pks o R; kB; k vkMrhoj elpdke djk; pks 'kMth v/kwu e/kwu I ko I kodkjdhpk /kmkch djhr gyrs vkMY; k uMY; k 'krd&; kwu rs deh; ktkr i \$ s | k; ps d/kh d/kh xjhc 'krd&; kph i fjfLFkrh c?kwu 0; ktch ekQ djk; ps 'kMth ; stkyk; kt d/kh Eg.kk; ps ukghr-rsungeh; ktkyk dPpsEg.kk; ps cki w [kkR; k ?krkuk y; o.Gk 'kMthdMuadPph nsÅu i \$ s?ksÅu efguk nksu efgusoki #u i jr djr vI s dok dok toG I kBysysi \$ scki w vku vkepapnyra'kMthdMafBok; ps 'kMth Eg.ktsvkeP; k ?kjkph cMtd gyrh-cki w I .kk I finyk dki M] 'kMthP; k nqkukrunp m/kkj ?; k; pk- R; k dkGkr dki Ma egkx gyrhekatji kVpk di Mk xkj xjhckauk ?; k; yk i joMk; pk-

, d fn'kh ckiwvaxkr OkVysyk I njk ?kkyw 'kMthP; k nqdkukr xsyk- 'kMthuh R; ks i kfgyk- I dkGps10 oktysysgqrs I qxh I jkbZl a ysyh gqrh- 'kMthi qxa10&12 'krdjh nqdkukP; k mac&; kr I rjathoj cI ysysgqrs dqkhrjh gjhck 'kMthyk fcMh dVVk vk.kw fnyk gqrk- 'kMthuafcMh i Voyh-

frrD; krcki wfrFkaxsyk-'kMthfcMho<ro<roki nyk Eg.kyk]^^rG'khjke vkr; s**
cki wvkr xsyk vku vkrcl yY; k xM; kyk 'kMthuh gkd ekjyh-^^; srplkjke tjk
ckqhj; h**

rqlkjke ckghj \vee kyk- 'kMthuh rqlkjkeyk dkghrjh MkG; kauh [kqkoya rqlkjkeua ckili; k \vee axkojpk QkVdk I njk Vjk- Vjk- QkMnu Vkdyk- ckinykch letsuk\ rqlkjke dk; djrks r λ

 $\label{eq:ckiwjkxkuaojMyk]^*, srpkjke] ryk dk; dGra dk\ ; Mk&chMk gk; dk] dk ; kM ykxya **$

rødkjke Eg.kyk]^^ekydkual kfixrya -**

 $\label{eq:continuity} \mbox{Eg.kY; koj ckiw , dnep uje iMyk o 'kMthyk Eg.kyk]^^'kMth]dkcjavkeP; kxjhckpklnjkrqbkjkeykQkMk; yklkixryk\^**$

'kMthEg.ky]^^rG'khjke] vkrk?kjkdMatkrkukrwuokInjkvækoj?kkywutk;kpa**ckiw\kp&cr>kyk-

'kMth xaxkjkeyk ekjoMMh Hkk"kmr Eg.kyk] ^^r@'khjkeyk 'kVkäyk fdrh dki M ykxra rp<adki M rkX; kruaQkMw | k- xaxkjkeuarhu feVj dki M rkX; kruaQkMw 'kMthP; k i qsaVkdya

ʻkMth rqdkjkeyk Eg.kyk]^^ rqdkjke] R; k othj Vsyjyk cksykow ∨k.k- ∨ku ; rkuk Vsi?kåu ; sEg.kkoā* othj Vsyjpanqdku cktnykp gqa rksyxp Vsi ?ksåu ∨kyk-

'kMth othj Vsyjyk Eg.ky]^^ gsc?k othj] rG'khjkeP; k 'kVkpaeki ?kh- vku yxmyx , d rkl kP; k vkr rG'khjkepk 'kVIf'kÅu nh**

 $\label{thm:limit} \textit{Vsyj} \,\, \text{dki} \, \text{M} \, \text{?ks} \, \text{Au} \,\, \text{xsyk-cki} \,\, \text{inNkV.khojp'kMthP}; \, \text{k} \,\, \text{cktnyk} \,\, \text{vo?kMnu} \,\, \text{cl} \,\, \text{ysyk} \,\, \text{grk-cki} \,\, \text{where} \,\, \text{k} \,\, \text{cktnyk} \,\, \text{vo?kMnu} \,\, \text{cl} \,\, \text{ysyk} \,\, \text{grk-cki} \,\, \text{k} \,\, \text{cktnyk} \,\, \text{vo?kMnu} \,\, \text{cl} \,\, \text{ysyk} \,\, \text{grk-cki} \,\, \text{k} \,\, \text{cktnyk} \,\, \text{vo} \,\, \text{k} \,\, \text{k} \,\, \text{k} \,\, \text{cktnyk} \,\, \text{vo} \,\, \text{k} \,\, \text{k} \,\, \text{k} \,\, \text{k} \,\, \text{k} \,\, \text{k} \,\, \text{cktnyk} \,\, \text{vo} \,\, \text{k} \,\, \text$

gk ijlax c?kwu , d'krdjh'kMthyk Eg.kyk]^^'kMth] rÆghy; cjadsya rGʻkhjke l kfrk dki Mf?kÅu l njk fʻkor u0grk**

 $\label{eq:continuous} $$ \text{NM}$ th R; k 'krd&; kyk Eg.kky}^{\alpha} sc^{k} flkeij rG'khjkel kj[kk l k/kk] ljG] $$ \text{HkkcMk}$ ek.kwl pk[kkeGk pkGklikl wu [kkyh ejkB; kr dksk ch uk; - ikp&l gk yxdjal blkkGwu iVV; k o"kkyk rhu pkj , dj ftehu fdøk tkxk [kjsh djrw - Hkkokph 6 , dj ftehu nksu o"kkir ?kryh-pkhk&; k oBk&; kryh ngk , dj ftehu #i; s2500 nsÅu ijokp ?kryh- cgknnj xMh gk; - I kblkko brdk pkaxyk gk; dh] dqkkP; k okGY; k i kY; kojgh i k; fBo.kkj Ugk; -$

 $\label{eq:continuity} $$ rh'krdjh\ ckinyk\ Eg.kyk]^rG'khjke]\ rsyk\ dk;\ ch\ deh\ i\ M.kkj\ Ugk;\ c?k-\ rq-h\ i\ kgap kaxyabjokj\ Bky;\ krh^**$

, o<; k oGr othjuauok I njk f'kÅu \lor k.kyk- cki warh \lor akkr ?kkryk- \lor u cki wuok I njk ?kkyw ?kjh xsyk-

	ckifi; k vakkoj uok l njk c?kwu vkb3yk y; hp vpeck okVyh- cki wa ?kMysyk l xGk i zdkj							
∨kbłyk I	klixryk-							

Hllx vdjk

undrhp pk%k&; k oBk&; kryh [kjnh >kyh grh- cki 1] ukuk]nknk \vee u , d 'kstkjP; k xYyhryk nkth ukokpk eu(); xYyhr 'kstkjh , dk ?kjkP; k dVV; koj xli k ekj r cl ysysgrs R; k dVV; koj nkth jkst l k1; kyk 4&5 oktrk ; k; ps nkth l kodkj grs \vee ku eukuach ek; nkG m/kkj grs dVV; koj cl Y; koj i ku]fcMh]cl yY; k yksdkuk rs | k; ps R; kerGa xyhryh cjhp'kh yksdafrFka; Åu cl k; ps

nkth nknkyk Eg.ky]^^bBnck rq>dkl dsylare; k Hkkoknuk ftehuhryk fgLl k fnyk rh-**

 $\label{eq:ckiwEg.kyk} $$ \text{ckiwEg.kyk}^{\ } \text{tk}^{\ } | k \text{ nkth}] \text{ cGhpadk}; eukoj ?ks^{\ } udk- \lor keP; k \text{ Fkkg}Y; k Hkkokua} $$ \text{vkEgkyk } ygkui.kkikluack- lkj [kalakkGyagk; - dok \lor kEgh ygku \lor lrkuk \lor kepk ck- nsonskP; k uknh ykxyk- \lor u iji pkruay{k dk<uu Vkdya rokiluanknk, o<k ekBk iji B; k oMrw k-nknkuaFkkMafeGoyadk\ \lor kt \lor kEgh th l ([kkva[kkrw rhnknkphpiq; kbZgk; - ** $$$

nkth Eg.kyk]^^rG'khjke rucjkcj ckyrul - ; k cGhyk ckyk; padk; dGr Ugk; -**

brD; kr frFka \lor keP; k 'kstkjph pgyr \lor kR; k \lor kyh- eh frFkap [kGr gqrks rh eyk Eg.kyh]^ \lor vkjalikiV; k] rgyk , d frljk Hkko >kyk; - yd# y; ns[k.kagk; -**

VkR; kual karkuk dVV; koj clyV; k ykdkuh, dya vu $nknk Eg.kyk]^^Vkjaok! > dkl > kyadh- <math>rG'khjkeyk Vktu$, dfrljkY; kxd > kyk; -**

 $nkth \ Eg.kyi ^rG'khjke]; k i kj kpk i k; xqk y; pkaxyk gk; - uqlrhp rw pk0k&; k oBk&; kryh ngk , djkph [kjnh dyh vku gh i kj xa tyekyk vkya -rG'khjke]; k i kj kpa uko f'kjer Bp-dkj.k gh ftehu eGph f'kjer i Vo/klukph gqrh-rh ykxudMavkyh vu ykxudMua rqgh f?kryh-**$

 $\label{eq:limit} $$ \sqrt{kR}; $$ kual okluk I k[kj okVyh-iakjk fnoI kuaxkllh ikMok glipk-ikM0; kP; k eglipkoj f'kjear uko Biya$

 $\label{eq:cktkj} \text{cktkj fn'kh cki wa vkEgkyk } I \times G_7 \text{ k i kj kauk } [kk; pa \lor k.kya ij okVnu ns kuk \lor kbLua \lor k...kkyk tkLr fnya ugeh \lor kbLvk...kkpk y; ykM djhr grh-$

eh vkbłyk Eg.kył^^ vk; ł vk..kkyk tkLr vu vkEgkyk FkkMaFkkMack cj **

 $\begin{tabular}{ll} $$ $$ V_k = K_k + K$

 $eh Eg.kya]^{-} eh ch'krkr dke djhu-** \lor kb/IEg.kyh]^{-}rapai k; i kax Gagk; rajrayk 'krkr dke djrk; skkj llgk; ** eh Eg.kya]^{-}ex] eh dk; d#**$

 $\mbox{$\lor$kyh]^{rul}$ kGk $f'kd]y; $y;$ I kGk $f'kduu$ ekeynkj gwEgath $ruyk$ d"Vkpadke djkphikGh; kph llgk; **$

eh j Mr j Mr \vee kb 1 yk Eg.ky 1 j^gh \vee k...kk dk; Eg.kr 1 y c?k]eyk i kaxGaEg.kr 1 y j yaxMa Eg.kr 1 y 2 vkb 2 Eg.kyh 1 y ykja ckckl kc 1 vki Y; k ygku Hkkokyk \vee l a Eg.kw uh R; kyk i ki V Eg.kkoå 1 vk...kk 1 y eh R; kyk i ki V d/khp Eg.k.kkj Ugk; 1 R; kyk yaxMa 1 vu i kaxGap Eg.k.kkj **

 $\forall k \text{epaxkonj} \ pa'kkr \ x \text{kokyk fpdVupg} \ qra \ \forall k \text{eph} \ x \text{Yyhlia yh} \ dh \ e \text{kaxokMk ykxk; pk-vku e kaxokM; kP; k i fydMapkj, dj ftehu o fMyka kftr grh-R; kyk fpdVuu I x G f k HkkodhP; k 4&4, dj ftehuh gR; k-ikj I kayki ji j LR; ki; ir ?kV; kP; kp ftehuh gR; k- <math>\forall$ keP; k 'kstkjh egknkukukph ch ftehu grh-R; kB; k ftehuhr nksu fgjh gR; k-10&12 \forall kB; kph \Rightarrow kMagrh- \forall ku ckxk; r Eg.kyarj ckj ges kk fr Fkaj r kG] x ktj j pokG f kP; k 'kaxk] eD; kph d.kl afi dr grh-dok dok eh egknk ukukpk MkGk prodou fr Fkauad Ppa \forall kr j j r kG] x ktj apk#u \forall k.kk; pks , d fno'kh eh pkjh dj r kuk egknkukukua eyk cf?kr ya

egknkukuk mp Egkrkjk grk- R; kP; k gkrkr dkBh grh- rh dkBh R; k1a ek0; kdMa fHkjdkoyh- eh n. kk. k k0eP; k [k1bi hdMa i Guu k1by w Egkxwekx ukuk k1by k2bp k2ki uch frFka qrk-

 $egknkukuk \ cki \ w/k \ Eg.kyk]^{^} \ \lor kjar G'khjke] \ r_Parh \ yaxMai \ kj xad Bk; \ \ y; \ djkerh gk; \ c?k] \ eG_{7} \ kr; \ Au \ I \ kj \ [kadk; \ rj \ dk; \ rj \ mpyw \ \lor k.kra] \ \lor krk \ dPpa \lor kcarkMrkuk \ eh cf?krya] \ fgdMai \ Gw \ \lor kya] \ dBrj \ yi w \ cI \ yav I \ hy**$

eh dMC; kP; k dk=hP; k ekxayi uu c1 yugqru

egknkukuk Eg.kyk]^^ekxwu [kkoko]i.k pk# uh-ekfxrY; koj eh dk; nr Ugk; 0g; ** cki wEg.kyk]^^ukuk] i ligk eh i kj kyk frdMatkÅ nr Ugk;] , o<; k ckj R; kyk ekQ djk**

ukuk fu?kw xxyk- vku eh dk=hP; k ekxuackiñ; k i gavkyw cki w Eg.kyk]^^vkja i kjk]v'kk pk&; k rwdjr tkÅ uxw rwvnwkdke gk; - vkrk rj r ϕ ai k; uhV >kysyagkbirh- i ljgk ekMY; koj dk; epkftehuhoj cl'khy-*

 $eh \ Eg.ky 1)^* cki 1) \ eh \ \lor krk \ dokch \ R; \ kh; \ k \ eG; \ kr \ tkr \ Ugk; -ij \ cki w r w dk \ jr kG] \\ \times kt jaykor \ Ugk; \ \lor kh; \ kph > kM ch \ y kor \ Ugk; \ dk \ cj à k**$

 $\label{eq:ckiwEg.kyk]^^vkjaikjk]R; kI kBh ik.kh Qkthy vku ik.; kI kBh fgj Qkthy-** ex eh Eg.kyij^^rqdk fgj ikMr Ugk; **$

 $\label{eq:ckill} $$ ckill^{fgj} ikMkyk cDdG i$ aykxR; krh] vku fgj ikMY; koj R; k > kMkuyk ik.kh dqkh | k; p\h^**$

eh Eg.ky]^^I kGk I WY; koj eh nhudh-**

 $\begin{tabular}{ll} $$ $$ \forall k$ $ k$ is k$ is known pkj , dj kph i VVh gqrh- fr $$ ka, dy; ek Bafynck pa>kM gqra R; k$ fynck P; k>kMk [kkyh vke P; k vk T; kph I ek/kh gqrh- R; k I ek/khyk eh j kst i k; k i Mk; pks vku R; k >kMk [kkyh i kg kncj kncj j kst ; sxosx Gs [kG [kGk; pks FkkgiY; k pqyR; kpk I qdk] 'kndj] e/kY; k pqyR; kpk fd I uk] j kek vu i fyd MP; k eG; krhy Hkkxor] j kt kj ke] b Z oj] rqdkj ke gh I x Gh i kj av k Egh n i kj h >kMk [kkyh , d=; k; pks vu - [kGr c I k; pks$

Ekh QxMavI Y; ke@aeyk [kGkr dkskp?; k; pauk; - Eg.kuu eh jMk; pks

'kst kj pk Hkkxor Eg. kk; pk]^ i ki V; k] rwQsxMk gk;] ryyk pkyrk; sr uk;] ryyk \lor kEgh [kGkr ?kr Ugk; **

eh cki nyk Eg.kyaj^cki nj eyk i kaja [kGkyk ?ksr Ugkblr**

cki wEg.kyk]^^ukf?kÅnh] eh rwyk cBk [kGf'kdforw**

ex cki wacMC; kP; k fpi kMkrwu fVi #ax d#u \vee k.kyh-R; k fVi #axki kI uacSy] cSyxkMh] Vd] \vee kxhuxkMh cuokyk f'kdoyh-cki wa, dnk f'kdoyadh eh ekÖ; k eukuaR; k fVi #axki kI ua; x; xGh [kG.kh cuow ykxyw fVi #axkph cSyxkMh] eky Vd] gq:gqc cuok; pks ek>h rh fVi #axkph [kG.kh c?kwu ckdhph i kgia ch [kGk; pa cm d#u ekÖ; kI kj [khp fVi #axkph [kG.kh cuok; pk i z Ru dj k; ph- >kMk[kkyh dqkh ekBaek.kw bl okV; kyk cI ya \vee I hy] rj R; kyk \vee kEgh fVi #axkph [kG.kh nk[kok; pks ekBh ek.kl aEg.kk; ph]^i ki VI kj [kh [kG.kh dqkkykp cuork; r Uqkbr-*

ex rh i kjaekö; k ekxaykxkph] vu Eg.kk; ph]^^,! i ki V; k] vkEgkyk [kG.kh cuow nk[ko dh**

eh R; kuuk [kG.kh cuok; yk f'kdok; pks R; kryh Hkkxor]pgyrHkÅfdI uno FkktMkI k ek>k ntl I kI dj k; ph-rh ekÖ; kdMuu f'kdk; ph \lor u Eg.kk; ph]^^ \lor kEgh i ki V; ki {kk pkxyh [kG.kh cuorw - c?kk-dqkkph pkxyh qkbir rh** ekBh ek.kI agI k; ph-

 $uplrhp \ l \ gh \ l \ i \ yh \ gph \ cki \ w, \ d \ fno'kh \ eyk \ Eg.kyk]^^iki \ V] \ vkt \ xkomjh \ tkÅu \ cl \ rwdk \ dMcaekxdGai Mya - xkokryh ppkj \ tukoja ; sÅu \ dMC; kyk ykxR; krh-** eh]^^gks ** Eg.kkyks$

nijkjh eh dMC; koj utj fBor fBor vktockP; k lek/khi'kh >kMk[kkyh dk; ck; fVi#akkph [kG.kh cuor gurwekpZefgU; kpsfnol gurs xkokryh xk<o] nokyk lkMyY; k x; k] c\$y] podkj tukojadMC; kyk ykxk; ph- vtu dMcaj puu fBoyauOgra

eh \lor u ckckl kc \gt kMk[kkyhp grpks \lor k..kk Egʻkhyk o \mathfrak{g} .k U; k; yk \lor kokrua \lor kyk grpkni kj pamu Qkj grpa

>kM vkiY; k vaxkoj i Mra vl aokVyaEg.kw eh vk..kkyk Eg.kyk]^^vk..kk]>kMkikl ua FkkMayko tkÅu mHkkjkgw; k dk **

 $\forall ku \ \forall pkud \ dk \cdot M \ dk \cdot M \ fn'kh \ , \ dekBk \ QkVk ok&; \ kuadkM \cdot dkM \cdot djhr ekMyk \\ \forall u \ c\#cj \ uedk \ ekÖ; \ k \ \forall axkoj \ i Myk \cdot R; \ k \ Bkl; \ kpaykdyl ekBagra rhykdyl MkD; koj \ i Mrk \ i Mrk \\ [kka| koj \ i Mya \ vu \ [kka| kojua \ i k; kP; k mt0; k \ x\n!?; koj \ i Mya \ cjP; k cja MkD; koj \ i Mya \ Ugk; - Ugk; rj ehfr Fkp [kykl \ gr grks [kka| kyk \ vu \ x\n!?; kyk \ y; erpk ekj yk \ yk \ yk \ y .$

eh , dne \lor k \mathbf{j} M \mathbf{y} \mathbf{j} ^^okpok!okpok! ! okpok!**

vk..kk toGp grk- R; wayxcxhua ekő; k xþl?; koj i Mysyk QkVk cktnyk dk<yk- eh jMr grij bûgGr grij chœyr grij xþl?kk rj brdk l þyk grk dh] xþl?; kph FkkMhch gkypky eyk djrk; r uûgrh- eyk okVr gradh ekő; k xþl?; kph okVh QlVyh v l koh- eh tkj tkjkr j Mnykxyks vk..kkuaeyk mBnu mHkk dj.; kpk i z Ru dsyk- i j eyk mHkk j kgrk; r uûgra

FkkM; k oGkuaokjaFkkxy | XGaokrkoj.k i fgY; kI kj [ka'kkr >kya

 $= h \ Eg.ky \ 2^{k} k. . kk] \ eyk \ [kka|koj gkr ?ks Au mHkk dj] \ eh y xk Mr y xk Mr r e_; kc \# cj ?kjh; r w^**$

 $\mbox{$\lorku \lork...$kyk $Eg.kyij $$ $^eyk $, dV; kyk IkMuu$ $tkA $uxij i i $ja;$ $hy] $eyk $Hkhrh $$ okVrh; k^* }$

eh ∨k..kkph bītkj/k#u mHkajkg.; kpk i z Ru dsyk- eh mHkk jkfgyw

ij $\vee k$...kua \vee akojpk gkr >Vdw fnyk- \vee u-eyk cktyk <dyw fnya \vee u Eg.kyk] $^{\wedge}$; syaM; k] gw cktyk**

ehijr [kkyhiMyn] vk..kk yxnyx /kkrjkP; k QkVD; k rMikr HkuldkV cka/knu ?kjhfu?knu xnyk-eh rFkpiMyw

rkl nku rkl >kys eyk dksk rjh U; k; yk ; hy] Eg.kwu eh okV c?kr gqrwijarqeyk U; k; yk dkskp VkyallgkbZ

I kB; kyk dMM ai Mya I kB; kpal krokty] rjhch eyk U; k; yk dksk vkyaUkkgh-vkeP; k xkokrdpjhrrkl k rkl kyk ekBk ?kW; kpk Vksy fnyk tkrgrk-rksVksy eyk xkomjh ,sdw; srgrk-R; ko#u ehoGh[kyadh] I kB; kpsl kroktysysgs-

válkkj i Mwykxyk grpk- eh y; ?kkc#u xsyksgrpw eh mBnu mHkk jkg.; kpk i lýgk , dnk nksunk i; Ru dsyk- ij xlýn?; kP; k okVheákh brD; k ej .kkP; k dGk grp gli; k dh] eyk xlýn?; kph FkkWhl lýnk gkypky djrk; r u0grh- FkkWhl jh gkyyarjh xlýn?kk Hk; idj níjkr grpk-

jkrhpavkB Vksy i Mya toGp; rkGckpaBk.kdagna R; k i fydMae<h tkG.; kph tkxk gnh-R; kyk e<& dlyh Eg.kr vI r- eyk Hkhrh okVuykxyh-e< dlyhrua, [kknaHkur rj; k; paUkkgh uk\

?kjh fujki nrk; r ulgrk- toGp ukuk vku ejjM; kP; k gnnhyk x.ki rhpk ekBk nxM grk- R; k x.ki rhpk , d y; ekBk ukx gk; Eg.kwu eyk ekfgr gra eyk okVk; p1 R; ksukx rj; skkj Ukkgh uk\

vkeP; k'krkP; k m'kkyk ygku ydjkph e<hijr grh-; kf'kok; frFkaxkokryh e¥; kyh tukojch Vkdyh tk; kph- dę÷ kpa, dy; ekBaVkGdagrarh dęh i kp&iUukl ckj geśkk ckjD; k ydjkph e<h md#u [kk; kph- rl po e¥; kyh tukojch [kk; kph- R; kerGarh dęh jkuVh cuyh grh- rh dęh ekB; k ek.kl kP; k Nkrhbrdh mpo grh- fnolkch rh ek.kl kP; k vakkoj xjxjk; ph- fnol Hkj dæY; krj >kMk[kkyh?kkGdk d#u cl k; ph-

j krhps vdjk oktY; kps Vksy , sdwvkys R; krya , d deaeh i MywgqwfrFka vákkj kr xjixjr vkya eyk okVyj ^jkrP; kyk ; k de; kpa; k >kMk[kkyhol frl Fkku vl koaEg.kw rh defgdMavkysyavl koa* >kWk[kkyh dkghrjhgk; ; kpk vmkt ?kr , d deaxjixjr toG vkya

uarj noj jh pkj&i kp d\(e\)h frFka \lor kyh] ykacuu gh d\(e\)h ykallX; kl kj [kh fnI r g\(e\)h jkrP; kyk ; k d\(e\)+; kauh c\(e\); kp 'ksrd\(e\); k' (kG\(e\)+ k] ckadMai GoY; kpaeh , sduu g\(e\)+ \lor krk gh d\(e\)h eyk Q\(kMuu \) [kkrhy dh dk; \\ ; kph Hkhrh eyk o\(kVr q\(e\)h-

Eg.kww eh I jdr I jdr to Gekkhww i Myky; k >kMkP; k QkV; kto G xxyks vkw R; krya , d ckjdaykdM ekkhww gkrkr ?krya deatlaxgixgir to G; r gma rlaeh R; k ckj D; k ykdMkwa de; kyk ngi gkdyww | k; pk i; Ru djhr gmw ij deadk; ykw tkr wûgra l kj [kal kj [kaxgixgir to G; r gma vkrk ckdhph dehch fr Fkatek >kyh vkf.k eyk pgwcktwuh pkj&i kp de; kwuh; kMk ?kkryk- ek>adkGht Hkhrhwa Fkj Fkjr gma eyk okVr gma vkrk gh deh eyk ftor QkMY; kf kok; I kMr wkghr-* eh ftokP; k vkdkarkwa gkM·---gkM· Eg.kr gmw vkf.k gkrkrya ykdM pgkcktwuh fQjor gmw rjhl (nk R; krya, d deay; to G; s; kpk i; Ru djhr gma vkrk Hkhrhwa ekÖ; k gkrkrya ykdMch x Gww i Mradh dk; vlaokVr gma

R; krya, d defabrdatoG vkyadh] ekő; k ekMhyk pko.kkj brD; kr eh ykdMkpk n.kdk R; kP; k rkMkoj ekjyk-rh defa FkkMaykc xsył ckdhP; k def; kuuh vkrk ekő; koj p<kbl dj.; kpk i z Ru dsyk- vkrk vki.kkyk dqkhgh okpow'kdr Ukkgh] Eg.kuu eh 'kpVh nokpk /kkok dsyk-gkM-----gkM Eg.kr grw vku rkMkuajke· jke ch Eg.kr grw

jkrhpsl Ook vdjk oktysysvl kor- vkrk xkokruadqkh; ska'kD; uOgra ckckl kc ?kjh x½; kurj eh fgFkai Myw Eg.kwu l kaxk; pk bljyk gyrk dk enpakep xli clyk gyrk\ dGkyk dk; lk/ku uOgra

fgdMavkeP; k xyhr jkrhP; k 10-30 oktrk ikjxadpaxyxi ikiV dpaxyyk\ Eg.kw dkyok I # >kyk- eh dok dok u I kxrk romyk fl upk c?kkyk ch tkr grw ^ij vkt eh ?kjh tokykch vkywulgrw** Eg.kw vkblual klixrya

cki wavkbyk fopkjyy^i ki V dyaxyk; ryk ekfgr y, dk; X^*

 $\mbox{$V$kbl Eg.kyh]$^{$^$}$ eyk dk; p ekfgrh ukgh] d \mbox{paxsya$} rh\ ckckl kcusch dk; l klixrya \mbox{$lgk;$} **$

 $\label{eq:ckin} \text{ckin}; k \text{ , dne } y \{ kkr \lor ky \} \lor u \text{ ckiw}, \text{ dne dikGkoj gkr gk.kw} \text{ Eg.kyk} \} ^ \lor kj \} \\ \text{nok} --- \text{ehbljypdh} \text{I dkGh R}; kyk ik.kh \lor u Hkkdjh f?kÅu dMcajk [kk; yk xkonjh ikBoyagqa ryyk ekfgr llgk; dk** \\ \\ \text{ryk ekfgr llgk}; dk** \\ \\ \text{ekfgr llgk}; dk** \\ \\ \text{ekfgr llgk}; dk** \\ \\ \text{ekfgr llgk}; dk + \text{ek$

vkbZEg.kyh]^eyk dkghp ekfgr Ugk; ** vkbZygku yxdjkyk f?kÅu cktoj grh- R; kyk I blkkG.; kP; k uknkr eh vkywdh ukgh\ rh bljyh grh- fttkbZgrh] i.k fruach pkbd'kh dsyh ulgrh- ckckl kc vkyk vu tÅu rkyehr >ki k; yk xsyk- R; kuch dqkkyk dk; I kbxryalgk; -

 $\label{eq:ckiwEg.kyk]^^?kjkr ,o<h ek.kl avl rkuk] ysdjkph l k/kh pk&d'khch dqkh dsyh Ugk; -dk; Eg.kkoa; k ek.kl kuk! deky gk;]npk]ukjk; .kk! dl algk; paek0; k l al kjkpavu egykpà.**$

cki wvkbłyk o ft tkbłyk f′k0; k fnÅ ykxyk vu pVfn′kh mByk vu R; kual lukkyk cykow ?krya

, d nku ikjkuk ckiwabpkjyarj ikjaEg.kkyh]^^ nijkjh ckjk , d oktrk >kMk[kkyh fVi#akkph [kG.kh cuor i ki V c I Y; kyk \lor kEgh cf?kryagira uarj okjk I \lor Vyk] R; koGh \lor kEgh \lor kovr \lor kywgirks R; kuarj dk; >kyarh \lor kEgkyk ch dGyallgk; \lor **

ckckl kcyk rkyehruacksykowu \vee k.kya \vee ku \vee kli kuackckl kcyk FkktknanVkowu fopkjy} ^^ckckl kc] i ki V_7 k dBk; $\$ rwxkomjh xsyk grkl $\$ uQgA $\$ ex frFkai ki V_7 kyk cRkhryaUgk; $\$ dk $\$ **

ckckl kc \vee ijk/kh eukua [kkyh eku ?kkyw mHkk grpk- [kG.; kP; k uknkr ?kjh \vee kY; koj l kak; pk bljyk grpk- R; keGaR; ks \times li grpk- dkghp ckyr uGar- \vee klikua o $Gh[kya \vee ku i t]gk$ nj Mkow bDakjya^1 kak] i ki V; k dBak; V ukghrj] ryyk myVk Vkaxw ekjhu-** rjhch ckckl kcV; k i kBhr , d /ki dVkryk-

cki wvkli kyk Eg. kyk]^^vkj al Mkk] R; kyk ek#u dk; mi x gk; \]R; kyk ekfgrul ay-**
I Mkk Eg. kyk]^^cki ij R; kyk I xGa ekfgr gk; - ij gh I kxr Ugk; - dk; rj yi owu
fBor;] nkj dkdkdwa vu ft tkbluaR; kyk ykMkua; Mad#u Vkdya -**

ckckl kcuabþkj dyk dh] $^{\text{kl}}$ idkj l kfixryk rj ?kjkryh ek.kl a $^{\text{kl}}$ ki kkyk cfMoY; kf'kok; l kMk; ph Ugkb $^{\text{kl}}$ Eg.kmu ckckl kc xlip cl yk-

nknk]ukuk xyhryh I xGh ek.kI axkGk >kyh] ?kj ki φ aykcdkph xnhłteyh- , dp dkyok I # >kyk dh] ^i ki V d φ arj gkjoyk; *

nknk Eg.kyk] Fkkæk] ful rk dkyok d# uxk] R; kyk \vee ki.k g \emptyset ld ψ k- \vee ki ψ i fgY; kmk xkomjh tk \mathring{A} u c?k ψ ; k**

 $I \ xGh \ ek.kI \ anknkyk \ tkÅ; \ k \ Eg.kyh-dqkh \ dfiny \ ?kryk] \ dqkh \ cWjh \ ?kryh] \ dqkh \ dkV; \ k \ xkomjh \ fu?kkyh-rok j krhpavdjk&I \ 0ok vdjk oktyagqra$

 $fgdMaeh\ de+\hat{\ }kP;\ k.\ ?kkGD;\ kr\ I\ ki\ Mywgrw\ fdrhgh\ gkM+\cdots-gkM+\cdot Eg.\ kyavu\ fdrhch\ dkBh\ fQjoyh\ rjhch\ de+h\ ykuc\ tkr\ u0grh- \ eh\ bipkj\ dsyk]\ ^vki\ wu\ xjaxGr\ >kMki\ kI\ uaykuc\ tkÅ;\ k- Egath\ gh\ de+h\ xIi\ cI\ rhy- dkj.\ k\ fgFka\ de+,\ kupkjkstpk >ki\ k;\ pk\ fBdk.\ kk\ VI\ kok-$

eh xjaxGr ykoz xsyks rjhch dejh ekÖ; k ekxavkyhp-; krya, d deja tkykr ekÖ; k vaxkoj ; såu i Mya vku ek>aujMa/kj.; kpk i j; Ru d# ykxya eh mrk.kk i Muu i k; oj dsya dej; kyk ujMai dMrk vkyauk; - dej; kuaekMh i dMyh-R; kgh fLFkrhr eh dej; kP; k ekuxVkoj ykdNJ gk.kya ekÖ; k ekMhpk #i; k, o<k ypdk rkMuu dejacktnyk >kya

ndjadeagYykdj.; kl kBh toG; så ykxya vkrk; k nd &; k de; kuaekÖ; k vakkoj ljG >i ?kryh- eh R; kgh ifjfLFkrhr de; kparkM nkNgh gkrkua/kjyavku de; kyk cktwyk <dyya d\(\frac{1}{2}\); k \(\frac{1}{2}\)xkr \(\frac{1}{2}\)y; k \(\frac{1}{2}\) tukoj kpa\(\frac{1}{2}\)kl \(\frac{1}{2}\) (kky \(\frac{1}{2}\)kl \(\frac{1}\)kl \(\frac{1}2\)kl \(\frac{1}{2}\

 $x M?; kP; k ej.kkP; k dGk]; kpk bjþkj u djrk] en dkBhP; k <math>\lor k/kk$ jkuarl kp mHkk jkg.; kpk i; Ru djhr grpw $\lor ku$ ljiVr ljiVr d $_{\mp}$; kakl u nu tk.; kpk ij; Ru djhr grpw ij d $_{\mp}$ hdk; ek>hikBlkMr u0grs

vkf.k vpkud ekGkojua dksk rjh ek.kl a ekÖ; kdMa; r vl Y; kpay{kkr vkya cWjhpk] danykpk i zkrk ekÖ; kdMai Mr gyrk- R; kuuk vkokt , zdwtkok Eg.kuu eh tkgitkgikr okpok
----okpok · Eg.kuu vkgi Myw ekÖ; k vkokt kP; k fnrkuup pkj pkSkai Gr ekÖ; kdMavkys

R; kauh ek>k vkokt oGf[kyk-ekÖ; k Hkkorkyh d \neq ; kpk; kMk i Myk g \neq k-gh ch R; kauh cf?krya R; k pk9kk&i kp t.kkauh dkB; k] nxMa?ksåu d \neq ; koj gYYkk dsyk- vkrk d \neq ; kauh ek>k ukn I kMnu R; k vky \neq ; k pk9kk i kapt.kkoj gYyk dsyk- R; kauh nxMa] dkB; k ; kP; k I gk_; kusd \neq ; kauk cMonu dk<ya vkli kua, d nksu d \neq ; kP; k i \neq dkMkr tkginkj dkB; k ?kkrY; k- d \neq ; kaph i \neq dkMavknu >kyh-frI &; k, dk d \neq ; kyk dqkhrjh eLrkd /k#u ekBk nxM ?kkryk-

'koVP; k ej.kkP; k ?kVdsyk ; k ek.kl kuh ; Åu eyk okpoyagıra eh nokpavkHkkj ekur gırks vu tkjtkjkr jMr qırks

cki w to G \vee kyk \vee u cki waeyk mpyw ?krya \vee ku cki w Eg.kyk]^ \vee kj li ikj kj rwbrdk o G fgFkad I k Fkkc \vee k**

ehckinyk?kMysyhlxGhdgk.khlkfixryh-

nknk Eg.kyk] ^^cja>kyackck] \lor kEgh oGoj \lor kyı] ukghrj ; k d \notin ; kuh ryyk QkMwu [kkYya \lor l ra**

ckinyk mnnskuu nknk Eg.kyk] ^^rG'khjke] i kj xavknuvkdke gk;] ákph tjk dkGth ?kr tk] ákph \vee kbZ ungehp ydjkckGkP; k /kcMD; kr \vee I rh; k- i kj xk dkBa xsyk]dk; dj rks] rkgh I okZuh dkGth ?; k; yk Qkthy-**

 $\begin{tabular}{ll} $$ $$ vklik Eg.kyk]^* ckckl kcyk ekfgr grag ghikgixafgFkaxkonjh gk; Eg.kuu-rjhch R; kua dqkkyk dk; I klaxryaUgk;] dk; Eg.kkoa; k ckckl kcyk] i kBpk Hkko gk;] Eg.kuu-rjh ásyk tjk e; k <math>\lor$ I kyk Qkthy dk Ugk; **

 $ek0; \ k \ mt0; \ k \ i \ k; \ kP; \ k \ ekMhpk \ , \ d \ \#i; \ k, o < k \ ypclk \ d _{\#}; \ kuarkMyk \ grk- \ vu \ R; \ kp \\ i \ k; \ ekMyk \ grk- \ eyk \ cki \ uua [kka] koj \ cl \ ouu \ ?kjh \ vk. kya \ ek0; \ k i \ k; \ kph \ t [ke / kryh \ vk. kya \ ek0; k i k; kph \ t [ke / kryh \ vk. kya \ ek0; k i k; kph \ t [ke / kryh \ vk. kya \ ek0; k i k; kph \ t [ke / kryh \ vk. kya \ ek0; k i k; kph \ vk. kya \ ek0; kph \ vk. kya \ vk. kya \ ek0; kph \ vk. kya \ vk. kya \ ek0; kph \ vk. kya \ ek$

nd &; k fn'kh eyk nok[kkU; kr f?kÅu xsyk- MkDVjkuh I kfixry]^ R; kyk cichr 14 batD'ku ?; koh ykxrhy- batD'kus bFks vkgr] vktikl w pkywd#-* ljdkjh MkDVjkuh 14

 $bat D'kus 14 \ fnol \ cachr \ fnyh-vku \ i \ k; \ ekMyk \ gark \ Eg.kuu \ [kktxh \ MkDVjkdMuu \ i k; \ dkeV; kua \ ckdkyk-vku \ i k; \ ekMyk \ gark \ Eg.kuu \ [kktxh \ MkDVjkdMuu \ i k; \ dkeV; kua \ ckdkyk-vku \ i k; \ ekMyk \ gark \ Eg.kuu \ [kktxh \ MkDVjkdMuu \ i k; \ dkeV; kua \ ckdkyk-vku \ i k; \ ekMyk \ gark \ eg.kuu \ [kktxh \ MkDVjkdMuu \ i k; \ dkeV; kua \ ekMyk \ gark \ eg.kuu \ [kktxh \ MkDVjkdMuu \ i k; \ dkeV; kua \ ekMyk \ gark \ eg.kuu \ [kktxh \ MkDVjkdMuu \ i k; \ dkeV; kua \ ekMyk \ ekMyk \ eg.kuu \ eg.kuu$

, o<ad#ugh nknk , d fn'kh Eg.kyk]^^r\$G'khjke] i kjkyk 'kuokjh etjpkMhyk i k.kh i ktk; yk f?kÅu tk- vku R; kpk i k; tksekMyk; R; kykch dk; rjh ekB; k nok[kkU; kr uÅu bykt dj-**

 $\hbox{ckiweyk f?k} \hbox{\mathring{A} u$ I ksyki jiyk xsyk-n f. \&; k fno'kh etj pokMhyk ik.kh iktya ekB; k nok[kkU; kr us \&u ek>k ik; nk[koyk-xff?kk Qkj I ftyk grfk-MkDVj kauh xff?; kyk cllust ckdkyso xkG; k vkSk/ksfnys$

HWX ckjk

∨kbZ?kjkr ydjal blkkGk; P; k uknkr ∨l k; ph-rh ckgji tkLrh y{k | k; ph Ukkgh- ∨kth ekriji ijrd ∨kbP; k ckGkri.kkyk eax[M; kyk ; sÅu l gk&l gk efgusjkgk; kph- ; k dkGkr ∨kth eyk o ekÖ; k ikBP; k cfg.khyk y; dkeal kaxk; ph- rG; kyk ckjD; k ydjkph ckGrph /kopkyk ikBok; ph- R; k dkGkr uG uûgra ik.kh ∨kMkpa ∨k.kkoaykxr gra dkiMa/kopk; yk rG; kyk tkoaykxr gra rG; kyk Hkjiji ik.kh∨l k; pa

, d fno'khvkthEg.kyh]^^ i ki V] rwvu i k#rG; kyk tkÅu ckGrph/krÅu vk.kk-** ehEg.kyij^^eyky; Hkrplykxyh; k-eh troY; kf'kok; ckGrph/krpk; yk tk.kkj Ugk; ** vkthEg.kyh]^^ ckGrph/krÅu vk.kY; kf'kok; trok.kfeG.kkj Ugk; -**

frrD; kr cki wvkyk- eh cki wk Hkwd ykxyh; k Eg.kw I klixry] vu vkth Hkkdj nbuk Eg.kw I klixrya

 $cki w Eg. kyk]^{\c k} ekeh] \lor keP; ki kij kyk r fighik.; kr dk c?krk-j kgk; pa<math>\lor$ l &y rj uhV j kgkok- ukgh r j r figh r fipP; k xkokyk t kok-**

ckiwxY; kuarj vkthua eyk toG cykoya vku rkiysya myFkua ikGkoya vku Eg.kyh]^ilj; kmk tj rq; kck yk rwpkgkM; k l kūxrY; k rj rq>aRok**M** ák myFkU; kua ikGohu-letyà**

eh enplkV ckGn; kpackpda?krya \vee u cfg.khyk f?kÅu rG; kyk xsyks R; koGh ek>h cfg.k i k#pao; 4&5 o"kkpa \vee 1 ay- eh rG; kP; k dMsyk enplkV ckGnrh /kopk; yk pkywdsyh-

[kjaEg.ktsckGurh/kmpk; yk eyk y; h tM tkr gura ij vkthP; k /kkdkuagsdke eyk djkoaykxr gura , d fnl kvkM ckGurh/kmpk; yk rG; kyk tkoaykxr gura ekö; k c#cjph dqkhp fe=ckGurh/kmpru0grs eh [kkyh eku ?kkyu ckGurh/kmprguru rok ik#ik.; kP; k dMadMayk ikgrgurh-ek>ay{k ik#dMau0gra ik#ikgrikgrtkLrik.; krxsyh-o xVaxG; k ek#ykxyh-

eh ckGqrh/kqpr/kqprlgt cf?kryajrjik#ik.; kr cNprgqrh-gsc?kww eh ckGqrhfrFkqp Vkdyh-vkwik#yk okpo.; kl kBh ik.; kr iGr xsyks [kjaEg.ktseyk chikgk; yk; r wûgrai.k eh ik#yk okpfo.; kl kBh ekxpk iqspk fopkj dsyk wkgh-ik# cNpr gqrh-frFkaik.kh ekő; k xG; kbrdagqra eh tkÅwik#yk/kjyaik#wa?kkc#wekő; k xG; kyk feBh ekjyh-R; keqGaeh o ik# nk8kch ik.; kr dyMyw ekő; kch wkdkrkMkr ik.kh tkÅ ykxya ik#waxG; kyk feBh ekjY; keqGseykch whV mHkk jkgrk; bZuk >kya eyk okVyavkrk ^vkEgh nk8kch ik.; kr cNnw ejrwk-* vkEgh nk8kacNpr vl ysya, dk mUgkGswkokP; k xjk[; kwacf?krya

, d ckb/Eg.kyh] ^^dqlkph ydjag\$r xackb\\ cjP; k cjagh xgk[kh ; Gr \lor kyk Eg.kuu gh ydjaokpyh**

 $frFkp \lor keP; k?kjktoGphik\# pkblkkjhu /kqka/kpk; yk \lor kyhgrp- fruavkEgkyk oGh[kya \lor ku Eg.kyh]^^\lor kxackbl gh nkjdkph ydjagfrdh- <math>\lor ku$, o<; k ygku ydjkuk ckGrph /kpk; yk rG÷ kyk dqkhikBoyavl y**

frua \lor kEgkyk ?kjh ?ks^u xsyh o ?kjh xs'; kuarj \lor keP; k \lor kbJyk Eg.kkyh] ^^nkj dk] gh ysdjarG $\dot{}$ kyk dqkh i kBoyh**

 $\sqrt{kb/Eq.kkyh}$ ^^dk xai k#] dk; >kya**

i k# Eg.kkyh]^^vkxankjdk] gh ydjavkt i k.; kr chhu ejr grh- cjP; k cjano gråurh xjk[kh mUgkGsfrFkavkyk vku R; kuacf?krył ukghrj gh ydjaik.; kr chlr grh- yxnyx R; kua i k.; kr thåu ydjkuk ckghj oMuu dk<yaEg.kuu gh ydjaokpyh**

fttkbZjkxkuanq&;k fno'kh frP;k xkokyk fu?ku xsyh- eyk y; vkun >kyk-vkeP;kdMu rh I xGh dkead#u?;k;ph- d/kh d/kh vkMkyk i k.kh ch vk.kk; yk i kBok; ph- jkukr tGku vk.kk; yk i kBok; ph- R;ksI xGk = kI vkrk deh gqkkj gqrk-

xYyhr cRrhP; k MkacktoG l kB; kyk Kkukck ?kgy] Kkukck ?kkMx] ukxwrkR; k l koath] Hkxoku l koath] nkewokdM] 'kadj okdM] 'kkejko l koath] f'kok fFkV] Hkxoku xoGh] /kkMlik ekLrj]fo".kq[kmkjs; kB; k xlik pkyY; k gB; k- xYyhr ejiyh/kj gtkjs; kapafdjk.kk nuplku gura nuplkukl ekj geskk xYyhryh o ckgjP; k xYyhryh ek.kl acRrhP; k Mkack[kkyh cl w xlik ekjk; ps

ek>aik; ikacGavIY; keqGaeh ikgikr [kGk; pksdeh vu ekB; k ek.kl kB; k xlik y; , xdk; pks 1957 ph I koI=d fuoM.kmd ykxyh grp- , dk&, dk ernkj I åkkr nksu&nksu [kkl nkj

fuoMwu | k; ph i/nr grph- I ksyki nj ernkj I akkr mLekukckn] ukmM] i qksftYákpk dkgh Hkkx tkMysyk grpk-; koGh ts th-ekjsgsI ferhpsvkf.k rk; kli k gjh I kuo.ksgsdkikki ps[kkI nkj fuoMwu vkysgrps eaxGosk rkyrplk I kaxksyk fo/kku I Hksyk tkMyk grpk- ; k ernkj I akkr eaxM; kps i kMjax gkuekusgsI ferhP; k fo#/n mHksgrps

 $fuoM.kqd \lor Vh r Vhph>kyh- I kakkY; kps dśkojkojkÅrekek i pM erkusfuoMu \lor kys nI \&; kP; k \lor xqnj nohph ?kVLFkki uk dsyh- <math>\lor$ kEgh o \lor keph Hkkodh \lor koP; k rqkkbps i qtkjh gqq uojk=kr o nI &; kr \lor keP; k ?kjkr /kkfeld okrkoj.k \lor I k; pa \lor kEgh i gkVajkst nohyk \lor kjrhyk tkr \lor I w frFkaI \lor G; k ck; dk nohph \lor k.kh Eg.kr \lor I r- ?kV cI ou ?kV mVhi ruj o Qt/la i quohi ruj \lor keP; k ?kjkr \lor bp /kkoi G \lor I k; ph-

; k dkGkr nohP; k i saiqtkjh Eg.kwu vkEgh i kjacl k; pks eh] x.ki k] Hkkxor] I qdk] fdl uk] Kkunj I ljkk"k] vokhkl] 'kodj] f'kok gh I xGh i kjackö; k o; kph fdøk ekö; ki skk ekB; k o; kph nohP; k i savkdysyai saxkGk dj k; ph- ukj G QkMnu v/kZdopky ?; k; ph- fuon ?; k; ph] vkf.k xær Eg.kth nohP; k Egkjad/kh d/kh i sk nku i sath fpYyj Vkdyh tk; ph- rh fpYyj vkEgh i kjapks#u f[k'kkr ?kkyk; pks vku R; kenGa nohP; k i sacl k; yk vkEgk i kjkr OgMkpMM ykxk; phvkeP; kr, d ucj, d i kjxayckM gyra rh i kjxanohP; k i spal xG; kr tkLr i sapkjk; pa eh ch Hkhr Hkhr FkkMaFkkMai sapkjk; pks

i quohP; k fno'kh nohP; k EgkġaekBk dk; Ыe ∨I k; pk- ∨kEgkyk y; etk; k; ph- xMh ∨kf.k ck; kB; k ∨ækr; k; pa dMwl ai MY; koj I kB; kyk nohP; kI ekġ BoyY; k jkbMX; kpato.k]I okiuk fnyatk; pa R; kfn'kh i quohpafVi yi pkm.kai MY; kya∨I k; pa jkrhP; k ∨djk&ckjk okti; ir noh Egkġa I okipk dkyok ∨I k; pk- ekBh ek.kI a ∨kEgkyk I kj [kh I kj [kh [koGk; ph ij ∨kEgh R; kuk tqkuk; pksUgk; -

 $noh \ EgkjuajkrP; \ kyk \ Nfcuk \ fu?kk; \ pk-rh \ Nfcuk \ ekacokM; \ krua \ dkyk \ Qjh ?kkywu \ ek?kkjh ; k; pk-R; k \ NfcU; kr ek; mkG \ ck; k \ vackr ; s^au ukpk; P; k-ck; k \ ekdGadd \ l \ kMwu \ fpjdwu \ ojMk; P; k-gsl \ xGac?kk; yk eyk y; etk okVk; ph-ij \ vackr ; s; koj \ vku \ nohoj , o<; k ygku o; krgh ek>k dkgh fo'okl u0grk-ij Ekh ckjdk \ V I Y; keGadqkkyk ckyw 'kdr u0grw$

 $fid\ gojM;\ kr\ \lor kY;\ koj\ \lor kepa\ dV/nc\ xkoktoGP;\ k\ xkonjh\ jkgk;\ yk\ tk;\ kpa\ frFkajkgk;\ yk\ y;\ y;\ etk;\ k;\ ph-\ ,\ d\ ekBh\ ?kkMh [kki ?kkryh\ tk;\ ph-\ R;\ k\ [kki hr\ ,\ d\ ekBh\ ykdMkph i $Vh\ \lor l\ k;\ ph-\ R;\ k\ [kki hr\ ,\ d\ ekBh\ ykdMkph i $Vh\ \lor l\ k;\ pal\ keku\ i hB]\ pV.kh]\ ;\ sl\ jj\ dkmaj\ csl\ u]\ nkGh\ \lor l\ k;\ pal\ keku\ i hB]\ pV.kh]\ ;\ sl\ jj\ dkmaj\ csl\ u]\ nkGh\ \lor l\ k;\ pal\ keku\ i hB]\ pV.kh]\ ;\ sl\ jj\ dkmaj\ csl\ u]\ nkGh\ \lor l\ k;\ pal\ keku\ i hB]\ pV.kh]\ ;\ sl\ jj\ dkmaj\ csl\ u]\ nkGh\ \lor l\ k;\ pal\ keku\ i hB]\ pV.kh]\ ;\ sl\ jj\ dkmaj\ csl\ u]\ nkGh\ \lor l\ k;\ ph-\ \lor ku\ R;\ koj\ l\ sl\ kd\ dj\ k;\ ph-\ cki\ wl\ kP;\ kyk\ f'kdwh i\ sl\ ok;\ pk-\ \lor kEgh\ i\ kj\ af'\ kdwh\ Hkkorh\ cl\ up\ 'kcdk;\ pks\ \lor ku\ tok;\ pks$

 $to Gp\ , d\ fgj\ gnrh-R;\ k\ fgjhpaik.kh\ l\ nnu\ Ekh\ \lor k.kk;\ pks\ \lor kEgh\ fnol\ Hkj\ 'ksrkrp\ jkgk;\ kpks\ xkokr\ deh\ ;\ k;\ pks\ ;\ kp\ dkGkr\ ek?k\ 'knrn\ 14\ ;\ k\ frFkhyk\ nkekthph\ t=k\ y;\ ekBh\ Hkjk;\ ph-\ t=k\ \lor kBMkHkj\ Hkjk;\ ph-\ t=r\ ek;\ nkG\ tukojabdkyk\ ;\ k;\ ph-\ t=r\ fi\ dkpaijn'klu\ ch\ Hkjk;\ pa\ ckjdackjdaikG.k\ k\ j\ kf.k\ brj\ dkgh\ eukjatukph\ I\ k/kus\ t=r\ ;\ k;\ ph-\ I\ kB;\ kyk\ rom fl\ uneavku\ rekl\ spkywûgk;\ ps\ eh\ \lor kblyk\ d/kh\ d/kh\ Eg.kk;\ pk]\ ^^vk;\ a]\ ^^eyk\ t=r\ fl\ unek\ c?kyk i\ afn\ dh-**$

vkbZEg.kk; ph^^re; k ck-dMuaekxwu?kh-**

 $ckiwEg.kk; pk]^{-} ikiV rwvktwd ckjdk gkbl] rwk fluwekpavkiW frdhV ?kl; krhfluwekr v/klfrdhV dok ul ra - vkiW frdhV dk-w ckjD; kukadlaijoMk; pa**$

vk..kk Eg.kyk]^^ex vladjcki ij rwvku eh nkikoch tkÅ; k] vki Y; k nkikoph nkou frfdVadk</br>
frfdVadk
kr- vku i ki V; kpafrdhV dk
kppaUgk; - rwR; kyk [kka] koj ?kh- vu ojuapknj Vkd- Egath i ki V; kyk frdhV cl k; paUgk; -** cki nyk ckckl kcph ; Oprh y; vkoMyh- jkrP; kyk l kMsuÅ oktrk vkEgh fr?kae.kj hP; k rour fl unek c?kk; yk xsyks fl unekpauko gra*cksydh ckgnyh*

nku frdhVadk<yh-cki waeyk [kka|koj ?krya eh R; koGh | kr&vkB o"kkipk v l u-ij ek>h mph tkLr grh-toGikl Ekh ckin; k [kka|kyk ykxr grw cki wa [kka|koj ?krY; koj eyk drijyk ik; kph frMh | k; yk | kūxrya v u oj u aekö; k vakkoj pknj Vkdyh-

 $gk \; I \; xGk \; [kVkVkii \; frfdV \; okpok.; kI \; kBh \; girk-R; k \; dkGkr \; , d \; \lor k.kk \; frdhV \; gira \; , d \; \lor k.; kyk \; Qkj \; fdær \; girh- \; eyk \; [kka| koj \; ?ks^Au \; cki i i vo?kMiu \; pkyyk \; girk- \; dkj .k \; ek>aotu \; tkLr \; gira fI \; uipkP; k nkjktoG <math>\lor$ kY; koj Mksvjfdijuacki iyk Fkkicoya \lor ku Eg.kyk]^^ frdhV**

cki wEg.kyk]^^ gh?; k-**

cki wEg.kyk]^^ckj dai kj xagk;]**

Mksvjfdij Eg.kyk]^^ikjkpao; dk; gk; **

cki wEg.kyk]^^vkl yanku pkj o"kkipa**

eh rl po dsya Mksvjfdij njMkonu Eg.kyk]^^, i kgik]mHkk jgk** nksu rhu oGk njMkonu Eg.kY; koj] eh mHkk jkfgyw rj ek>h mph toGikl ckiwbrdhp- Mksvjfdij o Mksvjojph l xGh ek.kl avkeP; kdMac?knu [kks [kks ql wykxyh-

 $\label{eq:ckinyk} \text{ckinyk y; fgjeq Y; kouh > kya dkj.k ckin; k jDrkrp yckMi.kk u0grk- LoHkko $$ \sqrt{r'k; IjG o ikekf.kd grk- dqkkP; k okGY; k ikY; kojfn[kny ik; fBor u0grk- vkepk ck-?kkcjyk- vu vk..kkyk Eg.kyk]^^ckckI kc]ckgj tk vku vktrd , d frdhV dk<nu vk.k-** $$ $$ (1.50 kg/k) (1.50 kg/k)$

ckckl kcua ckgji tk A u n $_{1}$ ja , d frdh V dk W vk.kya ck W ifg Y ; km W kp frdh V okpok; yk xyk V ku ck W ph Y fth Y kyh W th ck Y ph Y fth Y th $^$

HWX rjk

<oGI okVsyk nknk o ckinyk vktkckdMnu 6& 6, dj tehu okVnu vkysyh gnph-nknkua R; kP; k okV.khyk vkyšy; k 6, dj ki6h 3, dj tehu ckinyk bödyh gnph-vkrk <oGI okVsyk vkeph 9, dj tehu >kyh gnph- eh ckinc#cj cSyxkMhr jkukr tkÅ ykxyngnpw I qxh vI yh dh] Ekh ckinc#cj cSyxkMhr cl nu cSyxkMhyk Eg\$ ckaknu U; k; pks vku frFkaxšy; koj Eg²khyk FkkMlaxor pkjk; pks rI po dok dok Eg²khyk , dk fBdk.kh ckaknu ckVnd dk<nu ?kkyk; pks gsdke ek>agnpa

eh \vee u ckinch frFkand &; k >kMk[kkyh toyw eh \vee ku ckinua FkkMkl k blokVk ?krykblokV; kurj i ljqk ck; k dkekyk ykxY; k- eh Eg′khl kBh ckVnd dk
k; yk xsyks

 $\label{eq:ckiwck} \begin{array}{ll} \text{ckiwck; k1; k1eyi} & \text{tepG} \\ \text{kr} & \text{dkghrjh glyldr grpk-ik; kua mH; k vkM0; k tepG} \\ \text{kr} & \text{QkV; k ek\#u dk; rj oLrwglyldr grpk-ckiw [kkyh eku ?kkyw glyldw glyldw neyk-ckiph eku nfkyyk yh-ckiph eku ugehp nfkk; ph-ckiweku nfky; yk ykxyh dh ekuayk vk/kuae/kua fgl da|k; pk-ckipa ekuayk fgl da|k; pa cf?krya dh vl aokVk; pa dh] ckiw dqkkyk rjh ekuaua [kqkkow fgdMa; h]fgdMa; h]vl a[kqkkor vl Y; kpk Hkkl 0gk; pk-gh ckiph ugehph lo; grph-gh lo; R; kijxkop; k ck; kauk ekfgrh u0grh-ckiwl kj [kal kj [kaR; k ck; kdMac?kw ekuayk fgl danr grpk-vku R; kph gjoysyh dk; rjh oLrwglyldr grpk-ck; kauh rh cf?kryavku , dnksu ck; kauk okVya dh] ^gk 'krkpk ekyd , dh , dhyk tepG & kr cykorwgk; -* \\ \end{array}$

R; k , d nksu ck; kuh I xG; k ck; kuk I kfixry 1 ^rs c?k- R; ks 'krkpk ekyd ekuwa vki .kkyk dI k cykorw -**R; kfi; k R; kf

, d ck; Eg.kyh]^^ ck;! dl yk 'krkpk ekyd gk; \ exki kl uaEkh c?krh; k] u\(\text{ra} \) ra ekuwa[kqkkor\(\text{v} - \nu \) gdMa; h-\(\nu \) k b'\(\text{kj} \) dj r\(\text{v} - \) ck; \(\alpha \) yk dksk \(\nu \) k; k&cfg.kh\(\alpha \) kbir dk llgk; dgkkl BkÅl \\ **

'koVh ck; kuh dke cm dsya \vee ku >kMk[kkyh tk \mathring{A} u cl Y; k-

cki wabipkj yłj^^ ck; kuwdke dk cm dsył**

R; kryh, d ck; Eg.kyh]^^ \lor kjackck] ryk dk; ykt yTtkgk; dk\ e?kki kl uanwR; k Bdk eko'khyk \lor ku ; euk eko'khyk cykorw] ekuwabZkkj k dj rw]; kl kBh rw \lor kEgkyk dkekyk \lor k.kya 0g; λ **

ck; kpk dkyok y; ok<yk] cki waR; kauk I kfixrya ^^ck; kaulj ek>h eku y; n([krh; k Eg.kw eh ekuayk fgl danr \lor I rit*

 $\label{eq:ck:kdk: ck:kyk} ck; k dk; \ , sdkyk r; kj u0gR; k- gh dkyok , sdku 'kstkjP; k 'ksrkr nknk gyrk- R; ks vkyk]R; kyk [kjk i j dkj dGyk]$

cki wnknkyk Eg.kyk] $^{\sim}$ nknk] eh gFkat \mathfrak{q} G+ kr i \$kkpax ViGai \mathfrak{g} yag \mathfrak{q} arh I ki Mhuk >kya] rkl Hkj [kkyh eku ?kkyw Ekh g \mathfrak{q} Idr \mathfrak{q} - [kkyh eku ?kkrY; ke \mathfrak{q} aek>h eku n \mathfrak{q} kr g \mathfrak{q} rh- Eg.kw eh eku \mathfrak{q} kfgI dan \mathfrak{q} g \mathfrak{q} v**

nknkuch R; k ck; kauk I etkowu I klixrył ck; k i ligk dkekyk ykxY; k- eh ckVwd dk<kyk xsyks vku ckVwd dk<rk dk<rk 'kmkMł okGdach glydr grw ?kjh dkyokukyk nklydach glydr grw vku vpkud nklyd; kP; k; syktoG eyk , d QMD; kr ckilkysyaxBjal ki Mya Ekh rh xBja ?kryavu i Gr tkÅu cki wvku nknkyk fnya cki wa xBjal klyw cf?krya

nknk Eg.kyk]^^ vkjar©; khjke] rw xBjad®aigyagma vku gh xBjaR; k i kjkyk d®a I ki Myac?k\ cgmcd xBjad\; kuamd#u R; k frFkayko u\u00Au VkdyavI koa r@; khjke]jkukr vkl ai \$ a i \u00efu Bor tk\u00e5 uxa d\u00e4hm[k#u yko fu\u00Au Vkdr vI R; kr- cjP; k cja i ki Vyk xBja I ki Mya

cki nyk y; $\sqrt{\text{kun}} > \text{kyk}$ o nknkyk Eg. kyk]^^ nknk] xBj al ki Myacja>kya** R; k xBj kr 10&10 P; k uky/kparhu cMy graEqath 300 # i ; sqrs

nknk Eg.kyk] ^Ugk; rj r ϕ ai\$ a c¶r g ϕ a bukdkj.k r ϕ a?kj tGr g ϕ a i\$ a?kjh fBokyk tkxk ulay rj ekö; kdMafBor tk- i.k jkukr \vee l afBor tkÅ uxal -**

rokikl uackiw i\$ a TokjhP; k nk.; ke/kh] i kR; kr fBowykxyk-jkrP; kyk dokch mBw fpe.khP; k \lor afkvd i zdk' kkr rsi\$ arksekstk; pk- EkhfdR; zd o\$dk c?kk; pks

Ckki wacu i ji okVayk 'kidjeku] Ugkoh; kiph ftehu 3, dj 10 xiBa 5 o"kkP; k cksyhua [kMkuadsyh girh-ekÖ; k i kBhoj i k# tyeY; koj cki wa 375 #i; kyk rh tehu dsyh girh-dkxinch d#u ?kryk girk-R; k osGyk dis dk; nk l jdkjuavk.kyk girk-tksdkskh ek.kii [kMkua ftehu djhy R; kP; k ukokoj rh tehu disdk; | kuagkr girh-

vkeP; k cki pauko 'kadjP; k 'krkoj ykxyagra cki nyk ekeynkjph ukb/hl vkyh grh-R; k ukb/hl hr fy0gyagradh]^ 'kadj ekus; kph tehu rfgh [kblkuadjhr vkgkr] ræpsuko R; k tehuhoj dfG Eg.knu ykxysysvkgs rh tehu 40 i V 'krl kjk Hk#u ræP; k ukosgkå 'kdrs rjh ; k tehuhP; k l uko.khl kBh vend vend jksth l dkGh 11 oktrk rql hy dpjhr qtj jqkos **

 $r'khp\ , cl\ ukb/hl\ 'kaclj\ ekusyk\ l\ n/mk\ xsyh\ gnrh-\ l\ kB;\ kyk\ clMnl\ a i\ MY;\ koj\ 'kaclj\ ekus\ vu\ R;\ kph\ Egkrkj\ h\vkbZvkeP;\ k\ ?kj\ kclMa\ vkyh]$

'kwdjph Egkrkjh \lor kb/cki nyk Eg.kyh] ^^ rG'khjke] \lor keph ftehu dG dk; |ku rnyk feG.kkj gk; - Eg.knu \lor kEgkyk I jdkjph ukb/hl \lor kyh; k- I kEekjh ekeynkj dfpjhr \lor kEgkyk gtjjgk; kyk I kfxry; **

 $ckinEg.kyk]^{-}eyk.ch.r'khp.ukb/hl.vkyh; k**$

brD; kr frFka ukuk]nknk] vku xYyhryh dkgh ek.kl avkyh-ukukuaR; k 'kxdjP; k Egkrkjhyk dk vkyk\ Eg.kw bpkjya

Egkrkj hual oldkgh birh&oRrkar R; kyk I klixryk-

 $nknk Eg.kyk]^{n} rG'khjke] r_{p}k bjokj dk; gk; **$

 $ukuk]^{\wedge} \lor kjar G'khjke]; Mk&fcMkgk; dkdk; <math>\lor vkiu$ tehudk; $QqUV fcdV ?kskkjgk^{\wedge} rdk; \displays 40iV Hkjrw -**$

 $\mbox{ckii} \mbox{\it l}^{\mbox{\it h}} \mbox{\it rh} \mbox{\it tehu} \mbox{\it jhrljeyk} \mbox{\it bdr} \mbox{\it fnyh} \mbox{\it rj} \mbox{\it eh} \mbox{\it f?krw} \mbox{\it ij} \mbox{\it d} \mbox{\it G} \mbox{\it dk}; \mbox{\it |kua} \mbox{\it rh} \mbox{\it tehu} \mbox{\it eh} \mbox{\it eh}$

frFkaxyhryscl ysysHkkodhpsykod vokdp >kys

ukukuackinyk ckghj cykonu Ugsya vku gGwvkoktkr Eg.kyk]^^ gsc?k r@'khjke] ftehu pkaxyh gk;] f'kok; gh ftehu rq; kyxrkyk gk; - i fgyh okVnu vkysyh I kMsi kp , dj tehu vku gh I Ook rhu , dj ftehu v'kh feGw uÅ i ko.ksuÅ , dj ftehu , dk rGkyk grph; kvkja; M; k! I akh pkyw vkyh; k vu rwuxaEg.krw k- rgyk dk; ; kMk dk 'kkuk Eg.kkoà I xG; k egydkr d@dk; | kP; k ftehuh dI .kkj kyk feGwykxysY; k gk; R; k-ftehu feGr vI rkuk eyk uxwvI kEg.k.kkjk; kMk ek.kw; k eaxM; kr i fgyk rp vI 'khy vI aeyk okVr; **

cki ij^^ gsc?k cGh] eyk v'kh dqkkphch ftehu yqckMk; ph Ugk; **

ukuk] ^^ ex \vee l adj r(G'khjke]; kftehuhpk 40 i \vee l kjk Ekh Hkjrw \vee ku gh ftehu rw eyk rq; kukokoj >kY; koj] ekÖ; kukokoj d#u nh- Ekh I xGk [kpZHkjrw- \vee u ryykoj 'ksnku'ks #i; sch [kpkJyk nrkspkyhy dk\ **

cki ij ^^ gsc?k cGh eh rgyk l klixrya uk\ gh xjhckph ftehu Ekh yçkM.kkj uk; - \vee ku nd jaclqkkykch eh yçkMınskkj llgk; **

ukuk]^^ Fkqr~rq; kftuxkuhoj!**

'kadj ph∨kbZi &; kx eko'kh mByh∨u cki poai k; /k# ykxyh-

 $\label{eq:ckiwEg.kyk] $$ $$ \text{ckiwEg.kyk} $$ ^\text{k} = \text{ko'kh! rwek0; k } \times \text{kbP; k o; kph gkb1 - $$ $$ ek0; k d'kh i k; k i Mfrl \ tk?kjh tkÅu > ki tk-l kEekjh ekeynkjP; k i MaEkh rq; kl kj [kk tckc fnrw gk ek>k l cw gk; $$ $$ Vlalet-dqkh dk; cheyk l kbxryarj ek>h cq k i kyV.kkj Ugk;] ek0; koj bZokl fBo $$ \text{ku tk?kjh**}$$$

nd &; k fno'kh l kEekjh cki i) 'kadj eku] R; kph \lor kb] \lor ku R; kP; k Hkkodhryh pkj i kp ek.kl aekeynkj dpjhr xsys cktkjpk fnl grk- dfpjhP; k ckgj gh- Eg.ku xnh²teyh grh-

vku vkr dnG dk; | kP; k l quko.khl kBh gh- Eg.kwu xnhZekeynkjP; k i qsagqh- rkl nksu rkl kuarj ekeynkjP; k i vybokY; kuacki qoa vku 'kadj ekupauko i qdkjya uko i qdkjY; kcjksj'kadj]'kadjph Egkrkjh]cki ij o brj'kadjP; k Hkkodhph ek.kl a ekeynkjP; k i qsatkÅu gkr tkMwu mHkh jkfgyh- ekeynkjP; k i qsa'kadjP; k ftehuhph dl vkyh- ekeynkjus I xGh-dkxni=a [kkyhoj d#u cf?kryh-

vu ekeynkj Eg.kył^^gackyk-r©;′khjke?kysdksk vkgsk**
cki wEg.kykl^^eh gk; I j dkj-**
ekeynkj Eg.kył^^r@gh 'kodj ekuph tehu [kMkuafdrho"ki djhr vkgkr-**
cki ij^^i kp o"kidjhr g@ki I j dkj-**

 $\label{eq:continuous} \begin{tabular}{l} ekeynkj Eg.kyk]^gs c?kk rG'khjke] gh tehu rEgh djr gkrk Eg.kw Ijdkjua rEgkyk dk; | kua|k; ph Bjoyh vkgs; k tehuhpk 'krI kjk 30 i$ svkgs Eg.kts 30 i$ kkP; k 40 i V 'krI kjk 15 #i; sgkrks rks 15 #i; s [kM Hk#u gh tehu rEgkyk dk; eph feGsy- gh tehu rEgkyk IjdkjdMw dI w [kk.; kI kBh ns; kr; r vkgs; kies i krkB; k ijokuxhf'kok; gh tehu rEgkyk fodrk; skkj ukgh] cksyk rEgkyk; k vVh ekU; vkgr dk \ vkf.k; k vVh ekU; vI rhy rj bFka; k dkxnkoj I gh fdok vakBk djk- vkf.k y {kkr Bok} 15 #i; srEgkyk IjdkjdMsHkjk; ps vkgr** \end{tabular}$

cki ij^^l jdkj] ghftehu eyk udksgk; -**

ekeynkj]^^ dk vkjdk udksvkgs**

cki uEg.kyk]^^ eyk xjhckphftehu udksgk; -**

ekeynkj]^^ vjs?knyj gh tehu rnyk l jdkj vo?; k 15 #i; kr dl uu [kk; yk nr vkgs

vkf.k ruudksEg.krkd **

 $\begin{array}{lll} & \text{ckiil} \land \text{ukgh I j dkj} & \text{eyk gh ftehu diG dk; } & \text{kua?; k; ph llgk; **} \\ & \text{ekeynkj} & \text{j } \land \text{dk cj audksEg.krkl} & \text{k**} \\ & \text{ckiil} & \text{j } \land \text{eyk xkj xj h ckph tehu udksgk; -**} \\ \end{array}$

 $ekeysnkj]^{\sim} \lor j \c R; k \c R; k \c gkruu gh tehu dl. kagkur ukgh Eg.kuu rjh ljdkj ryyk cgky djrsvkgs <math>\lor$ kf.k rjhgh rwudksEg.krks \lor k'p; $\mathit{I} \lor$ kgs gsc?k ?kgy $\c g$ rq \lor kB fnol kuarj fopkj d#u l $\c k$ ux**

 $\mbox{$\lor$kB fnol kurj i $\psi gk \ l $\psi ko.khl kBh $cki uyk$ ekey$nkjkuacykoya $cki uuh tehu udw $Eg.kuup l $kixry$. }$

rsekeysnkj chá.k gyrs rscki udMac?kww Eg.ky $\frac{1}{3}$ ^ gsc?k?ky $\frac{1}{3}$ eh 30 o"kšukodjh djrks - i.k r $\frac{1}{3}$; kI kj [kk HkkGk HkkcMk ek.kw eh i fgY; kunk i kgkrks - ryyk tehu feGr \vee I rkuk] rwudks Eg.krks - fo'ks'k \vee kgs \vee kf.k r $\frac{1}{3}$; kdMsi kfgY; kurj rwQkj Jher \vee I kok \vee I aok \forall r ukgh**

ekeynkj kuh cki nyk toG ckykonu ?krya \vee kf.k i kB Fkki Vnu Eg.kky $\S^{^*}$ dk; no ek.kN \vee kgł no; kpałkyadj kł**

cki wafrFkY; k dkxnkoj tehu udksEg.kwu vakBk dsyk- 'kmdj o 'kmdjP; k vkbP; k MkG; krwu vkumkpsvkJwFkkcru0grs

 $\label{eq:continuity} ekeynkj 'kadjyk Eg.kkyj^^gsc?kk 'kadj] gk no ek.kl Eg.kw r@ph tehu ek?kkjhfeGkyh- vU; Fkk r@ph tehu r@gkyk ek?kkjhfeGw'kdyhul rh-**$

 $\label{eq:cki} \text{cki-watehu-l-kMY; kph-ckreh-l-xG; k-xkokr-dGyh-xkokrysykd-nku-pkj-fnol}; koj-ckyr-grs^rG'khjkel-kj [kh-ek.kl-a; k-t-xkr-yk[kkr-,-d-vl-rkr!**]$

Lychyk xkomjin LxG $_{\hat{7}}$ k 'krkryad.kLkG dMca c $_{yx}$ kMhua cki w $_{yx}$ ku $_{yx}$ k.kk xkGk djk; ps $_{yx}$ ku nku pkj ekB; k dk=h ?kkyk; ps

 $t \text{ fight } dk = h \text{ okGrhy } r \text{ fight } \sqrt{kB} \text{ is } k \text{ is } k \text{ finol kua} \text{ kGa} \text{ kkyk}; \text{ pa} \text{ Egath } dkG}; \text{ k j kukr } x \text{ ksy} \\ t \text{ kxk ifgY}; \text{ kank I kQ } djk; \text{ ph-} \sqrt{ku} \text{ R}; \text{ k I kQ } dsy \text{ k}; \text{ k j kukoj } \text{ i k.kh}} \sqrt{krk}; \text{ pa} \text{ j kukr } \text{ fp} \text{ [ky djk}; \text{ pk-} \sqrt{ku} \text{ R}; \text{ k fp} \text{ [kykr Hkl]} dV]} \text{ i kya Vkduu } \text{ rh} \text{ j ku} \text{ ?kV-djk}; \text{ pa} \text{ nku&rhu } \text{ fnol } \text{ rs} \text{ j ku} \text{ okGok}; \text{ pavku} \text{ ex } \text{ R}; \text{ koj i M}; \text{ k} > \text{kdk}; \text{ P}; \text{ k-} \\ \end{cases}$

 $T; k fno'kh e kM.kh \lor I sy R; k fno'kh R; k i M; k dk < w e kMysyh d.kl a [kG <math>\dot{\gamma}$ kr Vkdk; ph-vku rh d.kl anktigh ckt wyk pkj & i kp $\dot{\gamma}$ km mHkk j kg w dkBhuacMok; ph-R; k d.kl kpank.ka>Myadh] fi'kk nkr &; kua [kG $\dot{\gamma}$ kP; k ckgj $\dot{\gamma}$ vks w ?; k; P; k-I $\dot{\gamma}$ kGh d.kl acMok; ph $\dot{\gamma}$ kyh dh] [kG $\dot{\gamma}$ kP; k e/; Hkkxkr , d rhu ykdMkph okoMh mHkk dj k; ph-R; k okoMhoj , d ek.ki mHkk jkgk; pk- $\dot{\gamma}$ ku [kkywu

nk8kk&fr?kkauh ikVhr cMoysyaTokjhpaenku Hk#u ojP; k ek.kl kP; k gkrkr | k; pa ojpk ek.kl okja vkyadh] gGogGwikVhryaenku [kkyh l kMk; pk- ok&; kcjkcj HklpdV ykc tkÅu iMk; pa vku [kkyh i kajh 'kllkz Tokjh i Mk; ph- R; k f<xkoj gkr.kh ekj.; kl kBh , d ek.kl [kkyh cl ysyk vl k; pk- rksek.kl [kjkV; kua fdok fil (G; kua i Mys); k TokjhojpaXokMu cktnyk dk<k; pk- f<x ekBk >kyk dh 'kllkj l Ook'ksfdykph i krh Hkjk; ph- rh i krh [kG; kP; k ckgj vks.nu vk.knu mHkk djk; ph- ex 'koVh R; k i kB; kauk nkHk.k vkf.k l rGhua, d ek.kl rkM ykok; pk- vku rkMacm d#u Vkdk; pk- [kGa>kyadh l xGh Tokjhph i krh cSyxkMhr Hkjk; ph- vku rh Tokjh vkMrhoj fdok ?kjh vk.knu Vkdk; ph- extly; kr l qkhr Tokjh vk.krkuk xkMhoku xk.kh Eg.kr vl r- 'koVh HklpdV vkf.k i kyk; kph fVdGh ?kkyk; ph vku dMC; kP; k cuch ?kkyk; P; k- cuchoj ekBh ekBh <dGa Bok; ph-

 $[kGa>kyach] \ , \ fi \ y \ fclook \ esefgU; \ kr \lor kEgh \ xkokr j kgk; \ yk \ tk; \ kpks \ l \ qkh > kY; \ koj \ l \ xGh \ ek.kl \ a \ fuokr \ 0gk; \ ph- \lor ku \ oxoxG; \ k \ eukjatukr \ o \ [kGkr \ Hkkx \ ?; \ k; \ ph-l \ qkh \ > kY; \ koj \ [kGkyk \lor ku \ eukjatukyk \ ek; \ nG \ År ; \ k; \ pk-$

vkEgh ckjdh i kgʻa Tokjh nıçıkuyk ?kkyıw fl unekyk tk; pks dokdok l oxhr ekadG; k jkukr i Mysyhd.kl axkGk djk; pks R; kyk^l jok* Eg.kr vl r-gk l jok cMonu Tokjh djk; pho rh Tokjh nıçıkuyk ?kkyıw vkysy; k i Sıkr fl unek c?kk; yk tk; pks

dok dok respondukroj d#u xM; kpok MkGk podow resm?kd k; pks

 $\label{locality} \mbox{dok dok xM; kpajikVavkEgh [kk; kpks vkeP; k xYyhrya, d nRR; k ukokpa, d HkVdaikjxajkst reryk v/kk2[; kG QqV c?kk; yk tk; kpa$

, d fnlh R; kP; k MkD; kr , d rjdhc vkyh-R; kua dk; dsyarosph dukr [kkyh Vkdk; P; k vxmjp vákkjkr fl upekP; k ekMD; k xkMh[kkyh tkÅu yiya vku urj dukr [kkyh VkdY; koj R; k ekMD; k xkMh[kkyuagGnp ckghj; sÅu ek.kl kr cl ya vlajkst rsdjk; pa R; kpa c?kmu vkEgkykch rl np djkoavlaokVk; pa i j vkepadk; /kkMl 0gk; paUkkgh-

; kp t=B; k fufeRrkuseaxM; kr jM; kP; k Vdjh yko.; kphgh i /nr gkrh- jM; kB; k Vdjh nkekth t=k] fnokGh] på k"k"Vh] ukxi peh] edj l M; kVkykoY; k tk; P; k-

j M; kB; k Vdjhph I #okr R; k dkGps vkeP; k xkokrhy , d /kkMI h 'krdjh Kkukck f'kmekek ; kuh I # dY; k-j M; kB; k Vdjhph I #okr Qkjp ; ksk; kskus I # >kyh- Kkukck f'kms ; kph 15 , dj tehu vxnh xkokP; k yxrp nkekthi rkP; k elinjkekxsgkrh- gh 15 , dj tehu ckxk; r gkrh- ; k tehuhr jk=u&fnoI x6th kgckyk ekdG; k I kMyY; k tukojkpk Qkj =kI

Ogk; pk-; k tukojkoj utj Bo.; kl kBh f'kmekekuh, d pkaxyk jMk i kGyk gkrk-; k jM; koj cl w eG_7^2 kph j k[k.k j k=u&fnol dsyh tkr vls gkp jMk Eg'khuk ekt vkY; koj nk[ko.; kl kBhgh mi; ksh; k; pk- d/kh d/kh cSykcj kcj vk3rkykgh toj yk tk; pk-

, d fno'kh f'kmekek eG; krw xkokr gkyxh ykow j Mk oktor ?ksÅu pkyysgkrs frFks f'kmekekB; k 'krkyk ykxw t; Hkokuh Dycph i kjagkNyhckNy [kGk; ph- R; kuh rksj Mk oktor ur vI rkuk vkMoyk-

f'kmsekekuk i kj kpaEg.k.kai Vyao rsEg.kky}^^ Vdjhyk nq j k j Mk dBu vk.k.kkj \ **

R; kryavgen egyk.kh ukokpai kj xaEg.kky 1 ^ rky 1 kr j MaybIgkbIrh- ?kj fudh] <oGI ; k xkokr i dkyhuai k.kh Hkj.; kI kBh vud dkGh ykdkdMaj MagkbIr**

f'knsekek Eg.kky]^^fBd gk;] nkekthP; k t=sr ykow k jM; kph VDdj-**

BjY; ki ek. ksek?k efgU; kr nkekthP; k t=r ifgyh jM; kph VDdj f'kmekekpk jMk o ?kjfudhP; k dkG; kP; k jM; kcj kcj >kyh- R; kr f'kmekekP; k jM; kpk fot; >kyk-

urj ukxipeh] fnokGh] nljk] pik"k"Vh v'kk dBY; kgh l. kkuk jM; kB; k Vdjh] fuR; fu; ekua gkÅ ykxY; k-cxeiji] fl/nokMh] d¢y b xkoko#u Vdjhl kBhjMsvk.kystkÅ ykxys ek= 'koVhf'kmsekekP; kjM; kpk fot; gk Bjysykp vlk; pk-c&; kp oGkjM; kph fot; fejo.kmd dk<yh tk; ph-rBgk ekekpk ukrwckcmyk ekek jM; kP; k i kBhoj clok; psrsikgmu vkEgkyk Qkj xEer okVk; ph dkj.k ckcwvkepk cky fe= gkrk-

ekekP; kjM; kpk fot; gks; kph nku&rhu dkj.ksgkrh-ifgyadkj.k Eg.ktsekekpkjMk 50 QWko#u iGr tkÅu ndj &; kjM; kyk /kMd | k; pk- rh /kMd brD; k tkjkr vl k; ph dh] l ekjpkjMk ifgY; k /kMdrp ?kkc: u xkj 0gk; pk- f'kok; ndj jsdkj.k vl sdh] ekekpkjMk VDdj [kGr vl rkuk pkjh ik; kph [kdja, d= vk.kk; pk- pkjh ik; kph [kdja, d= vk.kyh dh ifrl i/kN jM; kyk ekekpkjMk ekxa<dy.ksv'kD; gkr vl s

 $\label{eq:charge_energy} \text{ekekP}; \ k \ j \ M; \ kpk \ cksyckyk \ ok<Y; \ kurj \ xkokrhy \ gk\ W _ sykysjke \ Qqkkjs; \ kulh \ , d \ j \ Mk \\ ygkukpk \ ek\ Bk \ dsyk- \lor kf. k \ , \ dsfno'kh j \ Mk \ oktor xkokr \lor k. kyk-$

xkooY; kuh jMk vkMoyk o l kfixry] ^^Vdjhf'kok; jMk oktor U; k; pk ukgh**

 $j \ ke \ Qopk \ j \ ky \ ky \ ky \ k, \ do'' \ kh \ t = r \ j \ ke \ Qopk \ j \ k; \ k \ j \ M; \ k fo \#/n \ e \ kel \ P; \ k$ $j \ M; \ kph \ VDdj \ y \ ko.; \ kr \ \lor kyh \ i \ k; \ j \ M \ p \ kel \ G \ k; \ k \ e \ kG \ koj \ VDdj \ y \ ko.; \ kps$ $Bj \ ys \ i \ kgk.; \ kl \ kBh \ y \ kel \ kph \ Q \ kj \ e \ kBh \ x \ nh \ t = yh - Qopk \ j \ p k \ j \ M k \ \lor kel \ e \ kel \ kj \ y k \ g \ kr \ k - e \ kel \ kpk$

jMk ekadGk l kMyk-∨kck eqsungh Qqxkjpk jMk ekadGk l kMyk-ekekpk jMk uggehP; k LVkbJye/; s 50 QMko#u iGr tkÅu /kMd ekj.; kl kBh l Tt >kyk-

ekekpk jMk tkjkr i Gr xsyk vkf.k vkrk QqxkjB; k jM; kyk /kMd ekj.kkj brD; kr ekekpk jMk toG tkÅu /kMd u nrk Fkcdyk- ekekP; k jM; kP; k ckcrhr i fgY; kmkp vI s?kMys gkrs ykkdkir ppklI ¢ >kyh]^^ ekekpk jMk /kMd u nrk Fkcdyk dI k** ykkdkie/; svuid rdl fordl dsys tkÅ ykxys dksk Eg.kky] ^ekekpk jMk vkrk Egkrkjkp >kyk; -** dksk Eg.kky] ^QqxkjB; k jM; kP; k ekF; koj MqdjkP; k ekl kpk okI fnyk; -R; keGsjMk Fkcdyk-*

rjhl ((nk 'koVh ekekP; kjM; kuatoG tkÅu dk gkbZuk /kMd fnyh- nkbjghjM; kph VDdj l # >kyh- , d rkl frFksVDdj l # jkfgyh- , d rkl kurj Qv;kjpkjMk deku VsdMhdMsi Gkyk-

ekekP; k j M; kusR; kpk i kBykx dsyk o frFksdeku ValMhoj VDdj I # >kyh- frFks, d rkI VDdj >kyh] frFknu Qqxkjpk j Mk t Nj; k dks/kP; k vkokj kr i Gr xsyk- ekekP; k j M; kus i Njgk frFksi kBykx d#u VDdj /kjyh-

ykalkuh 'koVh e/; LFkh d#u VDdj I kMoyh- VDdj >kY; kurj nktlghjM; kph xkokr Qkj ekBh fejo.kad dk<yh xsyh- o nktlghjM; k#; k ekydkuk aktkjkr ek#rfP; k noGki @sekukps Qt/snåu I Rdkj dj.; kr vkyk- extM; kr gh >kysyh 'koVph VDdj- R; kurj ekekuhjMk Egkrkjk >kysyk vkgs Eg.kuu VDdj dk; eph an dsyh- gh 'koVph VDdj eh i kfgysyh-

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HKKX pkak
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dokdok Ekh dMcapk#u bdk; pks vku vkyy; k i skkr p&u djk; pks

, dnk \lor kb/Eg.kyh]^^i ki V] eh ryyk xkomj kruunku i kp ϕ dMcack/kwu fnrh-ro<adMcacMcaoGhyk fuÅu bd- \lor ku i \$ a²ksÅu ; h- R; kryk , d i \$ k eh ryyk [kk; kyk fnrh-**

eh]^^ gkş eh fuÅu bdrudh**

Ekhrip daya dMcaf?kÅu ekGkojuaFkV dMcaoGhr xayks vku dMcafod.; ki kBh Fkkacyw vpkud dMcabdr vi rkuk dMcaoGhr cki pp fni yk- Ekh y; ?kkcjyw vkrk dk; djko\eyk dk; p dGhuk- dMcatkX; koj p fBow i Gwutkoadh dk; \ vi aokVwykxya

brD; kr cki wfr Fkavkykp- eyk i Gw tk; yk cki wavftckr I álkhp fnyh ukgh-

cki wEg.kyk]^^vkjai ki V rwgFkadl adk; \ vku dqkkpadMcabidrw **

cki wEg.kyk]^^dksk efrj gk; ro>k**

Ekh xøkGuu Eg.kyij\^^dkskp Ugk; **

dkskp Ugk; rjex dMcadqkkpagk; **

Ekh Eg.kyil/^uk; uk; esrj gk; uk R; ks----R; ksUgk; dk **

cki 1//^vkjaR; ksEg.ktsdksk**

Ekh]^^vkxkaR; ksxk---R; ks-----pkhlkkjkpkf'k&; k-gka----gka----R; kpaclMcagk; -**

cki nyk ekÖ; k cksy.; koj uaFkkMk l ák; vkysykp gksrkp-

cki wi &aEg.kyk]^^ex vI adj] gsdMcampyw vki Y; k?kjhfuÅu Vkd-**

 $\label{eq:entropy} Ekh? kkcjyw vu Eg.kyi]^^vkxkla cki wgsdMcavki yaUgk; I klixryauk rgyk- R; k f'k&; kpagk; -**$

cki ll^^vkjarh c#cj gk; - ij vkt vkiY; k Egʻkhyk xkonjkruadMcadqkh tkÅu vk.kyaUgk; - I klł; kyk Egʻkh EgkjaVkdk; yk dk; p Ugk; - rok gh dMcafʻk&; kdMuavkiY; kI kBh b&r ?kh-**

Ekh]^^∨u i **\$** λ**

ckiwEq.kyk]^^fnrwdh-do<; kykikponk bdk; yklkixryk; **

 $Ekh]^nku \lor k.; kyk i kppk bdk; yk I klixryk; **$

cki wapkj vk.ksdk<w fnysvku cki wfu?kw xsyk-

ek>k tho HkkM/; kr i Myk- eukrY; k eukr Eg.kya^cja>kyavki .k vkt pkjh djrkuk] I ki Mrk I ki Mrk okpyks*

dMca?kjh fuÅu Vkdya vku vkbłyk i \$ afnya R; kryk , d vk.kk Ekh ?kryk- ?kMysyk i dkj vkbłyk I klixryk- vkbł gl w gl w cstkj >kyh-

 $Ekk\div; k\ i\ kBki kB\ cki w cktkj krua?kj kdMa; r\ vI\ rkuk]\ vpkud\ cki wyk\ okVr\ pkilkkj kpk\\ Jhjax\ f'kansxkB\ i\ Myk-R; kyk\ cf?krY; kc#cj\ cki w, dnep\ tkxoj\ Fkkacyk\ vu\ Eg.kyk]^^, o<; k\\ m'khjk pkyyk 0g;]\ i\ kj xaokV\ c?kuu\ c?kuu\ ?kj kdMaxsyavI\ hy\ dh^**$

Jhjak Eg.kkyk]^^dqkkpai kjxa\ vku ek>h okV c?kk; padk; dkj.k gk; -**

cki wEg.kyk]^^ \vee kj af 'kjak rq>adMcaEkh ?krya - rwUgk; dk \vee keP; k i ki Vyk b \boxtimes k; yk I kaxu d \lozenge rj xyk grk-**

Jhjax gs, sdw pkV i Myk-vku Eg.kyk]^^cki ij Ekh dk; dMcarepP; k i ki Vyk bidk; yk I klixryau0grau1 raf>axkV ekö; k ekxadk; ykowudk-repaikjixavu regh c?kk-** Jhjaxyk ek>k LoHkko pkaxykp ekfgr grk]vl aEg.kw fu?kw xsyk- [kjk i zlkj cki li); k y{kkr vkyk-cki w frFkua?kjkdMai Grp vkyk-Ekh vki yavkbiz#cj xli k ekjr cl ywgrw

cki wa?kjkr ; såu [klyhyk \lor Mdkoysyk pkcmd ?kryk \lor ku Eg.kyk]^^ re; k \lor kbSyk----*

Ekh Eg.kyi)^^Ekh dk; dsya **

cki wEg.kyk]^^rwdk; dsya - rh gh pkcwd [kkY; koj | kax'khy-**

Ekh QxM; k i k; kuan.kku ckgj i Gw xsyks

Ekk \div ; k \vee I Y; k [kk $\!\!$ /kj M; k okx.; kyk cki wd $\!\!$ /kGw xsyk g $\!\!$ rk-

, d fn'kh ckiwaek>k gkr /kjyk \vee u Eg.kyk]^^py] ryk l kGrp ?kkyrw R; kf'kok; rw oB.khoj ; k; pk Ugk; -eyk okVy{} i kaxGagk; -cl w [kkb]y- ij rq; kl kj [kk djkerh i kj xk Ekh cf?kryk Ugk; -**

cki weyk gkrkyk /k#u I kGar xsyk-I kGapk i fgyhpk ox ZvkeP; k xYyhrp Hkj r gkrk-, dk pkblkkj kP; k okM; kr-frFka, d ctydsxt#th gkrs R; kpauko ukukI kgc [kki MsvI agkra

 $\label{eq:ckiwx} $$ \text{ckiwx} \# \text{thyk} \ Eg.kyk]^*x \# \text{th} \ ; kikjkyk \ I \ kGr?; k-yaxMagk; ij \ ckghj y; \ [kkM; k djra] \ dMcap \# u \ bdr; \] nk.kap \# u \ bdra] jkrP; kyk f I u pekyk \ tkra] Ugk; R; kP; kc # cj HkkM.ka djra] \ dokdok yaxr yaxr M pdjkB; k vu xkMokP; kuch ekxa ykxra] R; paik; y; oGoG djR; krh] R; syk I kGr?; k- Egath R; paik; vki ksvki \ tkY; koj FkkucR; kyå*$

x#thEg.ky3^^ dk; j3 'kkGr; skkj dk**

 $\label{eq:entropy} Ekh x\#thdMacf?kryavku eyk x\#thpaH; kp okVya Ekh vkxhpa; kd Vkxd rkMkr p?kGr p?kGr Eg.kyil^eyk I kGayk uxw**$

x#thEg.ky]^^ckiljikjxaEg.kra dhvks 'kkGsykudks**

ckiw]^^R; kpadk; , drko]ykok uko R; kpagktjhyk**

x#thEg.ky]^^dk; jsxk<ok] re>auko dk; **

ekÖ; k rkMw ek>auko podw xsył^xk<o***

 $x \# th Eg.ky]^{\vk} sxk < ok] ^xk < o^* dk; uko <math>vI radk; \^**$

Ekh Eg.ky $\sqrt[n]{}$ Ugk;] Ugk;] xk<o Ugk;] i ki V; k gk; **

x#thEg.ky]^^vjsok! uko rj Nku vkgs ^i ki V; k*-**

ckill^^vkoax#th]; kyk I xGh i ki V; kp Eg.kR; krh-ij gs pa uko i kG.; kr dk; rjh; xGp Bnya - eyk dk; /; sukr; r Ugk; **

eyk mnnskuu cki wEg.kyk]^^ ropai kG.; kryauko ryyk dk; /; sukr gk; dkj& **

Ekh Eg.kyij/^ eyk dk; ekfgr ukg-**

Ekh i Vfn'kh tkk; kojua[kkyh mMh ekjyh- vku ?kjh tkÅu vkb/pk MkGk pqdow d.kxhr tkÅu yi w cl yw

gdMackiwokV c?kwu c?kwu Fkdwu xsyk- \vee ku frFkax#thP; k l ekj clyY; k ikjkauk Eg.kyk] ^^; sHkkxor] fdluk] rffgh nk9k8kpk9katk \mathring{A} u R; k ikj V; kyk /k#u \vee k.kk] ukgh \vee kyarj] R; kph mpyckaxMh djk] \vee ku; srkuk R; kP; k \vee kb3yk R; kpa[kjauko bjbk#u; k**

i kgʻa?kj h \lor kyh \lor ku \lor kb ${}$ yk Eg.kyh]^^eko' kh] i kgʻ ${}$ k'* k d ${}$ Bk; \lor **

 \lor kb/ZEg.kyh] ^^ Ekh dk; c?khryaUgk; - gFkp d \upbeta rj \lor ′khy**

i ký aEg.kyh]^^?kj kdMavkya] cki wfrFkpp R; ph okV cär Fkkpcyk; -**

, o<; kr Hkkxoruad.kxhoj p<w \lor kr ikfgyarj] \lor kr eh yi w cl ysywgqrw R; sua , dne oj My $\frac{1}{2}$ ekoʻkh! i ki V; kfgFkagk; - d.kxhr-**

i kgi kauh eyk ckghj ; k; yk l kāxrya Ekh dk; ckghj ; sr Ugk; Eg.kY; koj] i kgi kauh ckghjuaeyk ckjhd ckjhd [kMaekjk; yk pkywdsya

 $\label{eq:continuity} \mbox{Ekh $$v$krup ojMyi]$$^{reP; k $$v$kb}yk---ykoyk- Ekh $$; $$r$kh ckghj] , o<k ne Ugk; dk $$r$gkyk] [kMad'kkyk ekj rko**$$

Ekh ckghj vkyw vku R; suyk Eg.kyij^^r@fgh i @fapyk] Ekh ekx@fuatjk ftow ; rn*

i kjaEg.kyh]^^R; sdk; pkyk; paUgk;] ryyk mpyw vk.kk; yk I kfixrya **

Eg.kw i kýkuh eyk /kjyk vkf.k mpyckæMh d#u ckghj U; k; yk pkywdya R; krY; k , dk i kýkuavkbžyk bžykjyj^^x#thuh ápai kG.; kryauko dk; gk; Eg.kw bpkjya]**

vkbZEg.kyh]^^ gpauko glpZ^ukjk; .k* gk; -**

eyk mpyckaxMh d#u i kjal kGar f?kÅu vkyh-

x#thEg.ky}^^I kWkR; kyk [kkyh-**

ikjaEg.kyh]^^x#th] [kkyh | kMY; koj i Gnu tkbZy-**

 $x\# th \ Eg.ky \ ^{dlaiGuu} \ tkr; \ rsc ?krp \ ikj kauk \ japik G.; krya uko \ dk; \ lkfxrya \ ^{**}$

i kg aEg.kyh]^^xq th]^ukj k; .k* gk; -**

x#th Eg.ky3^^ vkjaok]^ukjk; .k* rj uko pkaxyavkg3 nok ukjk; .kk! rwuko fopkjk; yk xsyk vu frdMp dlk clyk\ ukjk; .kk vkEghokV ikgw ikgw Fkdyks**

Ekh Eg.kyi)^^xq th] Ekh tor girw**

xq th cki nyk Eg.ky $]^{^*}$; kpk tUe dPa \vee kf.k d/kh >kyk; **

 $x\# th Eg.ky \end{subarray} $$ x\# th Eg.ky \end{subarray} $$ x\#$

x#thuh ∨nktkuaek>h tUe rkjh[k ykoysyh gyrh- ekÖ; kcjkcj ∨keP; k Hkkodhryh i kjøgh oxkir gyrh- HkkiX; k ek>k pyyr ekol Hkkå]∨ku fdl Ukk ek>k l [[kk pyyr Hkkå] l ([kk pyyr Hkkå-

ifgyhr ukukl kgc [kki Ms x#th vfr'k; ikekf.kd o dMd grs ij x#thyk cf?krY; koj eh y; H; k; pks eyk okVk; paj xq th Eg.ktsekxP; k i MD; k okM; kruaek.kl kP; k #i kruavkysyaHkmp vl koa dkj.k xq th fnl k; yk ch/dsgrs ukd ckjhd gra rsfdyfdY; k MkG; kuh c?kwykxysdh R; kps0gV foyx 0gk; ps vku ekBaekBankr fnl wykxk; pa i k; fdiphr okdMs grs vkxBsl j G i sau; rk frji sgrs R; kB; k gkrki k; kph ckVa'kxR; k ckVdkl kj [kh i savkyh grh-

R; kP; koj #m okclMh u [kagmph- \vee l aokVk; pach]* ek.kl kpa#i ?ksÅu ; sr \vee l rkuk] gkrki k; kP; k ck\\rangle kukl no \vee kclkj | k; \vee k fol j \vee s \vee l kosr-*

 $ifgys clkgh fnol Ekh x \# thyk y; ?kkcjk; pks Ekh oxkir clw R; kir; kdMa fcVfcV; k MkG; kuac?kr clk; pks xq th gkrkr fgjoh NMh ?ks^u udk'kkoj ph jakhr fp=ank[kor-vuul kryk ^v ·*- vkxxkMhryk ^vk · ·*] bfVnkMpk ^b · ·*]bMfyrepk ^bI · ·* vlaekB; kuax # th f'kdok; ps R; kryh , dch oLrweyk dGr u0grh-vuul Eg.kts dk; rs eyk ekfgr u0gra vkxxkMh cf?kryh grh ij ekxparkM dkskpavku i *parkM dkskpa eyk dGr u0gra bMfyreweh dok cf?kryau0gra$

 $xq\ th] \lor keP; k\ i\ exa\ dMd]\ ij\ gMekLrjP; k\ i\ exa\ Hkkxxpk;\ 0gk;\ ps\ \lor keP;\ k\ l\ kGayk l\ kBuxj\ l\ kGk\ Eg.\ kuu\ oGh[kya\ tk;\ kpa\ ifgyh\ rs\ pkSkhirij\ pkj\ ox2\ gqra\ ij\ \lor kepk\ ox2\ pkHkkjokM;\ kr\ Hkjk;\ pk\ \lor kf.\ k\ ckdhps\ rhu\ ox2\ \lor keP;\ k\ i\ kl\ ua\ yknc\ frdMa\ rG\ rd\ kP;\ k\ i\ kGhyk l\ kBuxj\ toG\ Egath\ ekaxokM;\ ktoG\ Hkjk;\ ps\ gMekLrj\ pkSkhpk\ ox2f'kdok;\ ps\ R;\ kapauko\ fHk-dw\ pki MŠ\ \lor l\ agqra\ rsi\ BHkkxkr\ jgk;\ ps\ dkGk\ dkY]\ dkGh\ Vki h]\ LoPN\ i\ kasja'khlkz/kkrj]\ i\ kasjk'\ kVI]\ gk\ R;\ kapk\ dMd\ bL=hpk\ i\ kskk[k\ gqrk-$

d/kh d/kh gMekLrj vkeP; k oxkir rikl k; yk; k; ps vkys dh vkeps x#th
gMekLrjyk cf?krY; koj Fkj Fkj dki k; ps vkEgh vkeP; k x#thpk vkorkj c?kwu 0gVkrY; k 0gVkr
gl k; pks

, d fno'kh gMekLrj oxkòj vkył vkf.k njMkow vkeP; k x#thyk Eg.kył^dWykWk dkpk; ** vkeP; k x#thuh dWykWk gMekLrjP; k gkrkr?kkcjr?kkcjrfnyk- gMekLrjuh dWykWk rikl yk vkf.k jkxkua vkeP; k x#thP; k rkMkoj Qdyk- x#thuh rksdWykWk >sy.; kpk iż Ru dsyk-ijarqx#thuk rks>syrk vkyk ukgh vkf.k Eg.kkył^e[klysdkpł] l k/kk dWykWkgh >syrk; rukgh-d'kkyk 'kkGsyk; rk\ gtkj oGk l kfixrył iVl {; k 30 P; k vkr; Å nÅ udk- iVl {; k 30 P; k vkr; Å nÅ udk- rjhgh; k ek.kl kyk dk; dGr ukgh- ek.kh vkgkr dk tukoja vkgkr**

 $\textit{vkepsx\#thEg.ky} \ ^{^{}} \textit{ukgh---ukghR; kpadk; } > \textit{ky} \ ^{^{}}$

gMekLrj Eg.kky \S^{dk} ; >kyarseyk I kaxwudk- gk dWykWk \vee kRrkP; k \vee kRrk eyk n#Lrd#u | k**

vkepsx#th Eg.ky]^^ nrks-- nrks-- ukgh--- ukgh R; kpa--**

gMekLrj Eg.kył^^ rĘgkyk gtkj oGk I klixrył ekő; k'kh cksyrkuk Li "V cksyr tkok], dnk Eg.krk; nrksnrksvu, dnk Eg.krk; ukgh ukgh-**

vkepsx#thEg.ky]^^gks | kgc-**
gMekLrjEg.ky]^^gks | ck; Eg.krk;]fuyItkI kj [k\lambda**
vkepsx#thEg.ky]^^ukghI kgc-**

osrkxwu gMekLrj fu?kwu xsys gk ial ax cf?krY; kuarj vkEgh x#thyk ?kkcjk; pa can >kyw gurw

 $ij \ x\#th \lor k Egh \ Ukkgh \ ?NkcjY; \ koj \lor k Egkyk \ y; \ Bkcdk; \ ps \ \lor k epk \ ox \ 2T; \ k \ okM; \ kr \ Hkjr \ grk-R; \ k \ okM; \ kph \ ekydhu \ ^xqkk \lor k Tth^- y; \ dMd \ grh- \ i kja fakkrhyk \ Vodw \ cI \ ys \ dh] \ xqkk \lor k Tth \ i kja kauk \ x\#thP; \ k \ I \ ekjp \ cMow \ dk < k; \ ph \ \lor u \sim Eg.kk; \ ph-^^xkcM; \ kauk] \ fHkrhyk \ fpdVY; \ koj \ fHkrhpa i kja Mafu ?kR; \ kr \ fdrh \ oGk \ r \ fgkyk \ I \ kaxk; \ p] \ r \ pP; \ k \ \lor k; \ k \ gFka; \ Åu \ fHkrhyk \ i \ krkjk \ | k; \ P; \ k \ g$^c \ 0g; \ \ **$

'kkGk l Nyh dhoxkir/knGhpsykNP; k ykN mBk; ps ekGkyk <kjam/kGY; koj t'kh/knGokoVGhxrmMrsr'khmMk; ph-?kN/k >kY; kc#cjekLrjyxpukdkyk/kkrjykorvIr-

?kjh x¥; koj vkbZjkst ek>sp\d; kl kj [ksi kæjs'k\dkz>kysysi k; i k.; kua/k\pk; ph-dkgh fnol x¥; koj fruaeyk, d cl k; yk i kR; kparkV\nd fnyajkst R; kph l\djGh d#u dk[ksr f?kÅu eh l kGayk tkr g\rks

 $I \ kGB; \ kR; \ k \ okM; \ kr \ H \ kuraj \ kgrkr \ v'kh I \ eturik j kae/kh gurh- fr FkY; \ k H \ kurkfo"k; h u u geh v kEgk i kj kr ppk20gk; ph- v kepaxko H kurk I kBh Egkt j gura i MD; k oLR; k] okMa i MD; k fgjh]ckjo xkokr c&; kp g$r-; k I o2fBclk.kh H kurkph oLrh <math>\lor$ I rh- H kur clk<.kkj si kp&I gk e arj &n bj I hsxkokr gurs ck; clkB; k \lor akh H kura; r gurh- R; kauk \gt kM kauk ckalkau ?kkynu cne ekj ns^u H kurkauk gkdynu fnyat kr \lor I s I ky.kai Mr \lor I § H kurkP; k x I i k gkr \lor I s R; kapao.klu chyat kbł, dryat kbł, dryat kbł \lor kai Mr \lor I § H khrh okVnu \lor x K kbl i MY; kx r okVr \lor I s

ojP; k oxkīr /kuxjkpa-, d dkGaikjxagyra RokM ?kkM; kxr gyra R; kpaMkGa ckghj



vkY; kxr i kasja 'ktylkz gyra i kgixa vfr'k; oktyl gyra oxkirY; ki {kk oxkir; k ckghjp tkLr oG j kgkr gyra egykacjkoj cV.kkuh] i fUl yhuh] fpptp; kauh l rr [kGr vl s dk; e R; kps f [kl s Hkj ysys vl k; ps ekjkekjh djrkuk rs vki Y; k ?kktyl rktylkuapko.; kpk i z, Ru djh- Hkurkir; k xks'vh fu?kky; k dh rsvkEgkyk Hkuraek>h nktr gkbir- Eg.kuu l kar vl s R; k i kgiki l ua usqehp eh ykac j kgkr vl s eyk rs

i kgi xaHkurkpap okVr∨l §

 $eyk\ ekj.kk\&;\ k\ [kki Msxe\#thP;\ k\ i\ k;\ kcnny\ o\ R;\ k\ ?kkM \ rkMMP;\ k\ i\ kj\ kcnny\ eh\ vkb\ Jyk \ l\ kixryarj\ rh\ Eg.kkyh\ ^^xq\ thpk\ l\ kklkko\ y;\ pkaxyk\ gk;\ -\ rwokdM;\ k\ i\ k;\ kuatYeyk\ rok\ y;\ ykxda\ rgyk\ Hkurp\ l\ etk;\ ph-\ ij\ rq\ Hkur\ Ugk;\ gh\ 'koVh\ Mkxnkjkusl\ kixryao\ rg>aik;\ uhV\ dsya xq\ thph\ ckVaokdMh\ ifgY;\ kil\ up\ vl\ rhy-\ ckVaokdMh\ vl\ yh\ Eg.kth\ rh\ ek.kul\ Hkur\ vl\ ravl\ a\ ukgh-\ vkb\ Laeyk\ l\ etkouu\ l\ kixrY;\ koj\ eyk\ xq\ thcnnyph\ eukryh\ Hkhrh\ deh\ >kyh-$

R; kpaoMhy okjyagma R; ksvkbjbk , dyrk; kcd Y; kcd gmk- R; kph vkbł/krkr jkstkua dkekyk tkr gmh- vkbłyk okVk; pacMyua'kkGk ybłfkckoh- vu cMy ekBk I kbł Ogkok- ij cMypafkk.kkdMavftckr y{k u0gra QDr nd &; kP; k oLrmoj R; kpk MkGk gmk- cMy R; kP; k oMykpk twk dky ?kkyw I kGyk; kpa dkykph ykmch i k; kP; k ?kkyż kirnj gmh- dky ?kkryk dh vkremh pMMh ?kkyk; ph cMyyk xjtp u0grh- dkykyk vkr ckghj y; f[kl agma c&; kp oGk pkjył; k oLrmcMy vki Y; k dkykp; kf[k/kkr yi ow fBok; pa

, dnk cMyua xq thpai\$ apkjya R; kpavla>kyadh xq thP; k NkV.khr mok y; >kY; k gR; k-Eg.kwu xq th vakkryh NkV.k dk-wu m?kMccc [kphioj mok ekjrclysgqrs xq thP; k NkV.khryh pkj vk.; kphikoyh [kkyhi Myh- xq thyk ekfgrp u0gra xq thuai blgk vakkr NkV.k o 'kVZ?kkryk- xq thP; k y{kkr vkyadh vki yspkj vk.ksNkV.khP; k f[k'kkrwu [kkyhi Mysvkgr-R; kwuh [kkyh'kkkkkkdsdsyhi.kR; kwh pkj vk.; kphikoyhdk; I ki Myhuk; -

 $xq\ thP;\ k\ toG\ cMy\ cI\ yagura\ cMyuadok\ ek;\ i\ koyh\ mpyY;\ kpadqkkP;\ kch\ y\{kkrvkya\ u\ 0graxq\ thyk\ i\ koyh\ I\ kiMr\ Ukkgh\ Eg.kY;\ koj\ xq\ thua\ I\ xG;\ k\ oxklyk\ fopkj\ yal^^vkjs\ i\ kjkukls\ bdMs\ y\{k\ |\ k]\ ekÖ;\ k\ NkV.lkP;\ k\ f[k'kkrua;\ Fks\ ek>h\ i\ koyh\ i\ Mysyh\ vkgarh\ gkj\ oysyh\ i\ koyh\ dqkkyk\ I\ kiMyh\ V\ sy\ rj\ |\ k-***$

IxGk ox 2 fpMhpqi gqrk- clkskp clk; Ikaxk; yk r; kj u0gra xq thuh IxG; kqph > kMk>Mrh?kgryh i jarqi koyh Iki Myh Ukkqh-

 $\label{eq:likelihood} \begin{tabular}{ll} $$ 'koVh xq thuacMyyk i exacksyoyao R; kpk dkV o R; kP; k dkVkpsf[kl srikl ys ijarq deY; kp f[k'kkr i koyh l ki Myh Ukkgh- dkVkyk f[kl abrdageradh] xq thyk ch f[kl arikl rk rikl rk ?kke QeVyk- \end{tabular}$

 $\label{eq:likelihood} $$ \frac{k^2 + k^2 + k$

xq thuh cjkp oG cMypk dkV [kkyoj [kkyoj dsyk-ij xq thph ikoyh xq thyk I ki Mhuk >kyh-v[kj R; k dkYkP; k vkr ea; s dkYkpavLrj , dk fBdk.kh QkVysyagkra rsxq thuh tkLrh QkMu R; kr gkr ?kkryk] rj xq thyk ikoyh vLrj vkf.k dkV; kP; k e/; sI ki Myh-

xq thyk brdk jkx vkyk dh xq thuh cMyP; k m?kM; k vaxkoj nku rhu oGk fyfixMhP; k NMhua ekjya cMyP; k vaxkoj oG meVya cMy frFkuath i Gkya rh i Njgk Eg. kw danh I kGayk vkya uk; - cMyph vkbZ dkekyk xY; koj I xG; k ck; kwk I kaxk; ph] xq thua ekö; k i kjkoj pkjhpk [kkVk vkG ?kryk vku ekö; k i kjkyk i Mkrj ekjya cMy i Njgk ckghj tkÅu rl pygku ekB; k pk&; k djrjkfgya

ekő; k i fgyhP; k oxkir ekf.kd ukokph, d vfr'k; l npj o xkM egyxh gnth- frpsoMhy rgl hy dfpjhr uk; c rgl hynkj Eg.kmu gnrs frph vkbigh Qkj f'kdysyh o l npj gnth- fgmh fl unekrY; k ofgnk j gekul kj [kh frph vkbi fnl k; ph- rh njjkst ekf.kdyk cky/kyk /k#u 'kkGr l kMk; yk; kp ekf.kddMa, d Nkyh cwk gnth- R; k cwksr frpk to.kkpk Mck] i k.; kph ckVyh vl k; ph- rh cwk frP; k ?kjkrY; k ukcjkP; k gkrkr vl k; ph- dokdok fryk 'kkGsyk l kMk; yk frP; k oMykP; k gkfi l kryk f'ki kbith; k; pk-

 $ekf.kddMaeh\ Qkjp\ vkdf''kir\ > kywgwrw\ dkj.k\ rh\ njjkst\ vakkyk\ I\ kcw\ ykÄu\ vakG\ djk;\ ph-\ frP;\ ktoG\ x½';\ koj\ frP;\ k\ di\ M;\ kpk\ ,\ d\ em\ I\ qxák\ ;\ k;\ pk-\ frpsdi\ Msvfr'k;\ LoPN\ o\ ifjV\ bL=hpsgwrs\ ekf.kd\ ugehp\ ekö;\ k'kh\ cksyk;\ ph-'kkGr \ dqkkpk\ ok<fnoI\ vI\ yk\ dh\ d/kh\ d/kh\ x#th\ R;\ k\ ikj\ kyk\ mHkk\ d#u\ R;\ kpavfHkumu\ djk;\ ps\ vkEgh\ oxkir\ ohl\ ikja\ ,\ d\ twyk\ tUeysyks\ gwrks\ R;\ ke@svkeP;\ k\ ohl\ t.kkyk\ x#thuh\ ,\ dnep\ vfHkumu\ dsya$

d/kh d/kh, dknai kj xaxkG; k okVk; pa ekf.kd okVyM; k xkG; k [kk; ph uk; - rh eyk | k; ph- I kGr nRrkpk QMij ekjrhpk QMvugqrk- nj 'kfuokjh oxkir ekjrhp; k QMvph i vtk Qgk; ph- ukj G vk.kk; pj eqykuuk okV.; kI kBh fpjeqis o nkG; kpk i il kn vk.kk; ps QkMyM; k ukj GkP; k [kkc&; kps rqtMs rqtMs d#u fpjeqis o nkGs fel Gk; ps d/kh d/kh R; k fpjeqis nkG; kr dkM; k&cRrk'kch vI k; P; k- i il kn okV.; kpadke ekf.kd djk; ph- i il kn ?; k; pk ek>k ucj vkyk dh eyk rh tkLrh i il kn | k; ph o ekÖ; kdMac?kuu xkM gI k; ph- eyk d/kh d/kh okVk; pj ekÖ; k QkVD; k o tqukV dki MkdMa c?kuu rj ekf.kd gI r uI y uk\ dkM; k cRrkI wo [kkcjaR; kruu; puu eyk | k; ph-rhqqkkj gqrh-

c&; kp oGk eh fryk vo?kM vo?kM 'kCn bpkjk; pks frP; kdMauohu i μ rdag μ h-rs i μ rd eyk | k; ph- o ek>aQkVy μ at μ ai μ rd frua?; k; ph- ckj ges kk ek>h dki MaQkVy μ v v l k; ph- Ekhnjjkst v3kkG djk; pksUgkbZ pMMh rj ek>h ges kk < μ c. kkoj QkVy μ v l k; ph-

d/kh d/kh eh QkVysyh pMMh ekf.kdyk fnl wh Eg.kwu FkkgiY; k Hkkokpk ykoc l njk R; koj R; kpk MkGk prplÅu ?kkyk; pks FkkgiY; k Hkkokpk l njk \times M?; ki; ir ykoc \vee l k; pk- R; ke \cdot Ga \vee kryh QkVysyh pMMh fnl k; ph Ugk; - poM; koj cl yadh ek \times pk Hkk \times i \cdot Fa; k; pk- o i \cdot Fpk Hkk \times ek \cdot GGk fnl k; pk-

, dnk eßkukr [kGrkuk ykæ l njk ok&; kuaoj mMyk-R; koGh <ap.kkoj QkVysyh pMMh ekf.kdyk fnl yh-l xGh i kjafpMowykxyh- Ekh 'kj eyw ekf.kdch Eg.kyh] i ki V R; sc?k ra-h pMMh QkVyh; k- dk; fnl ra rsc?k * vl arh Eg.kkyh i kbbyk f'kow | k; yk l ka * Eg.kw fruaek>h FkVVk dsyh-

eyk okVk; paekf.kd I kj [kh vki .kkyk ygku cfg.k v I k; yk Qk; th grph-ekÖ; k i kBph-ek>h cfg.k i k# ek; mkG HkkMdmGh grph-rh eyk ckj geskk ckpdkjk; ph-dok XokM ckykphp Ukkgh-ekÖ; k'kh ek; waokxk; ph Ukkgh-

ijekf.kdekő; k'kh Okjek; waokxk; ph-rhxYyhrpjkgkr grh-frpsoMhy ijxkops grps HkkMks=h tkxrjkgkr grps eh frp; k?kjh m/k?kkyk; yk tk; kpks xyhr uohu dksk l k; c cnyh gksÅu vkyk dh] vkepk nvík?kky.; kpk jrhc R; kP; kr vl k; pkp- Ekh nvík f?kÅu ekf.kdP; k?kjh xsyksdh] frp; kcjkcj [kGk; pks frph [kG.kh eyk rh [kGk; yk | k; ph- frph [kG.kh Okjp l nj o egkxMh grh- pkj pkdkph xkMh] j¥o] ekB ekB; k ckgn; k] oktok; psio] Me#] fofo/k jakkps xkkky l xGafrp; k?kjh grpa frp; k vkbZoMhykph rh, dgyrh, d grph-frp; k vkbZdMacf?krY; koj okVk; p]^vki yh vkbZch v'khp vl kyk Okthy grph-* ekf.kdpk l gokl l kGr o?kjh; r grpk-

[kjaEgath ekf.kdeGaEkh c&; kp xksVh f'kdywjkst \vee axG djk; yk f'kdyl LoPN di Ms ?kkyk; yk f'kdyw frP; kl kj [kacky.; kpk i; Ru djk; pks frP; k?kjh eh xsyksdh] rh frP; k \vee kbZkh d'kh cksyrh; kpaeh ckjhd fufj {k.k djk; pks \vee u R; k i jekup Ekh cksy.; kpk i j; Ru djk; pks

 $frP; \ k \lor kf. \ k \in k\"{0}; \ k \ cksy.; \ kr \ Qkj \ Qjd \ grk-eh \ ^cki M\"{a} \ Eg.kk; \ pksrh \ ^cd i m\"{s} \ Eg.kk; \ ph] \\ eh \ ^' k sok \' Eg.kk; \ pk] \ rh \ ^l sok \' Eg.kk; \ ph] \ Ekh \ ^okkMG \' Eg.kk; \ pksrh \ ^m' khj k \' Eg.kk; \ ph] \ Ekh \ ^okkMrki \ rjj \' Eg.kk; \ pksrh \ ^okkRrki ; \ jr \' Eg.kk; \ ph \ V \ sfdrhrjh \ 'kCn Ekh frpavurplj.k d#u f'kdk; \ pks$

 $\label{thm:condition} ifgyhph ijh{kk>kyh vku ekf.kdP; k ofMykph cnyh I kykijiyk>kyh-frpsoMhy I xGa?kjI keku ?ks^u tkr vI rkuk eh R; kuk fujki | k; yk xsyks I xGaI keku Vde/; sHkj yagıra frpsoMhy o frph vkbZ vku ekf.kd , dk thi e/; scI ysgırs tkrkuk ekf.kduaeyk gkr oj d#u fujki fnyk- eyk y; y; oakkG okVya n&[kkuaeyk , dne gndk vkyk] ekf.kdP; k MkG; k MkG; k ri.k i k.kh fnI ya i tlgk d/khp ekf.kdph HkW >kyh ukgh- rh vkrk d&avI sy]dk; djr vI sy] eyk dkghgh ekfgr ukgh- i j frpk pgjk ekő; k MkG; k I e¢/u vktuuch tkr UgkbZ$

HWx iákjk

vkeP; k xkoh ukxipehpk I .k ekB; k i ek.kkr I ktjk Ogk; pk-Ukkxipeh toG vkyh dh] drj rykokP; k Hkjkokoj i kja okoM; k mMok; yk ek; mkG xnhZ djk; ps ekBekBh i kja ekBekB; k okoM; k cuok; ps T; kph okoMh ekBh vI sy R; kP; k ekxangk&ohl i kja xnhZ d#u jkgk; kps gk okoM; k mMo.; kpk ukn vkeP; k xkokyk i fgY; ki kl w ybZgrk-exM; krhy ykckkuk eukjatukph I k/kusvucd grh-dlkR; k] jM; kP; k Vdjh] vkV; ki kV; kpk [kG] I kaxV; kpk cBk [kG vkf.k okoM; k mMfo.; kpk [kG-

 $ukxipehP; k vxpj lk/kkj.k 8&15 fnol u\underline{S}_R; ekUluu okja okgk; yk l \# okritU; Nk; P; k inskkr gkr vlrs rsokjsl # >kyschl okoM; k] irax mMfo.; kpk ekU e l # gkr vls irax gh pkJlkdrh vlrs iraxkP; k pkj cktwlkj [; kp ykuchP; k vlrkr o irax gk ygku vlrks$

okoMh ek= \vee k; rkdrh \vee l rs , d QW ykxc] \vee /kkZ QW #m brD; k ygkugh okoM; k mMfoY; k tkr- , d QWki kl w tkLrhr tkLr 10 QW ykxc o 4 QW #mhP; kgh okoM; k mMfoY; k tkr \vee l r- dkeV; kph Qxe r; kj d#u R; koj tkM rifdjhjxkpk dkxn fpdVoyk tk; pk-

; k dkGkr błoj oMjkph okoMhlokirekBh Eg.kts10 ck; 4 OM/kph cufoysyh vlk; phvikk okoM; k mMfo.; klkBh eki; k Eg.kwu ckjhd rkj okijyh tk; ph-, derdkii; k okoM; k dki.; klkBh; k rkjii; k eki; kyk ckjhd dks rsykoystkr vlr- błoj oMjkph okoMhlokirekBh vlk; ph- R; kwirj nksu ucj okoMh egkno vcknkl ukx.ks; kph vlk; ph-rhu ucj ekGh] xkjingj oBkjiJhjax xqxsb-r#.kkii; k vlk; P; k-

; k okoM; k mMfoY; k vkf.k ojP; k ok&; kyk ykxY; k dh R; k 15&15 fnol [kkyh; så 'kdrulr-; k okoM; k, dexdkil; k dki.; kil; k gh Li/kkilgkor vlr- biloj oMkj] egkno ukx.ks; kil; k okoM; k lyx 15&15 fnol mMr jkgk; P; k- R; kipk ekil; k nksu nksu ek.kl kiuk /kjkok ykxk; pk-; k okoM; k oj xil; kuirj foekukl kj [kk vkokt djk; P; k- R; kl kBh R; kiuk dkxnkpk pax fpVdoyk tk; pk- okoMhyk ekxsnk0; kiph 'ki Vh ckilkyh tkr vls gs'ki W dkl jk nksu dkl jk yksc vlk; ps 'ki V; k jaxh cjaxh vlk; P; k] rj 'ki V; kiuk jaxh r xkilligh ckilkystk; ps

okoM; k mMo.; kpk ukn ek>k ekBk HkkÅ \vee k..kkykch y; grk- rksokoMh mMok; yk \times kM cksyw eyk; rkGckP; k ekGkoj f?kÅu tk; kpk- ij R; kph okoMh mMkphp Ukkgh-

, d fn'kh rkseyk Eg.kyk]^^i ki V_7 k py ekGkoj - \vee ki .k okoMh mMou; k]** eh Eg.kyu'^uxackck]reh okoMh Ugk; mMyh dh rweykp cnkcnk ekj rw**

vkbZEg.kyh]^^tkikiV]vkiY; kekB; kHkkokykokoMhmMok; ykenrdj**

- eh Eg.kyı] ^\kbleh tkr Ugk; - frFkax\forall'; koj áph okoMh mMr Ugk; Eg.kw R; ksjkx rks ek $\ddot{0}$; koj dk<rksvu eykp ekjrls**

 $\hbox{$\scriptstyle \lor$kbZEg.kyh] $$ $^\circ$ckckI kc iki Vyk ek# uxkscj dk^{**} $}$

ckckl kc Eg.kyk] u k; ekjr]py , o<k o G^{**}

 $eh \ Eg.kyl) \ ^eyk \ rwf'k0; k \ fnY; k \ rj \ Ekh \ frFkuai \ Gw \ ; skkj \ gk; \ rwk \ I \ kaxw \ Bqrks \ vk..kk \\ Eg.kyk]cj \ cj \ py- \ Ekh \ rwyk \ f'k0; k \ nr \ Ugk; -**$

VkEgh okoMh mMok; yk xsyks frdMavkeP; k cktsyk ekBekB; k okoM; k mMr gR; k-R; k i kg.; kpk eyk ybp ekg gkr grk- ij vk..kk eyk frdMau tkÅ nrk okoMh mMok; yk ykr i kBok; pk- vu okjavkyadh gkrkuab′kkjk d#u okoMh mMok; yk I kak; pk- Ekh okoMh mMok; pksij vk..kkph okoMh dk; mMrk mMr u0grh- okoMhpaeaxGI & I find ekfgrxkjkdMu r; kj d#u?; koa ykxra ij vk..kk I kfrkp okoMhpaeaxGI & cuok; pk-R; kerGaR; kP; k okoMhpaeaxGI & uhV r; kj gr u0gra R; kerGaR; kph okoMh mMr u0grh- okoMh Ukkgh mMyh dh rksi Gr i Gr okoMhdMa; k; pk-eaxGI & uhV djk; pk- vu I Mk f?kÅu erG tkxpj tk; pk vu eyk okoMh mMokyk I kak; pk-R; kph okoMh d/khp mMyh ukgh- okoMh mMY; kpk vkum vkEgkyk d/khp feGkyk ukgh-R; kpau′khcp QWdagra

Uklxipehpk I.k [kjaEg.ktsefgykpkp ijrqvkeP; k xkoh i q#"k eMGhqh ukxipehyk okoM; k]vkV; ki kV; k] gqrqrw; kps [kG [kGw vkun ?; k; ps ukxpeh fno'kh ckjkGs ukD; koj ejhvkbZnoGkP; k i kBhekxs NkWl sukxkckps Bk.kds qqrs ukxkckP; k i rhdirh f'kGoj gq; k- R; k ukxkckyk i qt.; kI kBh I a'; kdkGh 3&4 urj efgykph vykV xnhZgkr gkrh-efgyk i pM I a'; kus uVw FkVw ukxkckyk Qqyao ykakpk ubs| nk[kfo.; kI kBh; r vI k; P; k-frFkavkY; kurj efgyk ukxkckph xk.kh Eg.kk; P; k] QqxM; kf>Eek [kGk; P; k-

R; kpoGh ckgkGsukdøjhy pkGdkr i #"k eMGh grppok [kG [kGk; ps grppkv[kG nkw I åkkr gkr \lor I s , d eakly; krhy rhu MkckP; k [kkypk I åk \lor kf.k ny jk rhu MkckP; k ojpk I åk- \lor 'kk nkw I åkkr \lor VhrVhpk I keuk 0qk; pk-

[kkyP; k l 3kkr i eq[; kusHkxoku l koath] jkeHkkÅ l koath] jkeHkkÅ okdM] nxMv?kgy] ekf.kd ?kgy] væknkl ?kgy] xki kG l koath] fuok Mkjy] jke Mkjy] l [kno tkoG] Hkxoku okdM] nRrk ckcj] vgæn egyk.kh] vkck vkirkM] ek#rh okdM]jke Mkjysvl s [kGkMwvl k; p] rj rhu MkækP; k ojP; k l 3kkr ckGkl kgc pki M] t; ukjk; .k dkMikjh] nRrk gkweku] dipfyd gtkj] 'kædj Hkxj] nxMqHkxj] l nk ekGh] ek#rh oMj] Jhirh cjM] nRrk gkweku] y{e.k dkMikjh] v'kkd

dlaklimh] euk Lokeh] jknachdj] 'knadj oMkj] fall u enpxny] vis [kGkimivik; ps njo"khi; knok t; ijkt; 'kD; rks Hkkim.kkrp Ogk; pk- gk [kG ikg.; kl kBh in(kalkph nkhigh aktnyk Okj ekBh xnhi Ogk; ph-

akgh okoMh 'kk&du dæj rykokP; k HkjkO; koj okoM; k mMok; ps

uohu ukmk; yk l kl jh xsyly; k egyhnuk ; k l .kkl kBh \lor k.kystkr \lor l s ukxi pehyk ekB ekB; k fynckir; k >kMknuk nkj [kMkir; k l gk; kus>kcdscki/kystk; ps gs>kcds[kG.; kpsdke ck; dk djhr \lor l k; P; k- >kcds[kGrkuk ck; dkir; k Li/kkl pkyk; P; k- mp >kcdk tksdkskh ckblubily fryk /kV o /kkMl h ckbll etystk; ps

ukxi pehyk fl uekps reigh nksu rhu ; $r \lor l r$ - ; k rein uohu fi Dpj $\lor k$.kys tkr $\lor l r$ - rein reie/; s xktysyk o uok fi Dpj $\lor k$.k.; kl kBh Li/kk $l \lor l$ k; ph- ukxi peh $\lor k$ f.k nkekth l^p ; k; k=r fl uekps reincjp; k; ps brjoGh 1&2 rein $\lor l$ k; pp- lkak l^q ; kpse.k l^q h dlu uhps 4&5 reingrs dehr deh , lrein l^p f, lkipk each l^q i; lkyk dlk; lty lk; lth; lth dlth dlth lth lth

 $ukxi pehyk j M; k P; k Vdjhgh ykoY; k tk; P; k-ukxi pehP; k fno'kh I dkGh j M; k Vdjh ykoY; k tkr <math>\lor$ I r-

; k I .kkfno'kh ?kjkr d.kdhpsxkGsR; ke/; sf'ktysyh gjHkjk nkG o xG ?kkyw r; kj dsysysvIk; ps R; kyk fnMavIaEgVystkr vIs f'kok; igi.k &ikGh]f[kj]oGo.khph vkeVh] xGkph xGo.kh] R; kr nvlk o rwi]Hkkr dgioM; k HkkrM; k b- i nkFkZvIk; ps vIkcr vIk; pk-

?kjkr Eg\$ gqrh- Eg'khph /kkj \vee kbZ | dkG | k8; kyk dk<k; ph- /kkj dk<Y; koj \vee kbZ ckck| kcyk cksyokph \vee u Eg.kkph]^^ckck| kc] , o<anvlk ih] rk8; kHkj fujl anvlk gk;] , o<al i ow \vee kcl]**

ckckl kc Eg.kk; pk]^^eyk udwgk; nwlk] eyk nwlk vkoMr llgk;]**

 $\begin{tabular}{ll} $$ \begin{tabular}{ll} $$ \begin{tabular}{ll}$

nd jh] frl jh vkf.k pk&khpsox/frdMadæj rykokP; k cktnyk Hkjk; ps dok dok nd jh frl jhpsx#th jtøj vl ysdh] R; ksox/vkeP; k oxkir; såu cl k; pk- ex vkepsx#th nktlgh oxkP; k egyk egyhe/kwu l kb.drhd dk; ide djk; yk l kakk; ps; kr tkLrh flkeuxje/khy i kjai ka vl k; ph- vkeP; k xkokr flkeuxjyk xk.; kph Okj tquh i jajk gkrh- R; k i jajjrp foBBy f'kmg i i/gkn f'kmsgstllekyk vkysgqs i i/gkn f'kmph xk.kh l xG; k egkjk"Vkr xktr gqh- ^#ryk ckb/ dkVk---vku xsyk gjh dq; k xkok----* gh xk.kh R; koGh xktr gqh- flkeuxje/kY; k i kjkuk vki w i i/gkn f'kmscukoavl aokVk; pa vku i i/gkn f'kmph xk.kh rh i kjagqqgq i i/gkn f'kmP; k xk.; kP; k pkyhoj Eg.kk; ph-

I kGk I kyh dh ?kjkryh I xGh dkea eyk djkoh ykxkph-toGp vkM gqrk-R; k vkMkojuackjD; k ?kkxjhuaik.kh vk.kk; pks fttkbZckjgeskk eyk vkMkpaik.kh vk.kkyk i kBok; phEkh Eg.kk; pk $]^v$ k..kkyk I kak] Ekh Ugk; vk.k.kkj* rj vkth Eg.kk; ph $]^v$ kjaiki V ckckI kcyk rkyehr tk; pavI r] ryk dk; rkyehr tk; kpagk; 0g; $)^*$

 $\label{eq:bound} b \textit{finjk} \ x \textit{kilkh} \ e \textit{ackll}; \ k y k \ ; \ k; \ ph \ g k; \ - Eg.\ k u \ e \textit{kB}; \ k \ e \textit{k.kl} \ k r \ y; \ p p \textit{kl} p \textit{ky} k; \ p h \ - e h \ r h \\ p p \textit{kl}/; \ k u \ f n \ A u \ , \ c d k; \ p k s$

rh ∨'kh]^1959 l kyh blinjk xkdkh ∨f[ky Hkkjrh; dkikkil P;k ∨/; {kk gkk;k-rl p HkkjrkP;k uHkkok.kh eæh gkk;k-1957yk th fo/kkul Hkph fuoM.kvd >kyh-R;kr dkikkil usl i kVvu ekj [kkYyk gkrk-tkxkstkxh l ferhP;k tkxk fuoMw ∨kY;k gkk;k-egkjk″Vkryh dkikkil ph fLFkrh I koj.;kl kBh blinjk xkdkhuh egkjk″Vkr nkgik dk<ysyk gkrk-

R; k I kakly; kojua FkW eakly; kyk vkY; k- R; kB; k c#cj dklkkl psvud dk; idrāgkrs R; ke/; s I kyki ji ftYákpsdklkkl v/; {k NUulji ax pmsył ckck I kGł dne xe#th] ekjokMh ofdy] jrhyky 'kBth] yoaxhpsekusi jdkj vi sfdrhrjh dk; idrāl HkB; k fBdk.kh Fkkucys gkrs R; kiph I Hkk >kyh i jarq R; kipa Hkk"k.k pkywvi rkuk] R; kuuk vLoLFk okVwykxył dkj.k I kakly; kpavu eakly; kpa es efgli; kryamu R; kuuk I kd oya ligkbł R; kuuh Hkk"k.k Fkkucoya vkf.k rMd R; k xkMhe/; s tkÅu ci Y; k-

panyruh ckck l kGuuk fyrcwljcr \vee k.kk; yk l kfixrya ckckl kGuuh i Gr i Gr tkÅu i ijkf.kdP; k dk \forall Mhod gkml e/kuu fyrcwljcr \vee k.kya

banjkthuh rsljcr?krya R; kauk cjaokVwykxya

 $dnex\#th \ b finjkthuk \ Eg.kky]^^vkeP; k 'kkGpa H knehi ntu \ rpP; k \ gLrs \ 0gko v'khvkeph b PNk vkas**$

blinjkth Eg.kkY; k]^^reP; k 'kkGP; k bekjrtP; k mn?kkVukyk eyk cksyok- eh fuf'pr; rs i jrqvkrk eyk i «satk; ph?kkbZvkqs**

vkEgh fr?kaEg.ktseh] fdl uk]vku Hkkxor Hkkodhrys, dkp oxkir gyrks fdl uk ek>k pyr HkkÅ gyrk- rj Hkkxor ekol HkkÅ vkf.k pyr HkkÅ gyrk- vkeP; k fr?kkr Hkkxor f'k&; kjkua n.kdV gyrk- ek>aik; QxMagyra vku fdl ukch vknyvkdke gyrk- vkEgh fr?kafeGyu l kGyyk tk; kpkj feGyu vH; kl djk; pks

vkepk ifgyhpk fudky 30 , fily fno'kh grk]vkEgh lkGr fudkykl kBh xsyks rj vkepsgMekLrj pki Msxe#th ckghj , dk [kphòj clysgrs lxG; k egykbuk lkGP; k QMaNkb/; k eBikukoj clo.; kr vkya vkEgh ifgyh rspkFkhpsl oZfo | kFkhZ, d= clyks vkeP; k cktbuk vkeps oxf/k{kd mHksgrs

 $rsi\ e_sEg.kky \ a^R; \ kpk\ bfrgkl\ ehr\ e_gkyk\ FkkMD; \ kr\ l\ kark \ ark \ grep; \ k\ y \{kkr; rsdk\ c?kk]$ $rep?; \ k\ i\ kB; \ i\ kpr\ dkr\ vki\ Y; \ kjkT; \ kpauko\ aepbZjkT; \ vl\ avkgs\ dmzljdkjua1\ uk\ gej 1956$ $jksth\ ,\ d\ v|\ knsk\ dk<u\ l\ kgk"V]\ xqtjkr]ejkBokMk\ o\ eqpbZbR; \ knh\ insk\ ,\ d=\ vk.kuu\ f0nHkkf"kdeepbZjkT; \ ?kkf"kr\ dsys$

 $ijrq \lor ki Y; k ej kBh turph ekx.kh gkrh dh] \ dluM \ Hkkf''kdkl kBh dukW djkT; kph fufeirh dsyh- ex \lor keP; k ej kBh Hkkf''kdkl kBh egkj k''Vkph fufeirh dk gksÅ u; & gk dnkpk nqtkHkko \lor kEgk ej kBh Hkkf''kdkl kBh dk\ Eg.kwu ej kBh Hkkf''kdkuh , d=; sÅu I a ipr egkj k''Va fufeirh I ferh cufoyh-; k I ferhr I suki rh cki V] MkW ckckI kgs <math>\lor$ kscMdj], I -, e-tkskh] i Ygkn dsko \lor = $\frac{1}{3}$ Jhi kn Mkx $\frac{3}{3}$ 'kghj \lor ej 'ks[k] i skskudkj Bkdjsb-dk; \forall right \forall kscMdhj gkrs

21 uklýgroj 1955 j ksth; k pGoGhrhy 15 dk; ZdrikgrkRes>kysi ks Ocopkjh 1956 j ksth erpbir gjrkG dsyk-; k gjrkGkr 80 yksdkuk gkfkRe; i klr >kys, dwk 105 yksdkuh; k pGoGhl kBh cfynku fnya 1956 yk fuoM.kwdk >kY; k-; krla fipregkj k"V"fueklk l ferhps; kpem | kojekB; k l $\{$; suafuoMwu \lor kys \lor ki Y; k nskkps \lor Fklea \neq h \lor kf.k egkj k"Vkps \mid \neq ek-l h-Mhnsker $\{$ k; kuh; kper $\}$ koj ea \neq hi nkpk j kthukek fnyk-

'koVh ek-blinjk xk/kh ; kuth vki ysfirk tokgjyky ug# ; k8; kdMse/; LFkh d#u eqb] fonHk]ejkBokMk]dkd.k][kkunsk]if'pe egkjk"V i nskkpk l $\mathfrak p$ pr egkjk"Vacuok; yk fgjok dliny nk[koyk-

nd &; k fno'kh egkjk"V*fnukpk dk; ble fu; kstuinobl >kyk-ehifgyhikl >kyks vkf.k vkEgkyk mUgkG I kyh feGkyh- xYyhr I al; kdkGh Kkunvkck] KkuwekLrj] ukxurkR; k; kB; k xlik cRrhP; k MkucktoG pkyY; k gB; k-R; k eh , xdY; k-KkuwekLrj Eg.ky}^^vkck vktpk fnI y; ekBk gk;] vkinu ikp o"kkikl nu vkiyaejkB; kpajkT; ekxhr gurn vk[kjhyk fnYyh I jdkjuaejkBh turph ekx.kh ekU; dyh-**

HMox I kGk

, dnk vkEgh nk9kamUgkGl WVhr ckHkGxkoyk fu?kkyks fu?krkuk vkEgkyk FkkMk nqmbkua m'khj >kyk-ckHkGxkoP; k vfydMal _; n ojoM; kyk i kpk; yk l k0; kpapkaxyavkB oktya frFkwu ckHkGxko nku rsfru fd-eh-gqaij; k nku xkok0; k e/kh y; ekBk m?kMk ekG i l jysyk gqk-; k ekGkojuaek; mkG i kmyokVk g0; k- i Ddk jLrk u0grk- vkEgh vmktkua vmktkua ckHkGxkoph i kmyokV/kjyh vku fu?kkyw

d".ki {k i ákjoMk grk- vákkj dkGkdly¥ i Myk grk- i k; k[kkyph i kmyokV fnI r u0grhtoG cWjh] dkM; kph i Vh dkghp u0gra R; k dkGkr oht u0grh- R; ker@axkokP; k toG x¥; kf'kok; xko vkY; kpáfnI r uI k; pa

vákkjkenGa∨ku vkeph ikmyokV lo; hph jkstph ulY; kenGa∨kEgh ikmyokV pplyks vu HkyR; kp okVuafu?kkyw lk/kkj.k l¸; n ojoM; kruafu?kkY; koj v/kkZikm.k rkl kr ckHknGxkoyk vkEgh ugeh ikgpk; pks ijarq vkt v/kkZ rkl >kyk] ikÅ.krkl >kyk] rkl >kyk rjhch ckHknGxkoyk vkEgh ikgpymuûgrw vmktkuavmktkuavkEgh rlpiqsanku rkl pkyr gnq

vkeP; k gkrkr ?kM; kGau0grh- R; ke(Gauædafdrh oktyadk; p dGr u0grà i k; kr piyk u0gR; k-ekGkoj ekBekBh nxMagrh- R; kyk vkEgh BpdkGr grw BpdkGw BpdkGw i k; kph ckVa QN/yh grh- c&; kp oGk I eij [kMMk fnI r u0grk]dk; oGk vkEgh [kMM; kr I i 'ky tkÅu i Mk; pks R; ke(GaxM?ka) gkrkpadki ja) ekj ykxw pkxyp I ¢tyagrao [kjpVyagra ekGkoj dBaoLrhch fnI r u0grh- dBa'kr ch fnI r u0grau() rk gM/k ekG i I jyk grk- eakh eakh dkVa)h [ka) Vakr vkf.k i k; kr ?ko) r gra

 $\label{thm:like} \begin{tabular}{ll} Hkkxoryk eh Eg.kyij^hkkxor] $$ $$ vki.k fuf'pr okV pqlyw] brdk oG $$ vki.k pkyrw-ij ckHkqCxko dk; ; $$ uk; - vki.k uedadqBapkyyw ghp I etr Ugk; $$ eakh, dnh oLrh fnI yh] $$ rj vki.k t#j pkGl'kh d#; kr] $$ vki.k uedadqBavkgq rhrj dGay-$

ije/khdBaoLrhfnIruOgrh-vkrkdk; djk;p**

 $\label{eq:hkkxor} \begin{tabular}{ll} Hkkxor Eg.kyk]^^ukjk; k] $$ $ \forall krk $$ $ \forall ki Y; kyk $$ d \beta rjh o Lrh $$ ykxr $$ Ugk;] fr $$ fr $$ ki rjh o Lrh $$ ykxr $$ Ugk;] fr $$ fr $$ ki rjh o Lrh $$ ykxr $$ Ugk;] fr $$ ki rjh o Lrh$

 $Ekh \ Eg.kyi]^{\sim} \lor kja0g; \] \ r_{\sim} ac\#cj \ gk; \] \ ij \ oLrhch \ dBafnl \ r \ Ugk; \] \ \lor ku \ [kkyh \ ik; okVch fnl \ r \ Ugk; \] \ ik; kr \ br \ cdadkVaekMY; krh \ dh \ pky.kavo?kM \ ch \ guu \ cl \ ya **$

vlaeh lkargr] brD; krHkkxor, dne tkjtkjkrojMkyk ykxyk]^^vk; !---vk; !-vk; ! ehywjackck!--** Ekh Eg.kył]^^dk; >kyaHkkxor**Hkkxor tkjtkjkr bûgGr grk- vku
Eg.kyk]^^vkjaukjk; .k]ekÖ; kik; kyk dk; rjh tkjkr pkoy; c?k jackck! cgrd#u pkoy⅓; k
fBdk.khy; tkjkrjDr; ÅykxY; kphtk.khogrh; k**

 $\label{eq:holdstard} Hkkoxr [kkyh l i'ky > ki yk] eh ch [kkyh cl yi] R; kpk gkr gkrkr /kjyk vku Eg.kyi]^ek>k gkr gkrkr f?kÅu re; k gkrkuarh tkxk nk[ko] ftFkartyk pkoya rh**$

 $\label{eq:hkkvoruaek} \mbox{Hkkvoruaek>k gkr idMyk $$ $vku ik; $$ kP; k ?$ kkb/; k[kkyh usyk- frFkagkrkyk y; mcnkj mcnkj okVr gqracgqr d#u rhj Drp gqra$

Hkkxorpaj
Dr Fkkær u0gra \vee krk dk; djko $\$ gh eykgh dGhuk >ky\aR; kyk dk; pkoyarch I etr u0gra

Ekh Hkkxoryk Eg.kyŵ/^Hkkxor Fkkac-rŵp; k i k; kyk Ekh HkkdjhpaQMdackalkrw Egath roþa jxkr ûgk; kpacm gboðy **

Eg.kuu eh fi'kohrua HkkdjhpaQMdadk<yavku HkkxorP; k?kkV; kyk tkjkr ckaky}

Hkkxor Eg.kyk]^eyk i kVd@hclk; yk udij pyrl po gGmgGwtkÅ; k QMå*

Ekh , d gkr Hkkxorpk ekb; k [kka| koj ?kryk- \lor ku gGgGw \lor kEgh nkgka Qha Qh

V/kkZrkI VkEghrI po gGwgGwQWapkyyw

vku vpkud vkEgh nk9ka, dk y; [okNy [kMM; kr nku pkj dksyka/; k [kkÅu i Myw vkEgk nk9kkaukch dk; p dGhuk\ dk; >kyars\ ák [kMMk gk; dk i Mdh fgj gk; ghp vkEgkyk I etru0gra\ [kMM; ke/kh dkVidNyay; gira I xGadkVidNyavakyk [kjpVysyagira nk9kkp ch I nja QkViu ckGirh >kyagira [kMM; kr diByarj tukoj gira vkepk I iqkkok ykxY; koj rh tukoj [kMM; krua mMh ek#u oj i Giu xsya vkEgkyk dk; p dGhuk] tukoj dByagira\ dkYga giradk I k; kG gira\ dk deagira\ dk; p dGkyk ekxZu0grk\

Hkkxor Eg.kyk]^^cgr d#u ekGkyk [kkdMay; vl R; kr-gs[kkdMp vl ko**

vkEgkyk y; eqdk ekj ykxyk gqrk-gkrkik; kpadkijaQNvyagqi MkD; kyk VaxGavkyh gqrh-xNM?; kruavku dki&; kruajDr; r gqra ifgY; k ifgY; kmk dk; p okVyaUgk; ij urjjDr; r gqrafrFkapqupqu djr gqrank9kkph f'k&; kja dkV; kdNv; kuaikj [kjpVm xYrh-vkEgh nk9kadl rjd#u vkcnr vkcnr [kMM; kP; k ckghj vkyw vkEgh, dedkyk fnl r u0grw ij vkoktkojua vkEgh, dedkyk oG[kr gqrw

brdk oG eukr nkow Byyyh Hkhrh ckghj i Myh vku vkEgh nk9kwch HkkodkM oklwutkjtkjkr jMwykxyw ngk feuhVa vkEgh jMynj ij vkepk vkokt , odkyk frFkadkskch u0gravkEgkyk vk/kkj | k; yk frFkadkskch u0gravkEgh , deodkykp vk/kkj nr gyrks dNgavkywdk; dGru0gravek?kkjh tkoaEg.kyarjhchokV I ki Mru0grh] vkufrFka>ki koaEg.kyarj eu [kwchj gyru0gravek?kkjh tkoaEg.kyarjhchokV I ki Mru0grh] vku

rjh ch Ekh Eg.kyŋl^^Hkkxor vkrk Ql/Matk.; kr dk; vFklUgk; - vki wu vktph jkr fgFkpa >www.k]vku igkVatjk QVQVhr >kY; koj ex vki.kkyk okVk dGrhy- vkrk pky.ka; Wai.kkpadke qk; -**

 $\label{eq:continuity} $$ Qhlatkoarj \lor tw., [kk | k [kMM; kriMw tho tk; kph Hkhrh okVr grh- \lor ku fgFkaFkkackoa Eg.kyarj ekGkojP; k fgla= tukojkph Hkhrh okVr grh-$

v/kkZrkI vkEgh frFkpcl yw vku nk9kkuh Bjoyavkrk vkiwu gkrkr gkr 9kkywu y; nekuaQMyatk; kpa, [kknk [kMMk tjh vl yk rjh [kMM; kr , dne QMyaik; Vkdk; pk Ugk; - v/kkZ v/kkp ikmM QMyaVkdk; pk vku ik; vyxn QMyafBok; pk- vladsyarj dehr deh [kMM; kr iMk; parjh vkEgh okpr gmrii*

 $\label{eq:hkkxor} Hkkxor Eg.kyk]^ukjk; .k] QMadBaoLrh fnl r Ugk;]dBaoLrh fnl yh vl rh] rj , [kknk fe.kfe.krk fnok rjh fnl yk vl rk fdøk dp&; kpaHkql.karjh , xdwvkyavl r] ij ; k eSyk nku eSykr dk; p fnl r Ugk; - vu , xdw; r Ugk; - rok ukjk; .k] vtød nku eSy pkyk; yk vki .kkyk l dkG mtMy-**$

Hkkxor Qlylavku eh ekxa Hkkxorph vakh /k#u pkyr grrw vkrk dr%; kpk vkokt gGggGwtoG , dwykxyk grk- vkEgh dr%; kP; k vkoktkP; k fn' kwafu?kkywgrrw FkkM; k oGkuavI a y{kkr vkyafd] vkrk draQykakHkj varjkoj vI koa

 $\forall ku \ \ \, \forall k \ \, \text{gkyk n} \ \, \text{i, d} \ \, \forall k \ \, \text{unkph xk$V fnl yh-rh Egath dq-8; kP; k fn'ksyk , d fe.kfe.krk fnok ch fnl yk- <math display="block"> \forall k \ \, \text{gh-vkunkuaoj} \ \, \text{Mr gq-w-vku , de.dkyk Eg.kr gq-wdh] } \ \, ^\vee \text{krk } \ \, \text{vki.k okprw-*}$

vku vkeph pkggy nku dr&; kauk ykxyh] rh nku d∉h i Gr i Gr vkyh vku rMd vkeP; k vækkoj i Myh- vkEgh gkrkyk ; hy R; ks nxM mpynu R; kauyk gk.kwykxyw vku tkjkr gkM··· gkM··· Eg.kwykxyw rjhch d∉h nji tkr u0grh- vkeP; k uf′kckua vkEgkyk gkrkyk ekBekBh nxMaykxyh- d∉a vækyk Li′kZdjra vlay{kkr vkyadh] vkEgh dr&; kyk nxMkua gk.kk; pks vkEgh Bjoyadh] gkrkryk nxMl lkMk; pk Ugk;] Ugk; rj vákkjkr i Njgk nxM lki Mk; pk Ugk;] Eg.kwu vkEgh gkrkrY; k nxMkua dr&; kæ; k rkMkoj] MkÐ; koj n.kdafnÅ ykxyw vkEgh nk®kkauhch nkNgh dr&; kæ; k rkMkoj nxMkP; k lgk; kuavlatkjkr n.kdagk.kyadh] d∉h ojeh ?kko cl Y; kerGaek?kkjh fQjyh-, d d∉anxMkpk n.kdk MkÐ; kr fuckj cl Y; kerGagyikMwu [kkyh i Myagra

 $\forall k \text{Egkyk dr} \&; \text{ kpad/kh H}; \text{ k okVyallgk; }] \text{ dkj.k ckjek; } \forall k \text{Eghjkukoukr fQjr grjj} \\ R; \text{ ke} \text{ GavI yhd} \text{ dr} \&; \text{ kukgk.kr gk.kr } \forall k \text{EghoLrhoj} \forall k \text{ yw} \\ \end{aligned}$

 $fr F kao Lrhoj \ , \ dy; \ e k B a v kork pa fn M i Myag r a r s fn M v k E g h n k 9 k k u h mpyya v k u I j G R; k d r \&; k P; k v a k k o j V k d y a j$

∨krk d∉h ek?kkjh fQj yh g¶h-

frFkax¥; koj ∨l ay{kkr ∨kyadh tukojam?kM; kojp ckdkyh g¶rh- ij oLrhoj ijda ek.kW ∨kY; kyay{kkr ∨kY; koj tukojaeku >kMwykxyh-

xkV; kruanku ek.kl adkV; k?ksÅu ckghj vkys nk9kk0; kch gkrkr dány gyra nk9kch tkgikr nj Mkow Eg.kyh]^^dksk gk; **

vkEgh Eg.kyi)^^vkEgh ckj dh i kj agko-**

nkligh dip&; kauk R; kek.kl kauh toG /kjya \lor ku bpkjy{}^dksk i kja d\bar{B}yh i kjagko\ , o<; k jkrP; kyk d\bar{B}.ka \lor kyko**

R; krY; k , dt.kkua dánykph okr ekBh dsyh vku dány mpyw vkeP; k nk9kk0; k rkMkQMa/kjyk vku vkEgk nk9kkayk U; kgkGwykxyk] vkeP; k vaxkoj ph dki Mai kd QkVw fpa| k&fpa| k >kYrh-

R; kuh bpkj yð^^ dqkkpajai ký koarægh**

 $\label{lem:eq:kyll^*vkEgh < kcd ckHkGxkoP; k xk; clokMkpaHkkpagko] [kjaEgath \lor kEgh eaxN; kpagko-nj o"khZl Vhyk \lor kEgh \lor kt Gh; $r \lor l rwij ák oGh m'khj > kY; kerGaojoM; kojua<math>\lor$ keph okV pplyh-**

R; ks ek.kul Eg.kyk]^^ckckuw! gh olrh dkrokMhph gk; - fgFkua dkrokMh Qykäk nhM Qykäk toGp gk; - **R; k nk9kkar , d ek.kul i Uukl I kB o"kkipk fnI r gurk vku , d ohl i pohl o"kkipk r#.k i kj xk fnI r gurk- R; k nk9kkuh r uck[kn; k fi 'k0; k dk<Y; k] dánykP; k m tMkr gkrkoj r uck[kn?kryh- FkkMk puk f?kÅu gkrkoj r uck[kneGyh] vku nk9kkuhch r uck[knpaHkdearkMkr Hkjyā]

R; kryk , dt.k Eg.kyk]^^ ræk [kw[kkrko dk; $\$

vkEgh Eg.kyi)^^vkEgh ræk [kw[kkr Ugko-**

Fkkt/lk oG xY; koj HkkxoruaR; kayk bpkj yaj^^fdrh oktyavl ay**

, dt.k Eg.kyk]^^∨keP; kdMarj dβa?kM; kGagfn\ ij ∨l aokVra], dnkupk Vkbæ >kyk∨l kok] ∨tw mxorhyk pkm.kh mxkoysyh fnl r Ugk; - Egath i gkVarhuP; k ∨kryk Vkbægk; -**

 $\begin{tabular}{ll} $$ vkEgk nk9kkauk ich Hkaplk y; ykxy; k gill; k-vkEgh ?kjkruafu?krkuk fi'k0; kr vkeph dki Ma vku FkkM; k FkkM; k Hkkdjh ?kry; k gill; k-R; k vkEgh okVirp [kkYy; k gill; k-, o<avkEgh i Myvij /kj i Myw i j 'koVirji vkEgh vkeP; k gkrkry; k fi'k0; k dk; I kMy; k Ugkbir-$

 $\label{eq:local_local_local} \mbox{$\scriptstyle $$ $ \mbox{$\scriptstyle $$} $ $ \mbox{$\scriptstyle $$} $ \m$

, dt.k Eg.kyk]^^∨kEgh xkokruaHkkdjh f?kÄu ∨kY; koj nk9kach tɒw >ksi yw c?krw QMD; kr , [kknh Hkkdj ∨l yhrj-**

rkso; Ldj ek.kM mByk vku xkB; kr xyk] xkB; kruagkrkoj, d Hkkdjh vku R; koj FkkMkpk Bpk f?kÅu vkyk-rscf?krY; koj vkEgkyk vkeP; k QMaipoDokukpato.k vkY; kl kj [ka okVya vkEgh v/kk'khi .kkuaR; k ek.kl kP; k gkruaHkkdjh pVfn'kh fgl dw f?kryh vku nk9kkuh v/khZ v/khZHkkdjh vu FkkMk FkkMk Bpk [kkYyk] frFka[kkijkph] ik.; kph dGh grph-R; kryaFkkMaFkkMaik.kh fiyM thokyk y; cjaokVya

 $\label{eq:rseg.ky} $$rsEg.ky]^^ \lor krk > ki k- \lor ku \ l \ dkGh \ mBw \ tkok- gFkuackHkGxko \ rhu \ pkj \ dkd \ rj \ \lor l \ hy-**$

 $\begin{tabular}{ll} $$ $$ vkEgh eukrY; k eukr fg'knc ?kkryk] Egath fgFkuackHknGxko ngk fd-eh- $$ vI koa R; kauh fnyY; k i kR; kapj $$ vkEgh $$ axaVkdyh- $$$

vax Vkdrk Vkdrk Hkkxor Eg.kyk]^^ repavkMuko dk; gk; **

R; kso; Ldj ek.kW Eg.kyk]^^ vkepavkMukof[kj l kxj gk; -**

 $f[kj \mid kxj \mid Eg.kY; koj \mid HkkxorP; k \mid MkD; kr \mid y[[kfn'kh \mid izk'k \mid iMyk- \lor ku \mid Eg.kyk] $$ ^ckHkGxkoP; k 'kkgwxk; dokMkpavkEgh Hkkpavkgr- \lor ku \lor keph ekeh fgFkyhp f[kj | kxjkph gk; -**$

R; ks ek.kN Eg.kyk]^^0g;]ckcGxkokr fnysyh rhikjxh vkeP; kp Hkkodhryh gk; -I dkGh yodj mBk- eh rfigkyk R; kB; k ?kjh fuÅu I Mrw Egath v2kG; k d#u ts.k&[kk.kad#u rfigh ckHkGxkoyk tkok-**

R; k i kûg.; kpacky.ka, chw vkEgkyk cjaokVyajkrHkj vkEgkyk ±kkW ykxr uûgrhek>k gkrkpk dkijk l qtw VEe >kyk gqrk- Hkkxorpk i k; dk; rj pkoY; keqGal qtw y; ekBk >kyk gqrk- R; kyk ?kkV; kyk dk; pkoyagqrj vkEgkyk dk; pekfgrh uûgr\ajkrHkj d.kr&dqrr vkEghfrFkaikR; koj >w yw

I dkGh mBw vkEgh vkepk vkorkj cf?kryk-vkeP; k vX; k QkVw fpjxVa>kY; k gQ; k-MkD; kyk VaxGavkyh gqrh-nk9kkqbh vaxa[kjpVw xsyh gqrh-dlaclavkEgh nMkoj tkÅu rkMa/kqryh-vku dki Macnyyh] QkVdh dki Mafi 'kohr ?kkryh]

R; k oLrhojP; k ek.kl kuaHkkxorP; k ekehP; k ekgih \vee kEgkyk usÅu I kMyaj i fgY; kmk \vee kEgkyk ekehP; k oMykua oG[kypa Ugk; - R; k oLrhojP; k \vee keP; k c#cj \vee kyY; k ek.kl kua I kfixryaj^ \wedge \vee kjarkruck] gh i kijarhp; k tkok; kpaHkkpa g\$r-**

rknock , dnep MkGaekBad#u \vee k' pł kuaEg.kyk] $^{\wedge}$ \vee keP; k tkok; kpaHkkp λ \vee ku gh i kj λ dk; Hkku \times M gk; \setminus d β ua \vee kyhrh i kj λ **

áuyk väkuGhyk i k.kh fBo]∨ku toku d#up áuyk okVaykon k-** ∨kEgh ?kMysyh I xGh dFkk ekehP; k ∨kbZyk ch I kūxryh-

rh Eg.kyh]^^cja>kyackckuwl i Mr/kMi Mr gFkarj vkyko-**

 $frpay\{k \lor pkud HkkxorP; k \mid tyY; k \mid k; kdMa xya\lorku Eg.kyh]^^i kj k] \ asik; kyk dk; ykxya re; k**$

Hkkxor Eg.kyk]^^vkR; k! dk; ykxyaUgk;] ij jkrh dk; rj pkoy; -**

rh uo&; kyk vkrupaEg.kyh]^^0g; oa \cdots i kjkyk dk; rj pkoya \ rsc?kk vku áyk vkckukukdMafuÅu nk[kok-**

rkruck Eg.kyk]^^0g;] nk[korwdh-pyk j ai ký kuks**

vkEgkyk QMa?kkynu rkrock xYyhrp , dk ?kjh xsyk] ckghjupa rkrockua tkgkr gkd ekjyh]^^ vkckukuk·····vks vkckukuk···---vkckukuk! ?kjkr g\$r dk·**

, d i kaj k i Vdk ?kkrysyk 60&65 o "kkpk Egkrkj k ek. kNl ckghj \vee kyk \vee u Eg. kyk] ^^dk jarkrnock\ I dkG I dkG ?kj yk dk \vee kyk I **

 $rknck \ Eg.kyk]^{1} gk; \ ukuk] \ gh \ ikjaikgq; \ kph \ ghh] \ \acute{a}k \ , \ dk \ ikjkP; \ k \ ik; \ kyk \ jkrh \ dk; \ rj \ pkoya - \ \acute{a}yk \ dk; \ vakkjke(G \ fnl \ yallgk;] \ ik; \ pkavykp \ l \ qt \ yk; -**$

Hkkxor Eg.kyk]^^Ugk; vksvktkck]vákkjkrdk; fnl yállgk; **

R; k Egkrk&; kua, d CyM ?kryavku gGnp lqtyY; k ik; kyk CyMua[kkp ekjyh] ik; kruaHkGkHkGk dkGajxkr ckghj iMya pkaxyav/kkZrk&; k dkG jxkr R; kruackghj iMya vkckukukuackgji tkÅu dlyk rjh ikyk vk.kyk]vku rh ikyk r0; koj xje d#u HkkxorP; k lqtyY; k ik; koj fpdVoyk vku ojuaQkVD; k dkiMkph iVYh ckakyh-

R; ksek.kW Hkkxoryk Eg.kyk]^^ikjk] ákrnku fnol ik.kh tkÅ fnÅ uxa**

 $FkkM; koGkua e kehpk HkkÅ frFka v kyk] rks I k/kkj.k 18&20 o "kkipk r \#.k girk-rkrick vki Y; k i kij kyk Eg.kyk]^ uok] ák i kij kauk cSyxkMhr ?kkyiu ckHkiGxkoyk I Miu; h] ?kkyoiu yxiiyx ek?kkj h; h-rFkaj kgufcÅ uxaj gFkaj kukr cSykph clkeay; [kkGkicY; krh**$

 $\label{eq:filter_filt$

v'kkijdkjs vkEgh y; ekB; k l adVkruu okpuu vkyugqru vkEgh nk9kkuuhch nokpavkHkkj ekuya frFkaFkkMafnol jkáyūvku FkkM; k fnol kuaxkokdMuafttkb3yk fu#i vkyk dh] ^vkbP; k ckGkri.kkyk yodjkr yodj eavM; kyk; h*-

fttkbleyk Eg.kyh]^^py jai kjk] rw, dVk d'kkyk gFkaj kgkrik**

 $\label{eq:kyll} \begin{tabular}{ll} Ekh Eg.kyllim* Fixed Reskyllim* Ekh Eg.kyllim* Ekh Eg.kyll$

pk%k&; k oBk&; kryh tehu [kjnh djroGh nknkyk gjhck 'kBthuh ckjkGsokVyk jktekU; kr 12, dj tehu [kjnh d#u fnyh grh- R; kp 12, djkP; k 'kstkjh egkno jktekus; kph i ko.kspkj, dj tehu fodk; yk fu?kkyh grh- rh ckreh gjhck 'kBthdMu nknkyk dGyh-

gjhck 'kBth nknkyk Eg.ky $\$ ^bBnck] rh; k 'kstkjph iko.kspkj , dj tehu egknojktekusuabdk; yk dk<yh gk; - fro<h rw?kh] Egath rp-h , dk rGkyk iko.ksl kGk , dj tehu ghy-**

nd &; k fno'kh 'kBth o nknk , d= clysgrs rok ckiwfrFkaxsyk- 'kBth nknkyk Eg.kkyk]^^bBrck] eh dky l kfixrysyh xks'V rG'khjkeyk l kfixryh dk** nknk Eg.kyk]^^0g; l kfixryh dh-** 'kBthckinyk Eg.kyk]^^ex dk; bDkj gk; rG'khjke**

 $\label{eq:ckiwEg.kyk]^^FkkkM; kr feGkyh rj f?k; w k-y; i $ al kak; yk ykxyk rj dk; mix 0gk; pk Ugk; -**$

'kBth Eg.kys' rwdk; ch dkGth d# ux $\$ ryk ?; k; ph vI y rj I khk FkkMD; kr d#: k**

cki wEg.kyk]^^fBd gk;] I kS| kyk dok cI w; k**

n(&; k fno'kh egknojkteku] cki) 'kBth] nknk] ukuk $I \times Gs'$ kBthP; k nkjkr dM(a i MY; koj I kB; kyk cI ys

'kBthEg.ky]^^ckyk egknovk..kk] reP; kftehuhpai\$ afdrh | k; p\ha**

egkno \vee k..kk Eg.kyk]^^, dp cksywdk nksu cksynx**

'kBthEg.ky]^^, d cksy] nku&nku cksy-vkEgkyk i joMyarj vkEgh?kskkj-**

egkno vk..kk]^gsc?kk'kBth#i; svMhp gtkj | k- vu reP; k [kpkluaiko.kspkj , dj tehu [kjnh d#u?; k-**

'kBth Eg.ky $\mbox{$^{\infty}$}$ gsc?k] egkn $\mbox{$0$}$ VMhp vu rhu Eg.kwux $\mbox{$0$}$ I jG nksu gtkj ?kh] vku vkeP; k vkeh [kj $\mbox{$n$}$ d#u f?kr $\mbox{$n$}$

egkno Eg.kyk]^^ckohl 'ksrj | k-**

ʻkBthEg.ky}]^^eh, drh, dpcksyr∨lrwn(jacksyk; pheyklo; Ugk; -**

egkno Eg.kyk]^^ek>a'kkr nku gtkjyk r
G'khjkeyk fny
] ij [kjnh d#u dok ?kskkj**

 $\label{limits} $$ 'kBth Eg.ky]^^gsc?k egkno] \lor krk l okhpk ek; nkG ?kk; Vk gk; -rok ,o<hlokhljkbl gkowex i kM0; kurj [kjnh d#] i kMok , fi ye/; s; rw - esefgU; kr uDdh [kjnh d#**] $$$

egkno Eg.kyk]^^fBd \lor kg \S b1 kj \mid k-**

'kBth Eg.ky]^^ fBd gk; d#; kr] ngk ikp deh vkl yarjhch ml uaikl uad#u f?kÅ; k-rwdk; dkGthd# uxili\$ kpk tp<k e\$G gr;] rp<k dj-ckdhpaek>heh c?kril*

 $\label{eq:ckiw2kjhvkykvkf.kdklkvkDdkdMmuckinykdGya^f'kjekP;kikBhojvktmd,dikjxa>kya]^*$

 $\label{eq:cki_wk} $$ \text{cki_wabpkj_clsyk} i \text{ kj_kpk_ik; } x \text{wk pkaxyk gk; - $$ $$ \text{vki_yk rdMa; } $$ $$ \text{gkj} $$ pkyugirk- rok gdMaikj_kpk tYe $$ -kyk-$

vkrk eyk rhu HkkÅ o , d cfg.k >kyh grh-

OdlaikMok vkyk vu ikM0; kP; k egyrkbj ckGkpauko ^iHkkdj* Bo.; kr vkya vkth xY; kp efgU; kr I kykijyyk xyyh gyrh- frFkaiHkkdj egkjktkP; k ik; koj MkdafBoyavku Eg.kyh gyrh] ^^ekb; k ydhpackGkri.k I ([k#i gwn]eh uko iHkkdj fBorh**- iN; kmk eyk ckGwrh /kpk; pa dke [kPpw ykxya ckiw'krkP; k [kjmhpai\$ axkGk djhr gyrk-I oZeky&Vky bdw ckikua iakjk'ks #i; sxkGk dsysvu-jktekU; krhy i ko.kspkj, djkph [kjmh 1960 P; k esefgU; kr dsyh-

 $30\ es 1960\ j\ ksth\ exkipi;\ kyk\ eg kj\ k"Vikpse([;\ ea=h\ ek-;\ 'koarj\ ko\ pûgk.k\ gsvkys\ bûk'y'k\ LchyP;\ k'kkGps\ ckalkdke i wiki > kys\ gqrs e([;\ ea=h\ ;\ k;\ P;\ k\ vxknj dne\ x\ \#th' 'kkGP;\ k\ mn?kkVukl\ kBh\ fuea=.k\ ns;\ kl\ kBh\ ftYákps\ ckalkdl urs ukenojko\ txrki\ ;\ kauk\ cjkncj\ f?kÅu\ eqpbyk\ xsysgqrs$

; 'korjko pûgk.k ukennojko txrki kyk ûkj ekur girs eirbir Hkby'; koj ei[; ea=; kauh ukennojkoyk fopkjya]^^dk; ukennojko] dk; dke dk<ya.** ukennojko Eg.kya]^^vkeP; kftYákrhy eaxby; k; k xkoh dne ljkuh ûkj i; Rukua'kkûph bekjr mHkh dayh vkgs dne lj

f'k{k.k {ks=kr vfr'k; rGeGhusdke djrkr-rjh rfigh eaxl\lambda; kyk; koavkf.k bekjrhpamn?kkVu djkoav'kh vkeph bPNk vkg\s*; 'koarjkokuh 30esyk; k; padcny dsya

 $30 \; esyk \; e(\c e) + 'kkGr \; ; \; skkj \; EgVY; \; koj \; 'kkGr \; , \; d \; LVst \; cufo. \; ; \; kr \; vkys \; x\# thuh \; rh \; tckcnkjhch- Vh-i kVhyl j kuk \; fnyh-$

; 'koarjko o R; kB; kcjkcj ftYákrys dkMkal ps urs vlk lxGk yoktek fBd lal; kdkGh 5-00 ok- 'kkGr vkyk-fnol if'peadMsekoGr vlrkuk lHkk bbKy'kLdwye/; slq >kyh-lHksyk ipbN xnhlgm-h- eh ygku vlyk] rjh ghlHkk, ak; yk xsyksgm; 'koarjko Hkk"k.kkr dne ljkauk itJgk itJgk mnnsku ^x#th]* ^xq th* Eg.kr gms rûgkikl w dne ljkapauko dne lj, pth ^dne x#th* >kya

; 'koarjko vkiY; k Hkk"k.kkr Eg.kky \S^{n} ekg nkekth efinj vkgso gsdne x#thposKku efinj vkgs; k Kku efinjkru ukaxj /kj.kkjk x \S^{n} ; q V 'krdjh r; kj >kyk i kfgts vlavkepaLolu vkgs gs Lolu x#th i wkZ djrhy] v'kh eyk vk'kk vkgs rl p R; kauh l fiFkB; k 'kk[kk vktuu ok<ok0; kr] eh R; kauk i jokuxh nrk \S x#thauh i i rko i kBokor-**

eyk; 'koarjkokauk c?kk; psgqr] Ekh cf?kry] eyk; 'koarjkoyk cf?krY; koj y; XokMl okVy] dkj.k Ekh ifgyhP; k oxkir; 'koarjkokpk /kMk okpyk gqrk- R; kr; 'koarjkokpaekBsi.k eyk dGyagqra; k I Hkuarj dne x#thpaeaxM; kr [km otu ok<y] x#thauk, dkp oGh i kp fBdk.kh 'kkGk I # djk; yk ijokuxh feGkyh vkf.k x#thauh oGkinj] uj [kM]vuxj]cxeinj]Hkkl s; Fks I &FkB; k uohu 'kk[kk I # dY; k-

ięss1961 twikl w x#thuh ed; k/; kidkpkjkthukek fnyk o ikVhy ljkauk R; kauh ed; k/; kidinh uæys rlp nkthl kgc dVVsgsl luFkpsl fpo grs R; kph dkekph i/nrh x#thuk vkoMyh ukgh- Eg.kw x#thuh nkthl kgckauk l fpo inko#u ik; mrkj dsys o R; k fBdk.kh uohu uæ.kad ch-Vh-ikVhyl jkph dsyh

nkthl kgckauk gk vi eku okVyk- Eg. kuurs l ALFkk l kMuu?kjh cl ys

1960 P; k vkl ikl bizhl h uûgrh- i jarq 1960 uarj ; 'koarjkokuh xjhc egykal kBh bizhl h l oyr l # dayh- 1960 P; k vxksnj 'kkl ukdMuu 'kkGkauk QDr 33 VDdsvunpku fnyatkr gra i jarq 1960 uarj 100 VDdsvunpku fnyaxayatkå ykxya 'khlkj VDdsvunpku l # ûgk; yk o uohu i kp 'kkGkaph i jokuxh; k; yk , dp xkB i Myh- R; ke@sdne x#th ftYákrys , d ekBs l la.Fkki d Eg.kuu vkG[kystkå ykxys R; kB; kdMac?kuu eh uagehp Hkkjkåu tk; pks rsvkeP; k xYyhr i kVykP; k okM; kr j kgkr grs R; ke@sR; kph o R; kB; k 'kkGph ekfgrh xYyhr cl Y; koj l xGh eyk dGk; ph- x#th ckj geskk xYyhr cRrhP; k Mkack[kkyh l a'; kdkGh vusd 'ksrd&; kacjkcj xlik ekjr cl k; ps x#thph mph deh qrh- i j canhph mph l oli keklJ; ki skk tkLr

girh-x#th ckyrkuk ugeh Eg.kk; ps^ek>k lekt fi< $\frac{1}{2}$ ku&fi< $\frac{1}{2}$ k $\sqrt{2}$ kkukP; k $\sqrt{2}$ kkjkr f[kpirinyyk $\sqrt{2}$ kj; k ekb; k lektkyk; k $\sqrt{2}$ kkjkriu eyk ckgj dk<k; pa $\sqrt{2}$ kg**

, d fno'kh crhrP; k Mknck [kkyh x#th o xYyhryh pkj 'kgk.kh l jjrh ek.kl axlik ekjr cl yh gnrh- x#th vkeP; k cki nyk oG [kk; p³] rsEg.kky³]^^nG'khj ke] ryyk i kjafdrh**

cki 1/1^i kp g/sh x#th**

x#thEq.ky\$^R; kauk 'kkGsyk i kBorksdk**

 $\label{eq:ckiwEg.kyk]^Fkkj} $$ \text{CkiwEg.kyk]^Fkkj} $$ \text{yatkr Ugk; } $$ R; kP; k i kBpayacMagk; } R; kyk i kBorksvu R; kP; k i kBph rhu ygku q$rh^** $$$

 $xq th] ^gsc?k rG'khjke rhp; k yaxM; k i kji kyk rj'kkGsyk i kBoxp] f'kok; R; kB; k i kji kukgh I gk o''kki qkZ>kY; koj'kkGsr i kBo-**$

cki wEg.kyk]^^x#th] I xGh ydjal kGayk i kBfoY; koj 'krh dqkh djk; ph**

 $x \notin \text{th Eg.ky} ^{^{\prime}} \text{ising ke}; 'konjko \lor ki Y; k Hkk"k.kkr dk; Eg.kkysngyk ekfgr \lor kgsuk\ rj; 'konjko Eg.kky} i kj kuk 'kkGk cDdG f'kdok] \lor kf.k 'krh djk; yk ykok- ukaj/kkjh 'krdjh x\lambda; q V \lor I yk i kfgt<math>\frac{1}{3}$ f'kdysyh i kj a'krh Qkj pkaxyh djrhy- r\lambda; r\lambda'khjke] I xG\(\frac{1}{2} k i kj kuk 'kkGsyk i kBo-**

x#thukvkeP; kckiph 'krhdj.; kph/kMiMQkjvkoMk; ph-ckdhphek.klax#thuk Eg.kk; ph]^^x#th] r@'khjke y; d"Vk@wvu/kjiMhek.klay;]vkRrkirji, o<kekBkiijpk Iblkk@wr@'khjke o"kklyk; kd'kkr; kdtkxk f?krw-** x#thEg.ky}^ok r@'khjke! rp-aeh vfHkumudjrkjtlarwo"kklyk, d'krfdooktkxk?krksrlao"kklyk, dikjxa'kk@r?kkyk; yk fol#udksEg.kts>kya**

frFka Kkunck ?knysclysgrs rsEg.ky $\frac{3}{xq}$ th] rG'khjke $\frac{1}{y}$ fygk; yk okpk; yk; rUgk;] ij rG'khjkeph c $\frac{1}{y}$; k ek.kl kijhl tkLr pkyrh-**

x#thEg.ky}^^rsdl i\ eyktjkQkMuuQkMuulkaxk**

Kkuck ?kgys Eg.ky $\frac{3}{r}$ r $\frac{6}{h}$ j ke $\frac{1}{k}$ J/nk ekur Ugk;] d $\frac{8}{k}$; k nokyk dok ckd $\frac{3}{k}$ dknc $\frac{1}{k}$ dknc $\frac{1}{k}$

 $\label{eq:continuous} \mbox{Eg.ky} \begin{picture}(2000) \put(0,0){\line(1,0){100}} \put(0,0){\lin$

 $x \# th \ Eg.ky \ ^nG'khjke] \ ryk \ eh \ ekuy \ [kja \ Eg.kts \lor kiyk \ cgqtu \ lekt \lor l Y; k \lor kl \ J/ne/; s Okj \lor Mdyk; Eg.kup \lor ki Y; k \ lekt kph \lor /kkxrh > ky yh fn \ rs \lor kgs \ ekjokMh] \ ck \ Eg.k \ th \ xqtj b- tkrh c?kk \ R; kB; kr dqkkP; k \lor axkr \lor ky ya r \ gh cf?krya \lor kgs dk \ d/kh \ R; kB; kr Hkur yk xy ya ek.k \ r \ \ r \ gh d/kh cf?krya \lor kgs dk \ ukgh--- gs QDr \lor ki Y; k \ lekt krp tk \ Lrh fn \ r \ dkj.k \ Vki yk \ lekt \ Vak \ J/n \ R; k xr \ r \ [kii \ [kky \ \#ryk \ Vkgs ; k \ lekt kyk f'k \ k.k \ n \ Au 'kgk.kadj.k \ gseg Rokpadke \ Vkgs \ Vki Y; k \ lekt kr , o<; k \ kBh f'k \ k.k kpk i i kj tk Lrh > kyk i kfgt \ V \ laeyk ok Vra \ Eg.k up eh ekb; k o Mhykph 40 & 50 , dj tehu \ V \ r kuk \] o ek > h o fdyh pkaxyh pkyr \ V \ r kuk \] eh R; kpk R; kx \ d \ u f'k \ k.k \ L k Fkk \ dk \ yh \ Vkgs f'k \ k.k kpk i i kj \ dj.k agp ek > a \ Vire /; $\ V \ .k k \ Vkg \ **$

 $x \not\in th \ cRrhP; k \ Mknck[kkyh \lor/knu \in/knu ; \&u \lor laicksku \ djk; p] \ rs \ xYyhrY; k \ ykncknuk \lor koMk; pa$

HWx I rjk

 $\label{eq:likelihood} njo"khl btxkoph \lor kR; k \lor kEgk eykhuk mllgkG; kr frFkY; k m: I kyk f?kÅu tk; kphnjo"khl frpa ckcdM \lor I k; pa R; k t=r fQjk; yk eyk y; eTtk okVk; ph-xkjxkj]yky dkM; k]Hkth] pýjejj xklnk.kh \lor kEgh [kk; kpks t=r cjp'ks [kG c?kk; pks eyk , d [kG y; \times koMk; pk rh Egath] ik.; kusHkjyk'; k cknyhr , d di Bøyk tk; pk]o R; k dikr ojua, d i$ k Vkdk; pk] i$ k dikr c#cj iMyk rj , d i$ kkyk pkj i$ afeGk; på eh , dnk nkunk i$ Ru dsykijarqeyk; 'k \times kykalgk; -$

 $t=r \mid dkGh \mid dkGh \mid ckcdMadki \mid yh \mid tk; ph \mid vkR; kpgh \mid ckcdM \mid dkGhp \mid dki \mid ys \mid tk; ps$ $eV.k \mid f'ktk; \mid yk \mid ckjkk, d \mid oktk; ps \mid vkR; k \mid tpk; \mid yk \mid k; p; k \mid vxmj \mid vkEgkyk \mid jkrhr \mid feBkpaeV.k \mid kk; kyk \mid k; ph \mid urj \mid fr \mid kV \mid vkeVh \mid eV.k \mid Hkkdjh \mid kk; pks \mid eyk \mid vkR; kP; k ?kjpaeV.k \mid Qkj \mid vkoMk; pa$

VKR; k Eg. kyh]^^ryvk fyrowvu l kMk nsh] rMI deh gholy- vku i kW ch ekod Gaghily-**
VKR; kual kMk] fyrowfnya rsi k.; kcj koj ?ksryaFkkM; k oGkuaek>ai kW gydagyda>kył
rMI deh >kyh**

vkR; k Eg.kyh]^^ghjhr tkÅu i Åu ; k- Egath ræph i kVafj dkeh grhyh**

VKR; kpk eGk xkoktoGp grk- VkEgh I kr VkB plyrHkkÅ eG; kr xsyklj Vku fgjhr i oyw i kb/avki ksvki p fjckeh > kyh- frFkai kgk; yk u ; skkjh i kgich fgjhr mrjyh- fgj i k.; kuaxPp Hkjyh grh- vkepk plyr HkkÅ 'kadj R; ks fgjhr mrjyk] R; kyk i kgrk ; r u0gra R; kyk btxkoe/kY; k i kjkuh fgjhr mrjoya okeu ukokpk , d ekBk i kjxk R; kyk /k#u I i kP; k dMayk i ouh ?kkywykxyk- vpkud okeuP; k gkrua'kadj I k/yk vkf.k fgjhr ck/wykxyk- okeu 'kadjyk okpok; yk xsyk- rj 'kadjuaokeuP; k xG; kyk feBh ekjyh- vku okeu o 'kadj nk8kach fgjhr ck/wykxyh-

fgj Okj [kksy grh-toGtoG 40&50 QN/ik.kh fgjhr grpa, dnk dk cN/yarj ek.khl rGkyk xsysyk I ki M.kadBh.k grpa okeuyk o 'kadjyk okpok; pa/kkMI dqkkpap grp u0gra vkEgkyk i kg.; kpk deh vunjko grpk-eaxM; kP; k dRY; kp i kgikpk ; k nk8kkauk okpok; pk ?kkI u0grk-vkEgh rsnk8kacN/mykxysEg.kY; koj fgjhP; k dMayk mHkk#u tkjkr ckac ekjyh-

vkeph ckuc , chu R; k vkeP; kdMaiGr vkY; k- vku vkEgkyk Eg.kY; k]^dk; >kyà** vkEgh ckYkua[kkyh nk[koyā] R; kuh oG[kyā] okeu oʻkudj xVkaxG; k ekjr gŵr-R; krY; k bmjckbZukokP; k vkrucfg.khuaMkodapkyoya fruaiGr tkÅu naMkojpaumokjh yokMavk.kya R; k yokM; kpk fiGk d#u fgjhr Vkdyk- R; ksfiGk R; k nk8kkB; k toG ikpyk- okeuuayokMatkijkr /kjyā] vkEgh IokZuh yokMa/k#u nk8kkaykch ckghj oMya okeu]'kudj Iiki; år vkys 'kudjP; k ukdk&rkaMkr Okjp ik.kh xsyagqra R; kyk mpynu ckghj vk.kya vku R; kyk mrk.kk vu ikyFkk dsya vkeP; ki{kk ekB; k vl y¥; k vkeP; k vkrucfg.khuaR; kP; k ikb/koj nkc fnyk- vku ikb/kruaik.kh ckghj iMya 'kudjP; k rkaMkruao ukdkruaik.kh tlatla ckghj iMr xsyarlarla'kudj I nhoj vkyk-

vkt 'kıdj o okeu ejrk ejrk okpysgırs rsdoG vkeP; k vkroofg.ktP; k gqkkjheGs vkeP; k vkroofg.kthfrFkaul R; k rj dnkfpr okeu o 'kıdj okpw'kdysul rs

vkEgh?kjkdMavkywrok vkR; kyk I xGadGyag**r**a

vkeP; ki{kk ekBk vlysyk vkrtikkÅ vk..kk vkR; kyk Eg.kyk]^^vk;! rsyk vDdy Ugk;], o<h ygku ysdjad'kkyk f?kÅu vkyhl] dk; >kyð] rj ekek yksdavkEgkyk QkMuu [kkR; kyh-**

vkR; k Eg.kyh]^^ gq ckck]rwEg.krksrh [kjagk; ij vlagbbly vlaeyk okVyau0gra**

vkEgh nqijhr vkY; kurri vkEgh iæjiji& fotkiji jkMP; k dMsyk vlyy; k nxMh o dkSyk# bekjrhr vkywgqrks jkMP; k ifydMsdacj ryko o ekacokMk gqrk- 'kkGB; k nq &; k cktwyk pkMkkjokMk vkf.k <kjokMk gqrk- rj 'kkGikl w FkkM; k vrjkoj egkjokMk gqrk- Eg.ktsvkeph 'kkGk vkeph?kqysxYyh] ekacokMk] ekijokMk] pkMkkjokMk] egkjokMk; kB; k vxnh dmlFkkuh gqrh-

ekaxokM; krhy Ink vo?kM] fuoRrh vo?kM] udVk Ink] f'kokth vo?kM] rj egkjokM; krhy v'kkd [kjcM] Hkkyjko 'kacM] dchj 'kacM] e&; kllkk 'kacM] HkkM] f'kansv'kh egyarj <kj okM; kruu fnyhi [kankj]e/kw[kankj] pkhHkljokM; kruu Jhjax f'kan] I jisk f'kan] mRre f'kan] Hkxoku xoGh]vkeP; k xYyhruu Hkkxor ?kgyij fdlu ?kgyij ,dukFk [kVdGij liqlk [kVdGij foBBy Vgyijfoëy tk/ko] nRrk I jdGijliqlk [kVdGsv/kh fdrhrjh egyavkeP; k oxkir grph-; kr ,dgh egyxk e/; eoxhij kpk uûgrk- I xGh egya krd&; kph o xjhc ?kjk.; kryh grph- vud egyke/; s pkaxys dykxqk grps dksk xkr grijdksk udyk djr grij dksk , [kknaok] oktok; pij dqkkyk vfHku; tek; pkj dqkkyk foukni l kaxk; yk tek; pa

vkEgkyk nqijhr vIrkuk vkeP; kp xYyhrys, d o; Ldj <kgikps <kcd.ks x#th f'kdok; yk grps R; kuk vftckr , cdk; yk ; r u0gra MkG; kukgh Qkj deh fnI k; pa 'kkGsyk fpdVuupjLR; kP; k vfydMsR; kpa?kj grpa R; kB; k ?kjkr , d fdjk.kk nqlku grpa R; kuk i kp&I gk i kga grph] i cdh dkgh f'kduu ukcdjhyk ykxysyh grph- , dk i kgikuarj i fgyh o nq jhph i jh{kk , dnep fnyh grph vu frl jhr xsyagrpa

R; kpa?kjkryafdjk.kk nqlku R; kph ck; dkj egyavkf.k l kP; kyk Lor% x#th pkyok; ps l kB; kyk dM(ai MY; koj nqlkukr dánykpk mtM Qkjp fe.kfe.krk i Mysyk vl k; pk-x#thph eGph n²Vh vákkd R; keGafx&gk; dkuauk.kafdæk ukW fnysyh R; kuk Li "V fnl k; paukgh-R; koGh poyhjikoyhj vknsyhj#i; k v'kh uk.kh gqrh- vkEgh l kB; kyk pkmhpk i ka; k dkxq i koyhoj fpVdkow vknsyh Eg.kw l kak; pkj rj vknsyhoj fpVdkow #i k; k Eg.kw l kak; pks x#th uk.ka pki pk; ps vu vkdkjko#u poyhjikoyhjvknsyhj#i k; k Bjok; ps cjhp egya l kB; kyk dMw a i MY; koj x#thyk Ql ok; l kBh Vi ysyh vl k; ph- xajkB; k ekxa xkGk dsysyh d.kl acMow rh Tokjh nqbkukr ?kkyk; pks]frgh l kB; kyk-R; keGaTokjh pkakyh gk; dk xkMkph rsx#thyk dGk; pa llgk; -

 $oxkir\ x\#th\ cjkp\ oG\ >kisk;\ ps\ >kisY;\ kuarj\ \lor kEgh\ dqkh\ dk;\ gkypky\ dsysyh\ \lor k<Gyh\ dh]\ rs\ \lor kEgkyk\ cnkcn\ cnMk;\ ps\ dkukus\ cfgjig n~Vhus\ \lor /ku\ \lor kf.k\ >kiskGw\ x\#th\ \lor IY;\ keGsvkEgkyk\ oxkir\ clk;\ yk\ udksokVk;\ pa\ >kisruavpkud\ x\#th\ tkxs>kysvkf.k\ , [kknaikigixadk;\ rj\ xMcM\ djrkuk\ fnl\ yadh]\ R;\ kyk\ x\#th\ cnkcn\ Bkdk;\ ps\ ^f'kdo.kadeh\ \lor ku\ ekj.katkLr^*\ \lor Ikijdkj\ x\#thP;\ kckcrhr\ qrk-$

Ekh, d fno'khoxki gktker d#u vkyksgrw olrk&; kuapeuxkVk dyk grpk-R; keGa MkdarGrGhr fnI r gra I kGayk ; srkuk R; kp rGrGhr xkV; koj FkkMa[kkcjy R; ky ykow vkyw grw ojrh dkSyk#yk Hkkday; grph-nijkjh ckjkP; k njE; ku ojP; k dkSykjkrw I q kph fdj.kaFkV ekb; k rGrGhr xkV; koj i Myh vku vkj'kkI kj [ka i frfcc ekb; k xkV; kpax#thP; k rkMkoj i Myax#thph n~Vh vnwvI Y; keGsR; kwk HkkI >kyk dh dqkhrjh i kjxaR; kB; k rkMkoj QWD; k vkj'kkpki jdk'k i kMra -

R; kauh oxkir tkgikr fopkjya^Q\vD; k \lor kj'kkpk rqDMk dqkkik'kh gk; \ I kaxke?kkikl nu dkskrjh ekb; k rk\vdiv kkj'kkpk i dk'k i kMra**

 $x\# th \ cfgjsg rs \lor kf.k \ \lor kokt \ ekBk \ g rk- \ dksk \ rjh \ Eg.ky \ ^^u k\&; k \ peux kV k \ d\#u \lor ky; \ R; k \ peux kV; kpk m t M \ r \ P; k r kMkoj i M r ks -**$

eh ?kj h xyks o"kHkj x#th \lor kEgkyk f'kdok; yk grsij rs \lor kepauko y{kkr fBow'kdr uûgrs n 2 Vh \lor kf.k dku ; kpc 4 cj p R; kph Lej .k'kDrhgh {kh.k >kyh grh-

nd &; k fno'kh Ekh oxkir vkyw ekb; k ijekuadkgh dkj.k ul rkuk xe#thauh vuodkauk cnMmu dk-yagqral xGk oxlx#thyk dk/kGyk gqrk-rsdkgh f'kdok; psukghr- QDr oxkir >kik dk-k; ps vku vkEgh i kydkdMardkj d#uh Eg.kmu vkEgkyk fuckj Bkodk; psvku vkeP; koj ng'krclok; ps

vki.k dk; ch d#u x#thph ftjok; ph-x#th T; k [kuphioj clk; p] R; k ykdMh [kuphiyk y; ekB; k ekB; k QVh gR; k] fpjk gR; k-c&; kp oGk x#thpa/kkrkj R; k QVhe/; s vkMdk; pa x#thmBrkuk] vyxn mBk; ps vku QVhr vMdysya/kkrkj vkyxn ckgj dk<k; ps dok dok QVhrya/kkrkj QkVuuh Eg.kuu x#th /kkrkj QMk; ps vu QVhruadk<uu f?kÅu itgk usl k; ps x#thpk l njk o /kkrkj [kknhpa vlk; pa l njk ykac xtl/?; kirij itll/r usg#lkj[kk vlk; pk-/kkrjkP; k vkr rspMMh?kkyk; psukghr-[kuphioj cluu c&; kp oGk R; kB; k /kkrjkpk l kskk l tl/ysyk vlk; pk-toG clyb'; k itgikuk udksvl ysyarsn≅; c?kk; yk feGk; pa

ekb; k MkD; kr, d dYiuk vkyh-e/kY; k l lyhr x#th tok ?kjh tkrhy rok x#th clk; P; k [kphir QVhr o fpjkr l çkHkGhpsfuckj dkVs[kok; ps x#thuk uhV fnl r ul Y; ke@s x#th R; k dkV; koj clrhy vu ex dk; gra rsc?kk; pa ekb; k; k dVke/; s brj pkj i kp egykuk Ekh l kehy d#u ?krya BjY; kiek.kal çkHkGhpsfuckj dkVs'kkdku vkEgh vk.kyso e/kY; k l lyhr l xGk oxickghj x¥; koj] [kphie/; srsdkVstke [koys VkcdaFkkMh FkkMh oj Bgyh-vku ckdhpk dkV; kpk Hkkx [kphir; k[kkyh Bgyk-

e/kyh l lyh l ai yh] csy >kyh- l x Gh i kja oxklr ; \mathring{A} u fpMhpki clyh- x#th usjehi ek.ka?kj kruu oxklr Mayr Mayr vkysvku R; k [kaphōj eBfn'kh cldu ek#u clys

 $x\# th \ [kphibj cl Y; kc\# cj , dne \ tkjkroj Mys^{v}k; \cdot vk; \cdot vk; \cdot esykt esykt$

vkEgh pk9kaekruj [kkyh eku ?kkywu eukrY; k eukr gl r gnrks vkeP; k dVkrya, d i kji xau j kgwu ekB; kuagl ya x#thuh R; k i kji kdMac?kwu ?ksrya x#th [knphb#u l kodk' k mBys x#thP; k i k' oHkkxkr vusd dkVs?knj ysgnrs x#th l kj [kal kj [kab0gGr gnrs vkf.k gkrkuai k' oHkkx pkGr gnrs x#th rl p ?kjh xsysvkf.k ?kjh tkÅu ck; dksdMwu l xGsdkVsl ppP; k l gk; kusl kodk' k dk<ys nnj kjh x#th ' kkGrp vkysukghr-

nd &; k fn'kh rs'kkGr \vee kyd tksikjxk ekB; kuagl yk gyrk- R; kyk R; kuh pkaxyay{kkr fBoyagyra oxkir \vee kY; kc#cj R; k i kjkP; k i b'dkNkr x¢# thuh mMwu ykFk ?kkryh \vee u Eg.kyd^1 kax] [kyphir dkVsdqkh [koysgyr\naunin**

rsikjxaEg.kky}^^x#thE; kukgh]x@th-**

x#thEg.ky]^^rwukghrj dkskh[koysl ka-**

i kg xaEg.kky}^^eyk ekfgr ukgh] x(th-**

x#th Eg.ky3^^ ryk d1 aekfgr ukgh rsc?krkp-**

 $x\#th\ vfr'k;\ jkxkr\ Eg.ky\ ^^uk\&;\ k]\ I\ [k]\ f'kjE;\ k\ vku\ f'k0;\ k\ dkskdksk\ vkgr\ rs\ mBk-**$

vkEgh oxkP; k ckghj mHkk j kguu Eg.kyN^^xq th] vkEgh dkVa[koyaUgkblr-**

xq thuh vkEgkyk vkeph ukoo fopkjyh-vkEgh [kkk/hp vkeph ukoa l klixryh-?kgys vl sy rj eqnxgy l kakk; pkg vo?kMsvl sy rj ok?kekjs l kakk; pkg xq thuk o"kHkj vkeph ukoa y{kkr Bqrk vkyh uûgrh-

vkEgh oxkiruu gkdyuu fnysyh i kji ackgji xsyks I nk vo?kMsua cki kyk cksyouu u vk.krk nd &; kp , dk ek.kl kyk cki Eg.kuu cykouu vk.kya vkf.k R; k ek.kl kuaxq thph ekQh ekfxryh-

Ekh Bjoya vki wch I nk vo?kMd kj [kpadjk; pa Ekh ?kjh xsyksvkf.k vkbłyk o cki syk u I karrk nd &; kp dlBY; k rjh ek.kI kyk cki Eg.kw I kGr U; k; paBjoya ?kjh cki wu0grkp]′krkyk xsyk grk-vkbłdk; rjh dke djhr grh-vkbłEg.kyh]^^ dkj@ I kGk I kMw ?kjh d′kkyk vkykI **

Ekh cj Eg.kywvku cktkjkr xsyks cktkjkrY; k gôkoj vâkliG dsyh-vâkliG djhr vI rkuk ekb; k MkD; kr bpkj pkywgrk]ck-P; k cnykr ck- Eg.kw dkB; k ek.kI kyk f?kÅu tk; kpa

 $\begin{tabular}{l} $$ \nabla p ku d = kb; k MkD; kr bpkj $$ \nabla kyk - \nabla ki yk o''kkDj cymraf?k Au gtker dj.kkjk' kudj $$ Ugkoh nqlkukr $$ vI ay rj R; kyk f?k Au tkoa eh $$ d#u R; kP; k nqlkukdMaxsyks rj' kudj nqlkukrp gnrk-$

eh 'kıdj Ugk0; kyk Eg. kyı $1^{^{\prime}}$ kıdjekek! 'kıdjekek! ek>a, d dke gk; djpky dk** 'kıdjekek Eq. kyk $1^{^{\prime}}$ kudjekek Eq. kyk $1^{^{\prime}}$ kudjekek Eq. kyk $1^{^{\prime}}$

 $\label{eq:continuity} \begin{tabular}{ll} Ekh Eg.kyij^R; kpadk; >kya] ekek\ xq thuaeyk | kGiru gkdyw fnya] ck- yk f?kÅu ; h] Eg.kyk; - ij vkepk ck- 'krkyk xsyk;] vkt rkMh ijh{kk gk;] vkt | kGk cklow pky.kkj lgk; rok?kVdkcj rkghp ekb; kc#cj; rk dk\ vku x\psyk thyk | kxrk dk** \end{tabular}$

 $'kmdjekek Eg.kyk]^{\sim}Vkjaikjk]xq theykoG[khydh\^**$

 $\label{eq:ckdkkgk} Ekh Eg.kyi]^xq thyk vkepk ck dksk gk; rh ekfgr Ugk; rok rÆghp Ekh rÆ'khj ke gk; Eq.kwu I kack-**$

'kıdjekek gl wykxyk-vku Eg.kyk]^^vkjai kjik] vla[kkVacksy.kacjagk; dk**

 $\label{eq:continuity} \begin{tabular}{ll} Ekh Eg.kyij^* vkt & ek>h rkMh ijh{kk gk; -rh cNyh rj &ek>aojhl ok; k tkbly-rok pkaxY; k dkekl kBh FkkMa[kkVacksyyarj dk; fc?kMra ** \end{tabular}$

'kwdjekekua FkkMk bpkj d $_{yk}$ vku Eg.kyk]^py] r $_{p}$; k x $_{t}$ thdM $_{t}$ c?kwdk; Eg.krw rh**

'kadjekek Eg.kyk]^^Og;] eh ápok cki po gk; -**

xq th Eg.ky3^^vkoarqepaikgxay; vkxko vkgs R; kyk 'kkGrwadk<w xgkoj ikBok-*

'kmdjekek Eg.kyk]^^dk oksx#thdk; dsya áuak **

 $xq th Eg.ky \end{rightarrow} $$ xq th Eg.ky \end{rightarrow} ^Ak xkcM; kuta vku nq &; k pkj & i kp dkj V; kauh eh cl rij R; k [kphP; k fpj kae/kua l qckHkGhpadkVa?kkrysgkrs rsdkVaekb; k i k'otHkkxkr ?kq ys j krHkj eyk y; rjkl >kyk] vtauch gkrks -**$

rs, dw 'kadjyk , dne gl po vkya

xq thEg.ky \S ^rfghcki \lor I w gl rk;] rfgkyk ykt okVyhikfgts**

'kndjekekuaxq thpsik; /kjyso jMk; paukVd d#u Eg.ky $\frac{1}{2}$ xq th] ek>apqdy $\frac{1}{2}$ ekb; k ikjkyk , o<h ekBh f'k{kk fnowudk- goarj eh R; kP; korhuaekQh ekxrw ij ikjkyk I kGar?; k**

xq th0g; Eg.ksi; ir 'kadjekekuaxq thpsik; IkMysukghr-

'kndj Eg.kyk]^\Ugk; \mathsq th] ghikj\mai\text{th} pnd dj.kkj\Ugk; -; kcnny eh r\text{Egkyk} cr fnr\mathsq cr eh ukghikGykrj eh tkrhpk\Ugk\Ugh\ullu-

xq th , dne \lor k'Pk; İpfdr gksåu Eg.kky \S^2 ^gk i kg xk ej kB; kpk \lor kgsuk\ rÆgh dksk \lor kgkr**

'kadj Ugkoh Eg.kyk]^^∨kEgh ejkBkp ∨kgqr-**

xq thEg.ky]^^exr@ghLor%ykUgkohdlaletrk**

'kxdj Ugkoh Eg.kyk]^Ugk; xq th] rqeP; k ,xd.; kr dk; rj Qjd i Mrw]eh 'kxrdjhp gk; -**

eh xli p gqrw \lor o?kMpk fuo&; k l | kyk Eg.kr gqrk]^^uk&; kuacki Eg.kw dksk ek.kw g\Mdw \lor k.kyk; j \lor å*

 $udVal \ | \ k Eg.kyi \ ^\sim dksk gk; \ dqkkl \ Bkond \ Ekhrj; k ek.kl kyk dokp cf?kryalgk; \ ^** \\ nkgkki; k xlik pkynvl rkuk ckdhph i kjafrFka, d=teyh-, dk fBdk.kh?kkGdk > kysyk \\ c?knu xq th tke of kxys vku frFka?kkGD; kr teyy; k I xG; k i kj kkuk Bkdwykxys$

xq th Eg.ky $\frac{3}{2}$ ^r $\frac{1}{2}$ xGht.k , d= tew dk; dkyok pkywdyk; I kakk-** i kjaxli p-

xq thuaudV; kI | kyk bpkjyå^^dk jsl xGh i kjarlþ; ki k′kh dk xkGk >kyh gqrh- [kja l kæ-Ugk; rj rgyk?kjh gkdyw nbZv**

udVal |k ekjkP; kH; kuaEg.kya]^EkhUgk; x#th] fuo&; kual xGhikjaxkGk dY; krh-**

 $x \# th Eg.ky \^^fuo \&; k dksk gk; \^**$

xq thP; k eukr 'kadk \vee kyh grph- xq th i jR; adkyk #GkuacMonu bpkj r gr 3 ^I xGs, d= ; Åu dk; dV djhr grpk rsl kakk-**

yıcı\varyafy\vartafy\varta; kuaxq thP; k H; kua ?\k\c#u I kixryaclh]^\udVaI | k \vee ku fuo&; k ckyr gırh clh] uk&; kuack- Eg.kıu \vee k.ky\vartayk ek.kılı uk&; kpk ck- Ugk; -**

 $\lor l \ a Eg.kY; \ koj \ x\#thyk \ , \ dne \ y\{kkr \ vkya \ vku \ xq \ th \ ekb; \ ktoG \ vkys \lor u \ eyk \ dq&; \ kpafi Yywmpyrr \ rl \ ampyyavu \ oxkl?; \ k \ ckgj \ Qidw \ fnya \ xq \ thuk Hk; \ rdj \ jkx \ vkyk \ gqrkeh xq \ thpk jkx \ vkG [kwu \ oxklr \ ek?kkjhu ; rk] \ ckgj p \ i \ Gwu \ xsyks \ nku \ pkj \ fnol \ kua \ l \ kGk \ chlow \ g Gp \ oxklr ; rAu \ cl \ yw xq \ thek>auko \ vkf.k \ ek>k \ ck\cdot \ l \ kjabl \ \#u \ xsysgqrs$

vkEgh fnokGhuarj xkomjh jkgk; yk xsyks grrw [kki hikl w tjk FkkM; k varjkoj , d [kMMk i kMysyk grpk- R; k [kMM; kr , d pny ekMysyh grph- R; k [kMM; kr cl w pnyhoj vkb2l \$ kd djk; ph- [kMM; kr pny vl Y; kenGsokjaykxk; pallgk; - vkb2vo?kMysyh grph R; kenGafryk [kMM; kr mrjk; yk o p<k; yk rjkl gnp grpk- vkb2 [kMM; kr cl yh dh] fryk gkrk [kkyh l xGal keku i Vhrua Ekh dk<w | k; pks l dkGh gkMxP; k ghjhpa i k.kh vkb3yk vk.kmu | k; pks ekb; kl kBh , d NkVh [kkijkph dsh ?kryh grph- R; k [kkijkp; k dshe/kmu eh i k.kh vk.kr vl s l xG; kP; k våknGhyk] di Ms/kpk; yk] I \$ kdkyk] HkkMh /kpk; yk fgjhpa i k.kh 'kmmu vk.kkoaykxr grpa fgjhoj , d ekpkM gnpa R; k ekpkMkoj ckj geskk , d i kgjk o nkj yVdoysyk vl k; pk- eh R; k ekpkMkP; k pkdkoj uai kgjk ckikysyk nkj vkr l kMk; pks i kgjk Hkjyk dh ckgj oMnu dk<k; pksvu dsh Hkjk; pks l dkGh i k.kh >kY; kuarj Ekh 'kkGsyk tk; pks oMhy o Fkkjyk HkkÅ c\$yxkMh f?kÅu n(&; k 'krkyk tk; ps i k.kh vk.kk; P; k dkekr dmhdmh i k# eyk enr djkph- i k#P; k i kBpk f'kjek rhu o"kkpk gnplff'kjek l xG; k 'krkr nMX; k pkyhuafQjk; pk] R; kpapky.kac?kmu eyk Qkj xner okVk; ph- d/kh d/kh f'kjek toGP; k fyckP; k >kMk[kkyh [kGk; pk-

, dfn'kh nijkjh Ekh 'kkGk ciployh girh- Ekh fyickP; k >kMk[kkyhp [kGr cl ywgurw ekb; k c#cj [kGk; yk fdl uk] jkek] Hkkxor] liplk lixGh ikja girh]vkticktwyk nkV o mip tipGa vl Y; kenGi vkEgh fyick[kkyhp [kGk; pks dinhalnh nk8k&pk9k feGw tipG; kr fQjk; pks dkj.k R; k oj "kh tipGay; mip vkyagiravku, d, dV; kykfQjk; yk Hkhrh okVk; ph-dkj.k lik; kG ukokpk, d ik.kh frFkaokoj r girk-v'kh ekBh ek.klal kakk; ph-

 $\label{eq:final_final} Fkkklik k o GkuavkeP; k v I ay \{kkr v kyadh] f'kjek v keP; k to Gulgrk-Ekh i GriGritk Au [kki hr cf?krya] rj fr Fkch u l grk-$

Ekh?kkc#u \vee kbJykmBoya \vee kuEg.kyJ $^{\wedge}$ \vee k;! \vee k;!f'kJ=kdBafnIrUgk; **

 \vee kbZ?kkc#u mByh \vee u Eg.kyh]^^c?k] fgFkpad**Brj**h t**n**G; kr [kGr \vee 'khy**

Ekh toGikl tqG; kr cf?kry] rj dBp fnlyk Ugk; - Ekh]^^f/kjek· f'kjek· Eg.kwu tkjkr gkdk ek# ykxyw ij f'kjek dBp fnl r u0grk- Ekh] vkbZvkf.k ik# tke ?kkcjyw vkEgh f'kjekyk gWldr gWldr l xGatqGaikyFka?kkry] ij f'kjek dBp fnl r u0grk- jMysyk vkokti.k; r u0grk- 'koVh Ekh ?kkc#u jMwykxywik# chjMwykxyh- vkbZch y; ?kkcjyh gqh-vkbZvo?kMysyh gqrh- frP; k ikb/kr l kr&vkB efgU; kpk xHkZgqrk- R; keqGarh HkjHkj pkyr u0grh-vkEgh tkjtkjkr gkdk ek# ykxY; keqGafyck[kkyh [kGr vl ysyh ikjach ?kkc#u vkeP; kdMa vkyh-

∨kbZR; kuuk Eg.kyh]^^i kgikoð dksk oj tkok] dksk [kkyh tkok] I xGatqnGai kyFka?kkykij i kgikyk gMduu ∨k.kk-**

I xGh i kgʻadkekyk ykxyh-nkgkankgkaf'kjekyk t \mathfrak{n} G÷kr g\plot fQ# ykxyh-t \mathfrak{n} Gamp g\text{gra R; ke}\text{Gat}\text{n}G÷kruauhV pkyrk ; \text{r} u\text{0}gra f'kjek \times pkud d\text{Baxk}; \text{c} > kyk ; kpp \times k\text{Egkyk \times k'Pk; ZokVwykxyag\text{r}a R; kP; kjM.; kpk \times kokt fn[kmy ; \text{r} u\text{0}grk-n\plik; k pkyhuaf'kjek ykac tk.ka \text{ch \times ? ku g\text{r}a \times k\text{Egh pkgkai k\text{kpc k} \times k\text{P; k t\text{n}G÷kr f'kjekyk 'kkgknykxyw f'kjek dk; I ki Myk u\text{0}grk-\times k\text{P; k 'krkP; k Hkkorkypk , d nksu fd-eh-Hkkx \times {kj 'k% \times k\text{Gm pkGnu dk<yk-ij i kj xad\text{Bal ki MyaUgk; -}}

gh ckreh xkokr dGyh] xkokryh ekBh ek.kl axkGk >kyh- xYyhryh ek.kl axkGk >kyh- ck; k ch HkYk; yk \lor kY; k- l kB; kpal kr oktya dMM ai Muykxyagıra

nknk Eg.kyk] ^mxkp dkyok d# uxk-ikjxal ki MyaUgk; rki ruj Ugk; rh rdZy<Å udk-nxMwvku ckckl kc rfgh tkok] vku f'kdB; k nqbkukr tkÅu nku cRR; k f?kÅu; k-vki wtk.kR; k i .kkuai kj kyk glyldw k-rl pal blkk] rwvku vktwd nk8kafr?kat.k egknkukukph fgj] 0gMX; kph fgj] frdMaukx.; kph fgj vku usui arkph fgj c?kwu; k-tkrkuk c#cj, d cRrh?; k-xkokrY; kclW&; k] d@nyadqkkdqkkdMag&r R; kwuh vk.kk] rl pjkdsypaVwcar; kj djk] glyld.kk&; kdMagkrkr Vwca|k-**

 $nknkual\ xGh\ r;\ kjh\ dsyh]\ brD;\ kr\ jkrP;\ kyk\ \lor kB\ oktrk\ xyhryk\ ,\ d\ ek.kwl\ iGr\ iGr\ \lor kyk\ \lor ku\ nknkyk\ Eg.kyk]^nknk!\ nknk!\ xkokr\ \lor kRrkp\ ,\ d\ nowNh\ |\ k;\ padke\ pkywgk;\]\ Ekh\ ,\ tdw\ \lor kyw\ -\ rhu\ o''kkpa\ ,\ d\ ikjax\ fnl\ k;\ yk\ xkjaxepVa\ vakua\ xkwlkG\ l\ ki\ Myagk;\ -\ \lor akr\ fpVkfpVkpk\ l\ njk\ gk;\ -\ dqkkpavl\ ay\ rj\ pkoMhruaf?kÅu\ tkok]\ \lor l\ anowNhokyk\ l\ kar\ gqrk-**$

nknk Eg.kyk]^^pyk- xkokr pkoMhoj tkÅ; k**

I xGh ek.kl apkoMhdMaiGwykxyh- xYyhryh vu xkokryh I xGh 'kalkjHkj ek.kl a xkGk >kyh grh-vkEgh i kgʻaekB; k ek.kl kP; k QMaiGhr grw ekBh ek.kl ayxcxhuapkyr grh-vkEgh I oʻlt.k pkoMhr xsyks

rj \vee kEgkyk I \times G; kuk , d y; ekBk \vee k'p; kipk /kDdkp cI yk- f'kjek pkoMhrp grk-pkoMhryk dkroky R; kyk pjejapkj r grk- f'kjekyk c?kwu \vee kepk tho HkkM; kr i Myk- f'kjekyk nknkuampywu ?krya f'kjek j Mr uûgrk- etr pjejs[kr grk-

nknkuadkrokykyk bpkj yłnagł i kj xagFkadqkh vk. kuu I kMyła**

- kojs dkroky Eg.kyk]^bBrcknknk] R; kpa v l a > kya dh] cui ji okVua, d ek.kul l k; dyoj fgdMaeakM; kyk; r grk] R; kyk okVar gsi kji xavkMoavkysyafnI yaj R; kuaoGh[kyaj ás i kji xaeakM; kpp gk; ij prpluu gh cui jihdMapkyya] i kji xaygkup gk;] ásyk uko xko dk; p l kaxrk; r Ugk; - rok R; k cui jihP; k ek.kl kua i kjikyk I k; dyoj c l oyavku xkokr pkoMhr vk.kya pkoMhr rykBh] i kVhy] I day I xGsgrs rkscui jihpk ek.kul R; kayk Eg.kyk]^^gsc?kk rykBh HkkmåI kc Ekh cui jihoj ua; r grji rok gh ckj dai kji xal MduafrdMaf'kokj kr pkyyagraj ásyk uko xko bpkj yarj] dk; p I kaxrk; r Ugk;] áß; k i k; kr dkVaekrij cDdG ekMY; krh-R; kerGayakMr yakMr pkyr graj cgr d#u i kji xay; pkyya] v I afnI r; - f'kok; R; kpai k; QQW; kuach Hkj ysyag&r- rok gh i kji xaf'kokj krua vhya gh dGkyk dk; p ekx2Ugk; -** rykBh Eg.kyk]^^gs c?kk i klg.kaj r kgh Qkj pkaxyadke dsyavkgs vkt; k i kjikpk tho r pP; kerGaokpyk vkgs r kgh, dkyk uok tye fnyk;] r pauko xko I kaxk- vkEgh noMh nsåu xkokyk dfGorw noMh fnåu dksk Ugkbip vkyaj r j jkoI k; ck QMao Qk&nkjkQMa; k i kjikyk usåu gh i kji xadkpal kMk; pars jkoI kc vku Qk&nkj Bjorhy] i si jyk ápk QMmfnåu i jxkopa g&dk\ áph ch pk&l'kh djkoh ykxay- r j r kgh r pP; k dkekyk tkok-r kgkyk m'khj ghy- uko o i Rrk r p< k tkrkuk nsåu tkok-**</p>

 $\label{eq:continuity} $$ dkrokypa packty.ka, schw I x G; kwk vkun > kyk- nknkua R; k dkrokykP; k gkrkoj fgjohxkj i kp #i; kph ukt/ fBoyh- vku Eg.kyk]^^gh i kp #i; svkeP; k f'kj ekoj uaookGw Vkd-** dkrokykyk i kpph ukt/ feGkY; ke@adkroky Qkj [kqk > kyk vku I x Ght.k f'kj ekyk f?kÅu ?kjh vkys$

 $\begin{tabular}{l} $$ \forall keP; $k ?kj kr \lor keph oMykph \lor kbldkl k \lor kDdk rolehp \lor klJ/nk eku.kkj h girh- \lor keph \lor kbl \lor kf.k \lor kepk cki ii v klJ/nk \lor ftckr ekur u0grs ek>h \lor kbph \lor kblfttkblrj \lor klJ/nB; k dVVj fojkkkr girh- \lor kbloMhy \lor kf.k fttkbipk i xMk \lor keP; k eukoj ygkui .kki l uip i Myk girkeyk dkl kvkDdkpk y; jkx; k; pk] dkj.k rh \lor kkr \lor kY; koj \lor keP; k ck- yk \lor ku \lor kEgkyk y; okbW oxkG ckyk; ph- rh ugeh Eg.kk; ph]^rG'khjke gk nonokpadk; p djr Ugk;] nokyk dkucMa cdjad/kh dkir Ugk;] dBY; k t=ayk d/kh tkr Ugk;] rok rG'khjkepapkaxyadl agbiy\; kph eyk dkGth okVrh-** \\ \end{tabular}$

, dfn'kh l k8; kyk dMM i MY; koj \lor keP; k ?kjkoj r Ω ku nxM Ω rd l # >kyh- brda nxMai Mr gradh] \lor kEgh ckghj ; s \mathring{A} u d \mathring{B} nu nxMa; \mathring{R} ; krh gsch c?kkyk ?kkcjr gr Ψ rjhch \lor kepk ck

/kkMI d#u ckfgj vkyk] o f'k0; k fnÅu Eg.kmykxyk]^; srep; k vkblyk xxx ykoyk-dksk nxMa Vkdrw]dksk gk; vk; ?kkyk] dqkkyk vkepac?kor Ugk; -**vI aEg.kr vI rkukp, d nxM vkeP; k ck-P; k MkD; kyk ykxyk-jj ckin; k MkD; koj i Vdk vI Y; ke Ga ckinyk nxM ykxyk Ugk;] ckin i GriGr ?kjkr vkyk-jkst jkrP; kyk vkBiI uauÅ&ngk oktirni nxMavkeP; k ?kjkoj i Mr grh; k oGr vkEgh ygku i kjhauk ckghj ; så nr ulgrw R; k dkGkr xkokr xYyh ckGkr vtnu ykbl/ vkysyh ulgrh-QdLr pk&dk&pkblkr xW cRR; k Mkckoj ykoY; k tkr gli; k- uedh nxMadlisua; k; krh gp vkEgkyk dGhr ulgra vkepk e/kyk psyrk o vkEgh jkgkr grij R; k tli; k okM; kojp nxMkpk o"kkb gr grk-vkEgkyk dk; djkoadk; pdGr ulgra.

HWX VBjk

, d fn'kh I kB; kyk dMw ai MY; koj nknkP; k?kjh I xGht.ka cI yh gmph-vki Y; k?kjkoj dksk dj.kh djra; kcnny?kjkr ppkZpkywgmph-ppkZpkywvI rkuk vpkud dkI kvDdkP; k vaxkr rk; &ck; vkyh-vu dkI kvkDdk?kmewykxyh-^^vga----vg·--- vga----** ukuk o nknkua?kjkrua dki jv o dkMhi Vh vk.kyh- dki jkP; k oM; k i Vomu EgkrkjhP; k gkrkoj fBoY; k- Egkrkjh i VR; k dki jkP; k oM; k rkMkr Vkdr gmph- Ekh rsc?kmu vk'Pk; Ipfdr gmp gmw ^^vkeph vkDdk i VR; k dki jkP; k oM; k d'kh Vkdr v'khy\ fryk dk; gmp uI hy dk\ fryk ftHkhyk R; ksdki ji i kGr u'khy dk\ T; kvFkhZ vkth i VR; k dki jkP; k oM; k fxGrh] R; k vFkhZ [k#[kjp frP; k vaxkr no vkyk vI yk Qk; thy-** dkI kvkDdkP; k; k d'rhenGaEkh vpficr gmp gmmw

FkkM; k o:Gkuaukuk dk1 kvkDdkyk Eg.kyk]^^cksyk! rffgh dksk gko**

dkl kvkDdk Eg.kyh]^^Ekh xYyhryh rk; &ck; gk; -**

ukuk Eg.kyk]^^cksyk! rk; &ck;] vkeP; k xjhckpa?kj rÆgkyk d1 afn1 yð**

 $\label{eq:continuity} $$ dkl kvkDdk]^*vjsHkDrk] rwek>h iqtk vpkZdjhr ukghl] Ekh xYyhr vluu fn[knydkh rwekb; k i k; k i Mhr ukghl -**$

ukuk Eg.kyk]^^noh] ek>h pud >kyh \lor l ay rj eyk ekQ dj] pudyaokdyarj HkDrkyk l blkkGuu ?kh**

 $\mbox{dkl kvkDdk Eg.kyh]r$ k vu r$$G'k\P; k ?kjkoj xYyhryk , d vkedk vkepk ek.k\lambda Hkkukerh dj r\lambda -**$

dkl kvkDdk Eg.kyh]^^vjsHkDrk] repapkaxyapexya>kysyaykdkuuk c?kohr ukgh**
bBocknknk Eg.kyk]^^ex rk; &ck; vkEgkyk l kaxk] rh ek.kN vkeP; k?kjkoj jkr vu/; k
nxMadlaVkdrv -**

 $\label{eq:continuity} dkl\ kvkDdk]^{n}\ R;\ ksek.k ln\ fnoGhr\ nxMaBurw\]\ Hkkukerhuavki wvki\ p\ fnoGhr\ yh\ nxMareP;\ k?kjkoj\ i\ lMrw\ -**$

nknk Eg.kyk]^^ex rk; ck; \vee krk ákruanp \vee kEgkyk okpho- \vee kEgh dk; dj.koanpMa I kax**

dkl kvkDdk Eg.kyh]^^; R; k fcLrjokjh xkc eMh ek÷; k l ejj dki k] rok eh gh Hkkukerh tkxojp Fkkcorh-**

I xGh ek.kl afprkxrhcl yh-vkrk xkc eMh dqkh bdr?; k; ph vku dqkh dki kph\
dkl kvkDdk Eg.kyh]^^ rG'khjke d/khp dBY; k nokpa fuon&uk#G djhr Ugk;] dok
dBY; k nokyk dkcMach dki r Ugk; - t l k tYeyk r l k R; waeyk dokp fuon&uk#G dsyk Ugk; -

rG'khjke ygku \vee I rkuk] R; patkoG dk

yaij eyk eM# dki ya Ugk; - rok \vee krk gh eM# rG'khjkep f?ky \vee ku dki hy- rokp eh gh Hkkukerh t
kxpj Fkkcorh**

nknk Eg.kyk]^^rG'khjke] rk; &ck; ph ekQh ekx- vku eM# dki rwEg.k] R; kf'kok; rhp; k ?kjkoj nxMai Mkph cm 0gkph Ugkbř ** cki ιQMa ekBk i p fuekžk >kyk grpk- cki wavkrki rij dBY; kp nokyk dkcMackdM fdok eM# cGh fnysyau0gra ^^vkrk i rij vki .k gsekur u0grwvku vkrkp gsdl aekuk; pa** gk i ½ u cki ii æagrk-nknkP; k nckoke Ga ukb3yktkuacki wadkl kvkDdkQMa gkr tkMyavku Eg.kyk]^^nok] r@gh Eg.krk; rseh yodj p dj rw ek>h pwd i njkr ?; k**

dkl kvkDdkua vki ys nkligh gkr gkrkr ?kVV i dMuu ukpok; yk l # dys vku Eg.kyh]^^gk rG'khjke d/khp dBY; k nokpadk; djr llgk; - ásanokpallgk; dsyarj fgFkuu QMa R; papkaxyallgkpallgk;] ásph ck; dwijok ejrk ejrk okpyh] rh fcpkjh eyk dokrj fuon&uk#G djrh; k- Eg.kuu rh okpyh- ij vkrk; k QMaeh rG'khjkeyk eM# dkiY; kf'kok; ekQ dj.kkj llgk; **

ckiwEg.kyk]^^c?kwvkDdk]yodjpdk; rjdjrw**

uarj cki waeM# dk; dki yaUgk; - vku nxMai Mk; padk; cm >kyaUgk; -

cki wo \$\text{s} k = k.kl kyk Eg.kyk]^\vkeP; k o cGhP; k ?kjkoj xsyh efgukHkj | kB; kyk dMM a i MY; koj nxMa i MR; krh-dk; dj.koa dk; p dGhuk**

'kgk.kk ek.kl Eg.kyk]^\v| adj rG'khjke], d pkj&i kp ek.kl ar; kj dj] vu xYyhr pkj dki&; kr pkj ek.kl amHkh dj vku R; k R; k dki&; kP; k ?kjkP; k ekGonkoj $y\{k fBok; yk l kacc#cj nxMaVkd.kkjk l ki Mhy-**$

cki warl padsya ckckl kc] nxMij ekfk.kd] Kkuji pkbliktj kpk | kuji vicknkl vku l bilkk áwyk l kii; kyk dMil ai MY; koj xYyhrY; k pkj i kp ckGkr mHkadsyavku R; kayk l kiixryij^^righ T; k ckGkr mHkkgk; frFlaQdLr ekGonkoj ek.kil dksk fnl rvr dk rio<ay{k fBok**nxMaVkd.; kpk l ií/ko T; k ek.kl koj vf/kd grpk R; kP; k ?kj kP; k cktnyk ckckl kcyk mHkadsyavkf.k ckdhP; knuk brj

ckGkr mHkadsyackcki kc I fi'ko vi yš'; k ek.ki kP; k ijM; kr vákkjkr nMmu ci yk gyrk-i kr oktrk vákkj xMn >kyk-vku R; ks ekGonkoj xsyk-vku i kR; krua, d , d nxM f?kÅu vkeP; k ?kjkoj fHkjdkowykxyk-ckcki kcuaoGh[ky $\frac{3}{x}$ xsyh efguk nku efguagkp ek.km vki Y; k ?kjkoj nxMaVkdrw ** ckcki kc R; kP; k ekGonkP; k i k; &; koj uai Grp xsyk-vku R; kP; k ekxatkÅu mHkk jkfgyk-R; ksek.km i kR; kryh nxMadk<r gyrk-vku feuVkfeuVkyk vkeP; k ?kjkoj fHkjdkor gyrk-xYyhr dkyok I # >kyk-^i Gk] i Gk-?kjkr tkok-nxMai MwykxY; krh-**FkkM; k oGkuackcki kcua R; k ek.ki kyk i kBhekxuadoGk?kkryk vku R; kyk i dMyk-

R; ksek.kdf]^dksk gk; ** Eg.knu tkjkr oj Mwykxyk- ckck1 kcua, dV; kupo frFkaR; kyk doG; kr /k#u nkunk ekGonkoj vki Vyk- ekGonkoj dkyok 1 # >kyk- R; ksek.kdf ckck1 kcyk f'k0; k nsÅ ykxyk- ckck1 kcuaR; kyk frFkpo i kBhr nku pkj ykFkk vku cpD; k ?kkrY; k- R; ksek.kdf tkj tkjkr vkj Mwykxyk-

R; ksek.kd 50&55 o"k \bar{k} o; kpk grk-'koVh nk \bar{k} k \bar{k} pk \bar{k} kaekGonkoj x \bar{k} ys \bar{k} ku R; k nk \bar{k} kkuk /k#u cRrh \bar{k} ; k MkocktoG R; kuuk \bar{k} kya x \bar{k} yhryh ek; nk \bar{k} G ek.k \bar{k} >kyh grh-

ckckl kc nxMmyk Eg.kyk]^^nxMm] vkeP; k ?kjkoj nxMaVkd.kkjk ek.kml gkp gkbZc?k**
ijr nxMmjekf.kd oxjsnk9kk pk9kkmuh R; kyk frFkaMkmck[kkyh fuckj Bkdya R; kpk HkkÅ vkyk vu
l xG; kLuh f'k0; k fnÅ ykxyk- o Eg.kmykxyk]^^ bukdkj.k vkeP; k Hkkokyk gh i kjadk ekjk
ykxY; krh\xYyhokY; knumr@ghp U; ko djk** xYyhrY; k ykdknuk pkaxyaekfgr gmadh] tksek.kml
ekj [kkrm] R; ksvku R; kpk Hkko nk9kach y; [kkm/dj gkbir-

nknk Eg.kyk]^^i kj kuw \checkmark krk g; uyk ek# udk] á $_{yk}$ ekdGk I kMk] eh dk; djk; parh c?kr $_{t}$ *

 $i \ kj \ kuh \ R; \ kyk \ e \ kcl Gk \ I \ kMyk] \ , o < k \ e \ kj \ [kk Å ugh \ R; \ kP; \ k \ \lor ackryk \ r kBi . kk \ \lor tuu \ ftjyk u \ 0 grk-R; \ ksf'k0; \ k nr nr p \ \lor akkj kr i I kj > kyk-$

nknkuaikfyl LVskuyk tkÅu R; k ek.kl kP; k b#n QkStnkjh dsyh- xyhrY; k dk; ek.kl kuhikfyl LVskuyk tkÅu QkStnkjkQMatckcfnyk-jkrP; kyk ngk vdjk oktrk ikfyl R; k ek.kl kyk idMk; yk xYyhr vkys rok R; ksek.km nk# fiÅu ykl gmu [km/ksckP; k npGkr nMmu clyk gm/k-

R; kyk i kfyl i dMnu f?kÅu xsys i kfyl R; kyk f?kÅu xsy; koj xYyhrys'klikj fnM'ks ek.kl ai kfyl LVsku QMaxnh\d#u Fkkcys dsyd.kl\Qk\scnkj dMd grps R; kuadicjpk i V\k dk<yk \vee ku R; k dkrMh i V\V; kua R; k ek.kl kyk Bkdkyk I #okr dsyh- \vee ku bpkj y\rightarrow\n cjacGh \vee ku r\rightarrow\kl\kgkp; k?kj koj nxMaVkdr grpk**

, dkikfylkua, ddkBh R; kP; kikBhr ?kkryh-R; ksek.kN Bks·Bk·sckncywykxyk-ckghjP; kxnhiryk, dek.kN Eg.kyk]^^vk; yk] y; ekjk; ykxY; krhfnl ra-** nn jk Eg.kyk]^^gs c?k ukek], drjikfyl Vskukph ik; jh p<k; ph ul rh vku, dnk dkik; jh p<yh dh] dk; [kja ul ra-vk**

 $frljk \ Eg.kyk]^{\wedge} \lor k; \ ?kkyalefgukHkj \ nxMaVkdra \] \ dk; \ ek.kal \ gk; \ dk \ gbku \ gk; \ !$, dknaysd# esyavl rarj R; kpadk; ----?; k; pagqadk; \ cjP; k cjackckl kcua/; ku nsÅu i dMyaEg.kau cja>kya ukghrj \lor thu fdrh fnl \ nxMaVkdr gqadqkkl \ Bkmd**

 $p \textit{kGkk} \; e \textit{k.kM} \; \; Eg.kyk]^{\ } \; \forall k jay \{e.k \; g; \; y \textit{k} \; i \; k fy | \; k auh \; e \textit{kcdGk} \; | \; k f \ wuh- \; u \textit{kghrj} \; i \; t \ y e \textit{kkf} \; y \; \forall k k p \; [k k f \] \; k \; djrjk f \ y-**$

frdMai kfyl R; kyk ek#u ek#u bpkj r gr $]^n$ rwcGhP; k?kjkoj nxMadk Vkd r grk** R; ksek.kli Eg.kyk $]^n$ dkj.k cGhpavku ek>aokdMagk; -**

ikfyl Eg.ky3^^dokiluaokdMagk; **

R; ksek.kN Eg.kyk]^^, dnk cktkj kr Ekh R; kyk nku #i; snk#I; kyk mI uaekfxryagnarj R; kuaeyk fnyaukghr- \lor ku oj eyk f'k0; k fnY; k-f'kok; R; kP; k i kj hP; k yXukP; k Vk; ekyk R; kua \lor keP; k nkj kr I okl uhpk ryv&fdLdk Vkdyk Ugk; - \lor kEgkyk R; kuadI Y; kp dk0; kJyk cyoya Ugk; -**

ikfyl Eg.ky]^^r@'khjkeuaropadk; okV@adsyag@a**

R; ksek.kW Eg.kyk]^R; ua \vee kepadk; chokVMGadsyaUgk; - R; ksek.kW \times jhc nokokuh gk; - cGhp y; dpdk gk; -**

 $i\,k\!f\!y\,I\,k\!a\!u\!h\,R;\,k\!y\!k\,n\!e\,V\!k\!d\!y\!k\!-\!v\!k\!u\quad i\,t\!t\!d\!g\!k\,\vee\,I\,a\,d\!j\,.k\!k\!j\,\,U\!g\!k;\,-\,\,;\,k\,\,\vee\,V\!h\!oj\,\,R;\,k\!y\!k\,\,I\,k\!t\!M\!u\!u\,f\!n\!y\!k\!-\,i\,t\!t\!d\!g\!k\,\,\vee\,k\!e\!P;\,k\,?k\!j\!k\!oj\,\,n\!\times\!M\!a\!c\!n\!h\!p\,i\,M\!y\!h\,U\!g\!k;\,h\!r\!-$

 $fcWh'k\;;\;k;\;P;\;k\;\vee\times nj\;\;Hkkj\;rk\;r\;jk\;t\;s\;kkgh\;gqrh\;\;\vee\;ucd\;j\;k\;t\;\}l\;jnkj\;]l\;k\;Fkkfud\;nj\;ckj\;k\;rhy\;orunkj\;ekBekBs$

tehunkj ck; dkf/kok; ckgj , d \vee xoL= $\frac{1}{2}$ [kyh½ Boyatk; pa rhp i/nr 50 \vee kf.k 60 P; k n/kdkr extl; kr cjhp/kh c?kk; yk feGr grh- \vee I a \vee xoL= Bo.kaEg.ktsekBi.kkpay{k.k ekuya tkr gra

∨keP; k xYyhr ∨'kkp izdkjpa okrkoj.k Okj ikgk; yk feGr gipa brj xYyhi{kk ∨keP; k xYyhr ∨'kh ∨axoL=acjhp'kh fnl r giphxYYKhr, d fdjk.kk nqdku gqra fdjk.kk nqdku pkyo.kkjk r#.k xkgkxqeVk gqrk ijarq ifydMP; k xYyhrhy, dk r#.kh'kh R; kph HkkuxM gqrb- R; k r#.khP; k uknkyk ykxqu R; kuaR; kpa nqdku ekMdGhl vk.kyaqqra rks'kqVh feyVjhr Hkjrh >kyk-

rl p vkeP; k xYyhr FkkW egk | k ukokpa, d ek.kwl gwpafnl k; yk pgjk Qkj mxzvkf.k nk
h ok<oysyk gwpk-rksgkrHkVVh nk# pks#u bdk; pk- ugeh i kfyl R; kP; kdMa; k; ps v/kwue/kwu R; kP; k ?kjkoj /kkM i Mk; ph- R; kyk nku ck; dk gkj; k-, d yXukph o nnj jh vakol= Eg.kwu Boysyh-R; k vakol= ckbidMs, d uxjl od pks#u jkrP; kyk HkW; yk; k; pk- ás FkkW egk | kyk dGyadh] rksdwp&; kokuh fil kGk; pk- ex rksBoysY; k ckbiyk ekj ekj ekj k; pk- frpauko pwnkckblgwparh fnl k; yk Qkj l nnj gwph-, dnk R; k uxjl odkph o FkkW egk | kph xYyhr y; tkjkr ekjkekjh >kyh-vkEgh ?kkc#u fpMhpwi ?kjkr yi w cl ywgww

xYyhrnoljk, dek.kol gork-R; kpauko [kV; kG EgkjR; kvl agora R; kykghnkuck; dk gōk; k-, dyXukph vu noljh Boysyh- yXukph ck; dks [kV; kG EgkjR; kP; k LoHkkokyk daNkGou ekgjih xsyh gorh- [kV; kG EgkjR; kuafBoysY; k ckb3yk xYyhr vfr'k; lonj [kksyh ckakou fnyh gorh-R; k [kksyhP; k vkrhy fHkorh em xGxGhr gōk; k-ckdh brjkB; k ?kjkP; k fHkorh ekrhua l kjoysY; k gōk; k-fHkorhyk vkruu fuGk jax fnyk gork- [kksyhr cjhp l tkoV dsysyh gorh-vkEgh ckgs#u R; k [kksyhr Mkckou c?kk; pks vkEgkyk okVk; pafdrh lonj [kksyh gk; !

xYyhr n(j)h d k h k u kokph c k b Z fruauojk l k h lyk g r k-rh ljG ljG c kok f Bo u j k f g y h g r h-cj k cj e/; e o; k p h v k b Z v k f. k r h d k h lk r j k g k; k p s f Bo y s y k c k c k R; k ? k j k r p j k g k r g r k-d k h k c k y r k u k Q k j p u [k j s d # u c k y k; p h-

R; kP; k?kjkP; k i fydMs , d ?kjmkt ?kjk.; krhy ckbZuojk I kMwu ekgjih ckok fBÅu jkfgyh gmrh- frykgh xkokrp fnyagmra rh uo&; ktoG jkgkr u0grh- fryk rhu pkj i kjih vkf.k , d i kjixk gmrk- R; k rhu&pkj i kjihgh vkbJ kj [; kp u [kj.sy vkf.k cktkjcl 0; k fu?kkY; k gR; k- frP; kdMs njjkst I kB; kyk , d f'kjer ?kjkryk e/; e o; kpk ek.kd ; k; pk- rks I kB; kyk vkyk dh xYyhrY; k dkgh yksdkscjkscj xlik ekjr cl k; pk- fcM; k oMk; pk vku jkrP; kyk R; k ckbP; k ?kjh >ki w i gkVal k6rkP; k ?kjkdMafu?kwu tk; kpk-

xYyhrp, d pkhlkkjkpadkyn; gnra, d Egkrkjk uojk vu R; kyk nku rj.; k ck; dk glij; k-nkgkhukch enyckG u0gra R; kryh, d ckb7vkeP; k xYyhrY; k Hkxoku ukokP; k i qkji.kk dj.kk&; k ek.kl kuaByyh gnrh-HkxokuuaR; k ckbP; k uknkual kirkpayXu Qkj m′khjk dysyagnra

 $xYyhr noj'khi.kk dj.kk&; k] \lor axkr no; skk&; k ck; k ch ek; nkG gli; k-, d Egkrkjh ckbZgkrkr doM; kph ekG?kvÅu I pluu I kaxk; ph-noj jh Egkrkjh ckbZtehuhoj ekrhr dkVdhuaj8kk ek#u I pluu I kaxk; ph-<math>\lor$ keP; k dkI k \lor kthP; k \lor axkr \lor /kuu e/kuu ; x; xG; k n0; k; k; P; k-

, d ek.hd iMD; k?kjkr, dVkpjgk; pk-R; kP; k iMD; k?kjkr vkEgkyk tk; kyk Hkhrh okVk; ph-, dnk yikNihpk [kG [kGrkuk pplu R; kP; k l kt; kr MkdkÅu ikfgyarj l kt; kr gGnh&dplwvu 'kmj ykoysyaxksy xksy nxMp grh-f'kok; , d esyY; k ek.kl kph gkMkph doVhch grh-xYyhrysykd R; kyk ^poMD; k dkMhjke* Eg.kk; ph-rksugeh Hkkukerh djk; pk-nohP; k txkr poMdaoktok; pk-

 $xYyhr\ t'kh\ yQMh\ tkLr\ grh\ r'khp\ vkeP;\ k\ xkonjhP;\ k'krkr\ tqnG;\ kr\ fnol\ k\ cjhp\ yQM;\ kryh\ tkMi\ h\ xli\ k\ ekjr\ cl\ k;\ ph-\ danhclanh\ vkEgh\ tqnG;\ kr\ fQjrkuk\ rh\ yQMhokyh\ tkMi\ h\ fnl\ k;\ ph-\ eyk\ cf?krY;\ koj\ Ekh\ dqkkyk\ l\ kaxwuh\ Eg.kw \ ek>k\ y;\ ykM\ djk;\ ph-\ [kk;\ kyk\ dk;\ rj\ |\ k;\ ph-\ ij\ eh\ R;\ kpa\ dk;\ ch\ u\ ?krk\ tqnG;\ krw\ i\ Gw\ ckgj\ tk;\ kpks$

vkeP; k xYyhr , d Egkrkjagıra rsugeh d∉hyk /k#u dk; rjh djk; pa QMaQMaR; k Egkrk&; kP; k ysdkuh R; kyk nk0; kyk ckáku fBoya

nd ja, dek.kd graß; kph ck; dksesyh grh-R; kykgh, d 15&16 o"kkph, d \vee fookfgr egyxh grh-R; k egyhoj R; kuadk; rjh \vee R; kpkj dsysEg.kmu R; kyk HkkodhrY; k yksdkmuh fuckj ekjya

vkeP; k?kjkP; klekjirk; ckbZgrh-, dvLi"VerhZvIysyknxM-xYyhr, dikjgrk-R; kikjkOjykclaldkGlkB; kykxlikekjhrclk; ph-R; kikjkP; klejji, d>duhpherhZnxMkrdkjysyhgrh-frFka, diMda?kjgraR; kiMD; k?kjkr, dek; yxdhjkgkrgB; k-yxdhpaukolkSkck; grafrughuojklkMysykgrkvu, dckckBsysykgrk-xYyhryQMhbrdhijarqR; kcnnydgkkykpdk; okVk; palgk; -vlyaokx.kax\$fdook; xGaekuyatkruQqra

rok dkl kvktheyk Eg.kyh]^i ki V; k rwokj hyk tkrksdk**
eh]^^eyk dlatk; kpå dBatk; kpå dk; dGr Ugk; -**

dkl kvkDdk Eg.kyh]^^rw, dVk tkÅ ux{} xYyhrY; k dkMkckb/c#cj tk-**

eh cjaEgVya ek>ao; R; koGh 9&10 o"kkipagqra tkrkuk dkMk] Bdk o /kgiik fr?kht.kh okjhyk fu?kkY; k-R; k dkGkr okjhyk pkyr tk.; kph i/nr gqrh-Bdk o /kgiik ij xYyhrY; k gli; krj dkMk vkeP; k xYyhryhp gqrh-uojk l kMnu ck0; ktoG jkgkr gqrh-rhu ck; k vku eh] vkEgh pk9kapkyr ia:ijiyk , dkn'kHP; k vknY; k fno'kh fu?kkyjl R; k frUghgh ck; k l k/kkj.k 20&22 o"k8

o; kP; k r#.k gB; k-tkrkuk R; k fr?khgh Okjp vkpdV&ikpdV cksyr gB; k-R; k fr?khgh popkG gB; k-fr?khuh ch ckoaBsyagna eyk R; kB; k cksy.; kpk uhV cks/k gnr u0grk-fr?khch ; x; xG; k i #"kkcnny xlik ekjhr gB; k-gkrokjsd#u R; k fr?kh; x; xG; k i #"kkps l kbkko dl svl rkr; kpao.ku djhrgB; k-R; k dk; cksyrk; r eyk dkghp dGr u0gr&-

vkEgh I dkGh yodj fu?kkywgqrw nqi kjh 3&4 ok- frFkai kgpyw

I kli; kyk dMM ai MY; koj, dk vMrhoj xsyks frFkavkMrhoj vkrY; k [kksyhr vkeph I okiph >ki k; ph; pLFkk dqkhrjh dsyh grh- vkEgh xsyksrok, dk ek.kl kua R; k vMrhpagkQhl m?kMmu fnya FkkM; k oGkua, d pki Mhpk tkMtMl ek.kM frFkavkyk-R; kuadjM; k jakkph Vki h o dkV ?kkryk grpk- i ka; s'kdlkk/kkrj grps rksdksk rjh e/; e o; kpk ckxk; rnkj i ekljh v I kok v I aokVr grpa I kli; kyk 788 yk rksvkyk-rksvkEgkyk gkVhykr f?kåu xsyk-frFkacDdG dk; ck; vkEgkyk [kkå ?kkrya vku frFkua rksvkEgkyk fl uekyk f?kåu xsyk-rhu ck; kli; k e/kh rksi ku [kkåu fi pdk8; k ekjr [kuphōj cl yk grpk- [kuphōj cl w fl uek eh i fgY; knnkp cf?kr grpw xkoh ricur fl uek tehuhoj cl w c?kk; pks fgFkaekrij [kuphōj cl w fl uek c?kk; yk feGr grpk-fl uek dkupk grpk] rsdk; vkBor Ugk; - i j fl uek pkywvl rkuk] vákkjkr rkspki Mhpk ek.kM rhUgh ck; kli; k vakkyk >Vr grpk- eyk vákkjkr FkkMa FkkMa fkkMa fnl r grpa rksdk >Vrks \ gs eyk dGr u0gra fl uek

jkrpa, d nhM oktyagıra R; k pki MhP; k ek.kl kuavkMrhpagkQhl m?kMya gkQhl kr , d ekBh l rjath Vkdyh gırh- Ekh fHkrhP; k dMayk >ki yw rh ek.klı rhu ck; kli; k e/kh >ki yk- jkrHkj R; kpa vkf.k R; k rhu ck; kpadıpıplpqcksy.kadk; rjh pkywgıra ij usedadk; pkywgıra rseyk dk; , clw; r u0gra eh vxmjp pkyw pkyw neywgırw R; ke@a eyk >ki dok ykxyh gsdGypaUgk; -

I dkGh mBw c?krwrj rkspki Mhokyk ek.kW i gkVayodj mBw fu?kw xsyk gqrk- R; k rhu ck; k \vee Lrk0; Lr >ki Y; k gq; k- Ekh R; kwk mBfoya rj R; k yxcxhuamBY; k- ex \vee kEgh unhoj \vee âkG djk; yk xsyks

unhoj tkr \vee I rkuk dkMh Eg.kyh]^i ki V_7 k] rwjkrh dok >ki ykI ja** eh]^^pkyw pkyw Ekh neywgrw dok >ki ykxyh eyk dGyp Ugk; -**

 $Bdk\ Eg.kkyh]^{rwj}krP;\ kyk > ki hr\ y;\ cMcMr\ girk\ ckck!\ \lor kEgkyk\ i\ fgY;\ kmk\ i\ fgY;\ kmk\ okVya\ rwtkxk\ gkbll\ -\ i\ j\ rijvk\ gkyouu\ cf?krY;\ koj\ rwvftckr\ tkxk\ > kyk\ ukghl\ -**$

pmHkkxr Luku d#u ikanjakkP; k i k; j hpan'ku ?krya okGob/kr QjkG dsyh vu ; rkuk , I -Vh-uavkyw dankoj , I Vhyk ek; mkG xnhZgrh- , dk , dk xkMhr 'kalkj 'kalkj ek.kI a?kql k; pk iz, Ru djhr grh- tkxkUgk; feGyhrj dk; ek.kI a, I I VhP; k Vikoj c I yh grh-

∨kepa?kj Egath rhu ∨k[k.kkph [kksyh- R; krp i kG.kk ckakysyk] frFkapal \$ kd djk; pk] frFkap tokpks ∨ku ∨kEgh I xGh frFkap >kik; pks pkj&i kp HkkoMa oGhua >kik; pks ∨kEgkyk

ikâkj.; kl kBh , d ekBh ikl Mh \vee l k; ph- , d i raynd# ckj geskk \vee kbP; k dqkhr \vee l k; patkxk Qkjp deh i Mr grh- Eq\$ nq &; kP; kf[kGX; kr ckakyh tk; kph-

vkepk e/kyk psyrk ukuk vku vkEgh nkbjgh dbyliga, dkp okM; kr j ligk; kpls ukukyk ekruj nku nku [k.kkP; k rhu [kkY; k okVu vkY; k gli; k-vkEgkyk rhu [k.kkph , dp [kkyh okVu vkysyh girh- ukukyk , d esyxh vu nku esyagirh- R; kipadiylig NkYagira vkeP; k diyligkr HkkobNa tkLrh girh-

cki wax Yyhrp, d [kgyh tkxk [kjnh d#u ?kryh gqrh- R; k tkxr cki wc\$yackalkk; pkcki wavkrki ryj i alkjk, dj ftehu bdr f?kryh gqrh- oMyki kftir i alkjk vkf.k bdr ?kryyyh i alkjk v'kh 30, dj ftehu cki lir; k ukos>kyh gqrh- f'kjerkP; k tlekurj cki waykxii kB o"kk&o"kkiyk rhu [kjnh dy'; k gli; k- pkik&; k oBk&; kryh ngk, dj ftehu ?krY; koj yxp QlyP; k o"khi/kjexko okVph pkj, dj ftehu bdr f?kryh gqrh- R; kurj R; kP; k i qxP; k oj "kh xyhrY; k djkli k rkMkph [kqyh tkxk ?kryh qqrh-

vkrk ftehu Hkjiji >kyh gyrh-ij jkgk; yk ?kjkph xjt gyrh-gk; rh rhu [k.kkph tkxk ijr u0grh-xYyhr?krysyh [kgyh tkxk 34 QN/ykc o 17 QN/#m gyrh-

cki wEg.kyk]^^j [kkeko'kh] tkxph ykch vu #nh fdrh gk; -**

 $j [kk eko'kh Eg.kyh]^{*} mh dk; rj rhu oko gk;]ykach ikj R; k f'kojke ?kyf; kP; k ikBfHkrhirnij qk; -**$

ckiwEg.kyk]^^tkxkrb;kukokojgk;dk**

 $j [kk eko'kh Eg.kyh]^^t kxk ekb; k ukokoj Ugk;] ekydkP; k ukokoj gk;] ekyd eY; koj ekb; k ukokoj dsyh Ugk; <math>\vee u$ eyk dqkhch Ugk; - R; kerGa ekydkP; k ek?kkjh ekb; kp ukokoj tkxk grh; k-**

cki wEg.kyk]^^tkxk rbp; k ukokoj d#u ehf?krw i j db<; kyk tkxk nrh rh cksy-**

j [kkckbZEg.kyh]^^gsc?krG'khjke] eyk dqkh ch Ugk;] rwydjk&ckGkpk cki gk;] tkxk ryyk fnyhrj rhp; k ysdjk&ckGkpk eyk vkf'kokh feGy-rok tkxk eyk ryykp bdk; ph gk; **

tkxph fder nku'ks#i; sBjyh vku rh tkxk cki wa [kjnh d#u ?kryh-R; ke Gavkepk oklik, dk fBdk.kh ckilk; yk tkxk ekd Gh Hkj i ij fe Gkyh grh-

cki waokM; kpackákdke pkywdyyagra gsl xGadjhr vl rkuk cki pohy; hp vkskrk.k gr grh-cki wl dkGi kl w l kB; ki nji j kukr j kc j kcr grk-, o<aekBadlync l blkkGw o"kkJyk, d 'kr bdr ?kr grk- gsl xGadpG cki B; k vrhd"VkenGa>kyagna cki w'krh djr djr dMcach bdk; pk-vku n() &; kph 'kra[kMkoj djk; pk-ikÅl dkG tkLr vl Y; ke(Gao"kkīyk 100&150 i krh eky grp grk- eky fBokyk tkxk ul k; ph-vkMrhoj cjkpl k eky fBokok ykxr grk-?kjh eky Hkjysyk vl k; pk-?kjkr u() ravk.kuu Vkdk; pa, o<p dke cki wdjhr grk-

?kjkr ekykP; k FkMh ykxyY; k vI k; P; k-, dk&, dk o"khl pkj&pkj efguadMcabdk; pk fI >u vI k; pk- cki w?kjh uI yk dh] R; kpk xjok; nk vkepk Fkkjyk Hkko vk..kk i ji j mBok; pk-pkj&pkj i k; Y; k] vkB&vkB i k; Y; k Tokjh pks#u usAu cktkjkr fdøk vMrhoj bdk; pk-vk..kk vkbpk o vkthpk y; ykMdk grk-R; kerGaR; kyk pks#u Tokjh bdk; yk vkblo vkth ugeh enr djk; P; k- i j i i i; kcnny cki nyk t'kh rGeG grh r'kh rGeG vkbl vkth vku vk..kkdMa vftckr ulgrh-cki n; k i j ckjs ugeh rs Tokjh bdk; ps

Vk..kkP; k gkrkr deh o; kr ugeh ugeh tkLrh i \$ k j kg.; ke(Gavk..kk ygku o; krp fc?kMysyk gnrk- pks#u fcM; k oMk; pk] dki MaQkjp Ndid okijk; pk- Ekh I kGr vI w ekb; k dki Mkyk d/kh I kc.k I kMk feGk; pk Ugk; - ij vk..kkP; k dki Mkyk geskk I kc.k] I kMk feGk; pk-vk..kk f'kddkbZykÅu rkI u&rkI v8kG djk; pk- R; kP; kI kBh; x Gadkyo.k cuoysyavI k; pa R; kyk x0gkph pi krh pks#u [kk; kyk fnyh tk; kph- vkEgkyk brj HkkoMkauk Hkkdjhpa rqlMavku I xG; kI kBh dsysyadkyo.k [kk; kyk feGk; pa ygkui.kki kI wup vkbZuavk..kkyk, d [kkI; xGh okx.kd fnysyh gnh- R; ke(Gavk..kkcnay vku vkbZnay ekb; k eukr jkx fuekZk >kysyk vI k; pk- cki wij xkoh dMcabdkyk xsyk dh vk..kk c\$ykoj xMh ykok; pk- vku pks#u bdyy; k Tokjhruajkstxkj Hkkxok; pk- MkD; koj dd ykc ykc jk[kk; pk- nokum Vkbi dkncMk Nki Hkkak i kMk; pk- geskk p\$uhrjgk; pk- fl upk cnyyk dh frdhV dk-w fl upkyk tk; kpk-

eyk ek= fl upkyk frdhV dk<w dnhp tk; kyk feGr uûgra ek÷; k vakkoj ckj geskk eGdh dki Mavlk; ph-väkkGhyk d/kh l kc.k ulk; pā ek>k ckj geskk olr&; kuaxkVk dsysyk vlk; pk-Ekh l kGr f'kdr vl rkukgh ek>adkGrud vkbJyk] vkthyk d/khp okVk; palugk; -vk..kk cSykoj xsyk dh] ekxph l xGh dkeaeyk djkoh ykxk; ph-cSykph of k dki w fBo.kā xkonjh fdok ekGkojP; k 'krkryaxor vk.k.kā ?kjh vkMkpaik.kh vk.k.kā ckjD; k yxdjkph ckGwrh /kqkā cSykpao Eg'khpa'kku&?kk.k dk<.kā vk..kkyk ocki nyk 'krkyk Hkkdjh uxÅu i kpo.kagh l xGh dkead#u eyk l kGayk tkoaykxr gra gh l xGh dkeadjr vl rkuk ekb; k QsxM; k ik; ke@aek>h pkaxyhp neNkd gq kph-'krkrual kæ; kyk vk..kk?kjh vkyk dh rksnkjkQMacSyxkMh mHkk djk; pk vu dkl jk [kkyh Vkdw rMd ?kjkr fu?kw tk; kpk- ex Ekh ekxMva cSyxkMh l kMk; ph] cSykyk nko.khyk ckilkk; pā cSykyk fp#u of k?kyk; ph] cSyxkMhryal xGal keku ?kjkr vk.kw fBok; pa gh l xGh

dkeaeyk djkoh ykxr grh- vk..kk d/kh ijk c\$yxkMhokyk >kykp ukgh- rks'krkruavkyk dh rkl rkl vax ?kkl w våknG djk; pk] bL=hph dki Ma?kkyk; pk vku ckgj fQjk; yk tk; pk- l kå; kyk c\$ykyk i Mch ehp ?kkyk; pks i gkVa ekrij cki wmBw c\$ykyk o\$j.k Vkdk; pk- dmhdmh i gkVamBw vkb&yk Hkkdjh dj.katek; paUgk; - ygku eny jMk; pa rok vkbZl dkGh m'khjk ekxkow Hkkdjh d#u ekb; ktoG | k; ph- R; k Hkkdjh i kgp dj.; kpadke eyk djkoaykxk; pa R; kurj eh 'kkGyyk tkr grw, o<ad#ugh eyk ?kjkr vkb&dMuavkthdMuanq; e okx.kvd feGk; ph- vk..kkua'krhpa dke dok vax >kMw dsyp Ugk; - un rk fVoY; k&ckoY; k djk; pk- R; kuavkEgk HkkoMkoj un rk #ckc ekjyk-R; ks?kjkr Fkkjyk grk-R; kP; k okx.; kpk] cksy.; kpk dke dj.; kP; k i/nrhpk u dGr brj HkkoMkoj i fj.kke gr grk-R; ksoMykcjkcj ugeh [kkVaokxk; pk- cki N; k eukl kj [karksdmhp okxk; pk UgkbZ R; kP; k okx.; kyk ugeh vkbph l kFk vl k; ph- R; kerGacki vr?kjkr ugeh o\$rkxysyk vl k; pk-

, ա I դփք; k ?kk; V; kr ckckl kc cki nc#cj HkkM.kad#u ckHknGxkoyk tk; pk- eh i kaxGk VI Y; kenGacki waeyk cSyxkMhoj jkukrY; k dkekoj dnihp usyallgk; - QDr ojph dkeaeh djhr ցրա

cki wekb; kcnny ugeh Eg.kkpk]^^i ki V vnwvdke gk; rok R; kyk jkukryh tM dkea I kxwu mi xkpallgk; - R; kyk ?kj kryhp dkead# fnysyh pkaxyh-** ckckI kc ugehp ek>k bI kG djk; pk vu Eg.kk; pk]^^R; k i kxG; kyk dokrj cyxkMhoj i kBor tkok] dokrj jkukryadke ykor tkok- eykp dk cjal kj [kal kj [kadke ykork; **Ekh ekrij vk..kkP; k rI Y; k okx.; kdMa ugehp dkukMkGk djk; pks

HWx, dkskhl

1958 rs 1962 nknkl kgc <oGldj gsuxjk/; {k gyrs 1962 l kyh y{e.k ukx.kj ekjokMh ofdy] jrhyky 'kgk]ckck l kGj f'kokthjko ukbZokMh o dkgh uxjl pd 'kBthP; k V'de/kw l ksyki ji yk tkr gyrs nybkuaV'dpk vi?kkr i aji ji &l ksyki ji jkMoj nl ji i kVhtoG >kyk-R; kr 'kBthpk mtok gkr ekMyk-, d&nku dk; Zhrł; k vi?kkrkr esys ckdhP; kauk fdjdkG nykki rh >kyh-

1962 I kyh exchl; kr uxjikfydł; k fuoM.kodk ukłgoje/; stkghj >kY; k-R; kosGh exchl; kr pkj okMZ cufo.; kr vkysgrs i lit; od okMkinu pkj uxjl od fuoMou | k; psgrs vkeP; k okMkin ekjokMh ofdy], dukFk txrki] ek#rh ukx.ksvkf.k tuk/kiu I koath vI spkj mesnokj dkłkh i {kkrQimHksgrs rj dkłkh fojk/kh xVkru jrhyky 'kgk] I [kkjke nRri) vocknkl ukx.ki] vkf.k ckcijko vkorkMsgsmHksgrs fuoM.kod Qkjp vVhrVhph >kyh-nknk]ukuk]cki wgs ekjokMh ofdy i kVhios dVVj I eFkid grs dkj.k ekjokMh ofdy gsgjhck 'klithosI [[ksHkkÅ grs o R; kpa pkfj=; vfr'k; I r-khy grs rsugeh vkeP; k dlyokyk dkł/ldpjh]f'k{k.k; kl cakh ekxih kiu djhr vI r-R; keGa vkepadlyop ekjokMh ofdykP; k ekxaBkei.ksmHkajkfgya

; k fuoM.kuchr vkeP; k okMkir dkiki psrhu menokj fuoMu vkyj QDr tuk I koath i jkHkur >kys R; ki; k tkxh dkiki fojkKh xVkpsjrhyky 'kgk fuoMu vkys; k fuoM.kuchr ofdykph i kVhicgprkuh fuoMu vkyh-uxjk/; {k dqkkyk djk; pa; koj ofdy I kgcki; k i kVhir cjhp'kh ppki >kyh-

; koGh okMZucj , de/kw fuoMw \lor kysysJh y{e.kjkoth ukx.ksgs, d \lor fr'k; nku'ky' 'krdjh grs R; kwh i a; ji y jkM \lor p \lor l ysyh \lor ki yh Lor%ph 26 , dj tehu ekdV dfe \lor hl kBh nku fnyh gkrh-

R; kph nku'kjroRrh ofdy I kgckuuk \vee fr'k; \vee koMyh- Eg.kuu ofdy I kgckuuh i kp o"kkil kBh R; kuuk uxjk/; {ki nkph I alkh fnyh- R; keqGs 1962 rs 1967; k i kp o"kkir y{e.kjkoth ukx.ksgs uxjk/; {ki nh j kfgys y{e.k ukx.ks; kuuk fyfgrk okprk; r u0grs rs I ghP; k , pth \vee axBk djhr gqrs eaxM; kP; k bfrgk I krysrsi fgys \vee axBcgknj uxjk/; {k gqrs

rstjh vakBrogkmaj vlyj rjh R; kuk dke djrkuk dlyhp vMp.k; r uûgrh-rs LoHkkokusvfr'k; ljG] i kekf.kd o fuLig grs R; kpsir.ksolarjko ukx.ksofdy grs R; kers dry; kgh dkxnkoj lgh djrkuk ofdykuk nk[kom rslgh djhr vlr-y{e.k ukx.ks; kpsFkkjys caknggh 50 P; k n'kdkr uxjl od grs ukx.ks?kjk.; kyk jktdh; okjl k ekBk grk- ukx.kokMh olo.; kl kBh R; kr; k i noztkuh Lor%ph tehu fnysyh grh-R; kersk; k olrhyk ukx.kokMh vlauko fnyaxyagkra R; kr; k kj kj.; kl kj [kankrRo each]; kr R; k dkGkr dqkkdMp uûgrs

dok dok x#thjtoj vI ysch oxloxkiryk ekwihVj pkyok; pk-vkeP; k oxkir cjhp fnoI <kijkpk fnyhi ekwihVj grk- fnyhi I xG; kr tkM vku mpi kijxk grk- rksoxkir xk.kh Eg.kwu?; k; pk- nijkjuarj I kGB; k ekxaebikukoj [kG?; k; pk- fnyhi Lor% yaxMh ?kkyr ?kkyr i kijkuuk i dMk; pk-, d xksy fjax.k vk[kyatk; kpaR; k fjax.kkr pkj i kp i kijal kMyh tk; kph-vku, dk i kijkua yaxMh ?kkyr R; k i kijkuuk i dMk; pa dk; dk; i kijayaxMh ?kky.; kr ybip i Vkbir grh- Ekh ekrij yaxMh ?kky.; kpk [kG d/kh [kGywukgh- dkj.k ek>ai k; QxMagra dok dok eh vkcnr vkcnr yaxMh ?kkyk; pks ebikukr nij jsch [kG pkyk; ps-dcMMh] grunbR; knh-

Ekh ekryj i k; ke@a[kGkr tkLrh Hkkx?; k; pksUgk; - oxkir Hkheuxje/khy i kjaOkj I nj xk.kaEg.kk; ph- R; k dkGkr 60 P; k n'kdkr vkeP; k xkokrua, d xk; d eqcbiyk xsyk gqrk- rks eqcbir Hkkoxhravkf.k xkG.kh Eg.kk; pk] R; kP; k xk.; kP; k jcdkMZi kV; k fu?kkY; k gq; k- R; k vkEgkyk ykmMfLi djoj c&; kp oGk, cdk; yk feGk; P; k- ^#ryk ckbIdkVk---]* ^xsyk gjh dq; k xkok----*- gh xk.kh i lygk i lygk, cdk; yk vkoMk; ph- R; ks xk; d egkjk"Vkr Okjp xktr gqrk- R; kyk I oZ egkjk"V*i i ygkn f'kms; k ukokuaoG[kr gqra rkseqcbiyk jkgk; pk- R; kyk i \$ ky; feGk; pk- ; kph ppkZ xkokr o Hkheuxje/; sy; 0gk; kph- i ygkn f'kmseqcbiy juadmhdmh I .kkI nhyk eaxly; kyk ; k; pk-rks vkyk dh] eMbDQMaQqdV xk.kh xkokrY; k ykckuk, cdok; pk- Hkheuxje/khy 10&20 i kja R; kP; k ekxa ekxa fQjk; ph- rks R; k i kjkuk cDdG [kkonii Å ?kkyk; pk- R; ke@aflkeuxje/khy ckjdh i kjai ygkn f'kmscuk; paLolu ckGxwu gqrh- vkeP; k oxkir 8&10 i kjaHkheuxje/khy i ygkn f'kmp; k xoG.kh o Hkkoxhra gqcgq xkowu nk[kok; ph- I kBwxje/khy ch i kja xk; k; pk i z Ru djk; ph-

 $I \ kBuxje/kyk \ I \ nk \lor o?kMs, \ d \ pkaxyk \ xk; \ d \lor keP; \ k o xkir g prk-c&; \ kp o Gk \ I \ nkP; \ k xk.; \ kyk \ dkj \ I \lor kEgh \ | \ k; \ pks \ I \ nkph \lor keph \ nkLrh pkaxyhp teyh g prh- I nk y; \ buksh g prk-ckj geskk \ dk; \ uk \ dk; \ buksh \ I \ kaxuu \lor kEgkyk g I ok; pk-R; kpabuksh , xd.; kI \ kBh \lor kEgh \ I \ kYh \ fno'kh R; kP; k I \ kBuxje/khy > ki \ Mhr tkÅu c I k; pks <math>\lor$ u R; kpabuksh \lor u xk.kh , xdk; pks

eyk eshkuh [kGkr QxMavIY; keqGajl uûgrk-xk.kh]udyk; krp vf/kdjl gqrk-Ekh udyr Hkkx?; k; pks oxkir plaxY; k udyk djk; pks Ekh danh danh xk.kh ch Eg.kk; pk i; Ru djk; pks xk.; kpk ljko Ekh, dVkp xkomjh cl mu djk; pks eyk xk.kh, dkyk Qkj vkoMk; ph-l kGk l VY; koj xYyhryh i kjavkeP; k l kGaQMa NkV; k eshkukr ykski kVkpk [kG [kGk; ph-eshkukr yky ekrh Vkdysyh gqrh-i Myarjh ch [kjpV.; kph Hkhrh uûgrh-ckjdh i kjabrj [kG [kGk; ph-c&; kp oGk bLVki pk [kG vkEgh [kGk; pks , dt.kkuaMkG; koj i VVh ckakk; ph-vu nq &; kauh tkÅu yi k; pa MkG; kojph i VVh l kMuu ex gMdk; pa , [kknk [kGkMufnl yk dh R; kP; k ukokua bLVki Eg.kk; pa mnk-[kGrkuk ^HkkX; k* tj fnl yk rj ^HkkX; k bLVkM·*Eg.kuu ojMk; pa tlsxMh 'koVi; ir fnl k; pk ukgh-R; kyk [kGkryk 'kji xMh ekuyatk; kpa vl Y; k [kGkr eyk Hkkx?; k; yk

y; \vee koMk; pa danh danh ikgialkiMuuh Eg.kuu y; \vee Mp.khP; k tkxh tkÅu yik; ph- \vee 'kk \vee Mp.khP; k tkxh idM.kkjkyk l gtkl gth ikgprk; \$r\$ uûgra

, dnk vl pp [kGr vl rkuk xyhryay{kk ukokpaikġxafiaiGkP; k >kMkoj tkÅu cl ya vu ikukr yiya R; kyk [kii 'kkdk.; kpk iz, Ru dsyk-ij rsl ki MyaUgk; - y; oG rh frFkpo Qkonhoj cl yavku frFkacl w cl w davkGya vku >ki h xsya vku [kkyh i Mya rok R; kpk gkr ekayk-vkeP; ki{kk ygku i kġaf'kok f'kohpk [kG [kGk; ph] Egath i kBykx d#u i dMk; pa

 $ek>k/kkdVk Hkko f'kjek psyr Hkko 'kadj] l splkj j kek , dnk v l sp [kGr gsps [kGrkuk f'kjekyk 'kadjual kGB; k tkB; kojua[kkyh < dysu fnya R; kesGaf'kjekpk Mkok gkr ekblyk-rksgkr okdMk >kyk gspk- R; k dkGkr eakly; kr gkrkyk lyWVj ckdkk; ph l ks dBp u0grh- f'kjekyk xkokrp , dk^npdj*ukokP; k ek.kl kdMagkr ckdk.; kl kBhjkrP; kyk cki wf?kÅu xsyk-$

gkr ck/kuu ?kjh; k; yk jkrhpavdjk oktys f'kjekpk gkr dkeV; kuack/kyk grk- gkr l dtyk grk- f'kjek jkrHkj jMr grk- rGeGr grk- rseyk c?kor uûgra nd &; k fno'kh l dkGh f'kjekuagkrkyk ck/kyy'; k dkeV; k dk-w VkdY; k] gkr ekWyk grk] FkkMkgh gymr uûgrk-

eachl; ki kl ua 15&20 fd-eh-vrjkoj ^Hkkl \$ ukokpa, d xko gk; - R; k xkokr gkr ckdk.kkjk, d ek.kh grk-cki wf/kjekyk l k; dyoj f?kÅu Hkkl yk xyk vu frFkaR; kpk gkr ckdkykvku ?kjh vk.kya R; k dkGkr R; kP; k gkrkoj uhV bykt >kyk ukgh- R; kenGaR; kpk gkr dk; epk okdMk jkfgyk- gkr ljG dj.; kl kBh dkgh ek.kl a f/kjekpk gkr tkjtkjkr pkGk; ph- R; kyk ej.kkP; k onuk 0gk; P; k- pkj pkj ekBh ek.kl a f/kjekpk gkr tkjtkjkr pkGk; ph- f/kjekparMQ.kaeyk c?kok; paUgk; - f/kjekyk iajijyyk MkDVjdMausyavl rarj dnkfpr f/kjekpk gkr uhV >kyk vl rk- ij [kbl; krY; k HkkmwMkDVjkpk l Yyk , chu vkepk cki wQl yk grk- cki pk vdkJ/noj błokl u0grk- ij cki pk HkkmwMkDVjkoj y; błokl vl k; pk- dkj.k HkkmwMkDVj deh i \$kkr bykt djR; kr vl k cki pk l et grk- nku&rhu o"kki phłek>k i k; >kMkP; k Bkl; kenGaekMyk grk ij ekb; k i k; koj dełkel a kskua pkacyk bykt >kyk grk-

vkblekrý pkýysysis stoG dákhp fBok; ph Ugk; - dmh dmh pkýyš; k iškkruavkbleV.kokY; kph vku dGokY; kph m/kkj h Hkkxok; ph- xYyhrp, d /kuxjkpk Egkrkjk ek.kl ckxdMadkik; ; pk-frFkuavkblfdyksnku fdykseV.km/kkj vk.kk; pho i kýkuk [kkÅ?kkyk; ph-

 $xYyhr \; Hkheuxje/kyk \; , \; d \; ^fyaklik ^* \; ukokpk \; Egkrkjk \; dG \hspace{-0.1cm}] \; fl \; rkQG \hspace{-0.1cm}] \; ckj \hspace{-0.1cm}] \; fpDd \hspace{-0.1cm}] \; vkuca \; bidk; \; yk \; ; \; k; \; pk- \; Mky \; MkD; \; koj \; f?komu \; rks \; tkj \hspace{-0.1cm} kr \; ojMk; \; pk]^<math>\vert vkuca \cdot \] \; dGa \cdot \] \; fl \; rkQGa \cdot \] \; ckj \hspace{-0.1cm} a \cdot \]; \; k-*$

?kjkr nvlkkph Eg\$ ckjk efgua v| k; ph- rsnvlk dk<nu ckckl kcyk | dkG&l k8; kyk , d rk8; k fujl aQ\$ vkysyanvlk |; k; yk | k; ph- eh] f'kjek] ijHkw vkEgh nvlk |; k; pksUgk; - ekruj Hkkdjhcjkcj [kk; k; pks ?kjkr dkyo.k d/kh ul k; pa nvlk] Hkkdj vu pV.kh gkp vkepk jkst pk vkgkj gvrk- R; kryamjyal jyafyVj nku fyVj nvlk cke.kkyk ojok Eg.kwu ?kkryatk; kpa ek>h vkbZ nvlkkr i k.kh dalkhp fel Gk; ph ukgh- R; kevGa xYyhP; k 'kstkj ph cke.kkph ek.kl avkeP; k ?kjh nvlkkpk ojok ykok; I kBh y; /kMi Mk; ph- xYyhrY; k yksdkuk vkbZ pgkyk nvlk QvplVp | k; ph- Hkhdk&; k&vkdk&; kyk Hkkdjh] mjysyadkyo.k ok<k; ph- vkMY; k&fuMY; k yksdkuk enr djk; ph- ekak¶; krY; k ck; kuk Tokjh I Lr bZdk; ph-

 $xYyhrY; k ck; k cki M; k \lor kbJyk y; ukoktk; P; k \lor u Eg.kk; P; k]^nkj dkpk gkr y; ekBk gk; ! I Hkko y; pkxyk gk; ! mnkj <math>\lor$ r%dj.kkpk I Hkko gk; !**

ij dk; oGk xyhrY; k ck; k vkeP; k vkbP; k I Hkkokpk x\$Qk; nk ?; k; P; k] vkeP; k Hkkodhrp vkbiph , d njiP; k ukR; kryh ckbZgrph fryk vkbZckj geskk QqUV nvlk | k; ph-vkbipk I Hkko I jG]I k/kk vu HkkcMk grk-

e/kyh payrh vku vkEgh, dkp okM; kr jgk; pks ij e/kY; k payrhyk vkbP; k okx.; kpk gpk okVk; pk- vku rh vkbč#cj I kj [kh HkkM.kadjk; ph- R; kB; k vkf.k vkeP; k emh fHkrkM u0gra R; keGavkeph ydjaR; kB; k vax.kkr xY; kpafryk vkoMk; paUgk; - rh frP; k ydjkuk I okJ e{k d/kh [kk&fi Å ?kkyk; ph Ugk; - fryk okVk; pa vkeph HkkoMadk; ekxrr dk dk; \ vkbZdkdnyk d/khp dk; ekxk; ph Ugk; - dkdnvku ukuk nk8kkpk ch I Hkko FkkMkI k QVdnu okxk; pk gn/k- ukuk ch Hkkokph ydjaEg.knu dmh pkaxyacksyk; pk Ugk; - rksch vkepk I kj [kaI kj [kajkx jkx djk; pkvkeP; k?kjkr I kr&vkB ydjagn/h- vkEgkyk /kM [kk; yk feGk; paUgk;] /kM d/kh dki MafeGk; ph Ugkbř- ugeh vkeph vkcnk vI k; ph- vkbZcki nok ugehp vkEgkyk pkaxya paxya [kkÅ&fi Å ?kky.; kpk i z Ru vI k; pk- ij ?kjkr i kjkph I a[; k tkLr vI Y; keGa okV.kh d#u FkkMp feGk; pa ukuk vku dkdnvkeP; kc#cj R; kB; k i kjkuk [kGw | k; psUgkbř- vkeph i kjkph ugeh xkomjh vacr&i acr cI k; ph- ij vacr i acrhyk R; kB; k enykuk ukuk; zÅ | k; pk Ugk; -

, d fno'kh nknk ukukyk Eg.kyk]^^ \vee kjacGh] i kj kauk tj k ekdGal kMr tk- y; ch i kj kauk dkMnu fBor tkÅ uxal -**

ukuk Eg.kk; pk]^^R; kpa dk; gk; nknk] ek>h ok.kh&fd.khph nku ysdja g\$rh] rG'khjkel kj [kaeyk ysdjkpay\Nkj \lor l r] rj eyk R; kph dkGthjkáyh ul rh-, d ukgh rj nj ja rj oákkpk fnok pky\nfBohy- ij ek>k oákkpk fnok , dk e\nfbojpkp gk;] fdl uno l kj [kk l kj [kk \lor ktkjh \lor l rks rok ek>k oákkpk fnok , d \lor k jkekp pkyo.kkj gk; - Eg.kuu eyk ekb; k ysdjkph dkGthok \lor rs**

ukuk \lor u dkdıph i kgʻa ekruj. I Hkkokua pkaxyh gırtı-rh i kgʻa pks#u yi nu \lor keP; k'kh [kGk; ph o cksyk; pt- ukuk ekruj. R; knuk \lor keP; k'kh cksyw|k; pk Ugk; - ukukyk okVk; paek>h enya rG'khj keP; k enykeGafc?kMrhy-rsukukpsfopkj, dk n $^{\alpha}$ Vhuac#cjp gırs dkj.k ek>k Fkkij yk HkkÅ \lor k..kk fc?kMY; kI kj [kk okxr gırtı- \lor ku ekb; koj ch R; kpal ludkj gır gırs \lor ku eh ch R; kpac?knu ygkui.kh fcM; k oMk; pks rsukukyk ekfgr gıra Eg.knu ukuk fdI ukyk ekb; k c#cj [kGw|k; pk Ugk; -

ukuk xqi pwi xq#thyk I kaxk; pk]^^vkeP; k HkkokP; k i kgikc#cj vkeP; k i kgikyk clowudk-vku [kGwch nA udk-dkj.k vkeP; k HkkokparsyaxMai kgixay; [kkMdj vku dMwgk; - R; kpa ok.k&xqk ekb; k i kgikoj i Mwh-**

, dfn'kh l kGk pkynvl rkuk ukuk fdl ukl kBh l kGir nilk f?kÅu vkykx#thfdl ukyk Eq.kyij^^tk ckqi-ro>soMhy vkysvkqir-**

following foll

ij ukukph fpdkVh dk; livr u0grh- vkBM; krua ukuk , dnk&nkunk fdlukyk [kk; klkBh dk; rj [kkÅ f?kÅu lkGar; k; pkp- vku fdlukyk cGacGa[kkÅ ?kkyk; pk- fdlukpk ykM Ekh f[kMdhruac?kk; pks vku eyk okVk; pa] vki Y; k ch ?kjkr ydjadeh vl rh rj vki Y; k vkb&ck- uavl kp ek>k ykM dyk vl rk-* danh danh okVk; pa ^fdlukP; k ck- yk ydjadeh vku vkEgkyk tkLr dk cjà nokuavkeP; kp ?kjkoj vU; k; dk cjadyk vl hy cjà **

Ekh , dnk nkunk ck∙ yk bpkjy}^^ ∨ki Y; k?kjh , o<h ydjadk cjà**

 $\label{eq:ck-Eg.kyk} $$ ck- Eg.kyk]^^vkjackck] nokph djik gk;] Eg.kwu , o<h yxdjavkiY; k?kjkr gfrh-** eyk okVk; pjj ^no blukdkj.kp vkeP; k vkb&ck- oj , o<h djik dk cjadjr vI rhy* $$$

 $\begin{tabular}{ll} \hline $Vkbiph$ Vku psyrhph $dBY;$ k uk $dBY;$ k $dkj.kko: u ?kjkr $Vkf.k.jkukr I kj. $kh I

ukuk cki nyk , dnk Eg.kkyk]^^, rnG'kk] rnyk dlMhph \lor Ddy gk; dk\ fgFkaekb; k 'kst kjh j kgk.; kpk yk; dhpk gk; dk rnk**

 $\label{eq:ckiwEg.kyk]^^vkjsvakG} $$ckiwEg.kyk]^^vkjsvakG^; k] $$ ehch fpekth $vklikP$; kikMpkp gk;] $$r$ p; krjx $vlyh$ rj $QMa; hc?kwr$p; krfdrhjx gk; rh** $$$

ukuk Qlyla vkyk vu nkiskkoph [kj ks[kj p Hkkli.ka l e# >kyh] >kock>koch l e# >kyh-cki w ukukyk rkcinhuatkl r gnrk-ij ukukuacki npamt0; k gkrkpae/kyackt/rklikr /k#u], o<; k tkj kr pkok ?kryk ch v{kj'k% ckt/ fuEe rlyya vku ykocdGk; yk ykxya ckt/ke/kua v{kj'k% j DrkP; k /kkj k okgwykxY; k-cki w^vk; \cdots ! vk; \cdots ! ** Eg. kwu tkj kr ckocyyk] rjh ch ukukuacki npackt/rklikrua l kblya lgk; -xYyhrY; k ykockwuh Hkklil.ka l kbloyh-nknkch vkyk vku nkikkwuk f'k0; k nså ykxyk-

nknk ukukyk Eg.kyk]^^vkjacGh] rwekBk gyrk]ygku /kkdV; k Hkkokpk rjh bipkj djk; pk gyrk] R; kpackV rwpkÅu rkMwu Vkdyagkbil] rwHkko gk; dk Hkkokpk ojjh gkbil \ rgyk dk; vDdy&fcDdygk; dk ukg**

nknk cki nyk nok [kkU; kr f?kÅu xsyk vku cki N; k ckt/kyk Vkda?kkynu błykt dsyk-

HkkiM.kkikI uacki wvku ukukpaeqkqi &I kikI kj [kadk; epaojiRo fuekZk >kyagqra rsnk9ka, deodkpad/khp pkaxyafparr u0grs ckiwR; kpk fo″k; dBpp d/kh dk<k; pk Ugk; - ^ckiwu ukuki (kktklr tehu feGoyh gqrh-ckiwyk /kM/kkdV y; ikjagqrh-rsdnkfpr ukukyk c?kor uI koa* vI a xYyhrY; k ykolkuk okVk; pa

I kGar ekruji x#th ykoda ukukpa, oduu eyk foll ukcjkoj d/khp [kGw | k; psukghrukuk Hkkxoryk y; xkM cksyk; pk vu I kaxk; pk]^rFqgh nk 2 kafeGw cI k] feGw vH; kI djk] i ki V $_{7}$ kyk rpP; kcjkoj vH; kI kyk 2 kar tk 2 udk] rsyaxMay; dMwgk; ! R; kpsvkb 2 cki ch y; dMwgk 2 F 2 **

ij ukukP; k | kax.; kpk ifj.kke Hkkxor o fal ukoj tkLrh d/kh >kykp Ugk; - rl k | kHkko Hkkxori{kk fal ukpk Qkj pkaxyk grk-rksdmh dmh R; kP; k vkb&ck-yk u dGrk eyk ckyk; pk-R; kP; k lkkÅ e/kyk [kkÅ eyk | k; pk-

ij R; kph vu ek>h thou'kSyh i wkī .ksfHkUu grph- rksl kGk d/khp cMok; pk Ugk; - Ekh ?kjP; k dkekerGa vkBM; kruanku&rhu fnol l kGk cMok; pkp- rksl Whr d/khp xjjajk[kk; pk Ugk; -Ekh ekrij l Whr ckj geskk Eg\$l jk[kk; pks R; kyk ?kjkryh dkeadkghp djkoh ykxr uûgrh- eyk ekriji ?kjkryh I xGh dkeadjkoh ykxr grph- Ekh vkMkyk i k.kh vk.kkyk tk; kpk] ij fdI uk d/khch vkMkyk i k.kh vk.kkyk; k; pk Ugkbł eh ckj geśkk ygku ysdjkph ckGrph /kpk; pks fdI ukoj d/kh ckGrph /kpk; ph i kGh vkyhp ukgh-

Hkkxor vkf.k ek>h gh thou'k§yh r'kh fHkUup grph- HkkxorP; k?kjh c§y ckjnkuk o brj tukojauûgrh R; kenGa R; kP; koj d/kh xjjajk[kk; ph i kGh; sr uûgrh- rksch d/kh vkMkyk i k.kh Hkjk; pk ukgh- eh I xGh dkeaerpkV; k djhr grpks ij, d dke eyk ekrnj vftckr d# okVr uûgra rh Egats ckjD; k i kjkph 'kh- dsysyh ckGrph /kqka xYyhr ekb; k o; kP; k dlBY; k ch i kjkyk ckjD; k i kjkph ckGrph /krpY; ki kBoyatk; paukgh i jarqekb; k vkthu] fttkbusrsdke ekb; koj dk; epayknyagra ckGrph /krpY; kf'kok; d/khp tok; yk rh | k; ph Ugk; -

 $fttkbP; k\ cksy.; kr\ vkf.k\ dirhe/;\ sFkkkklk k\ Qj\ d\ grk-\ cksyrkuk\ ek>aekb;\ k\ ukroklkoj\ y;\ iegk;\ vl\ ank[kok;\ ph-\ dirh\ ek=;\ sxGh\ vl\ k;\ ph-\ l\ xGh\ ?kk.k\ dkeaeyk\ djk;\ yk\ ykok;\ ph-cki\ n;\ k\ ek?kkjh\ vkeP;\ koj\ ng'kr\ cl\ ok;\ ph-\ nhM&nksu\ o''kk\ yk\ vkeP;\ k\ ?kjkr\ i\ kG.kk\ gkyrp\ grk-R;\ k\ ek\ Gao''kk\ rysl\ kr\ vkB\ efgusrjh\ fttkb\ vkeP;\ k\ p\ ?kjkr\ jkgk;\ php-\ ckHk\ Gxkoyk\ eh\ tok\ l\ vhr\ tkr\ vl\ g\ rok\ rh\ eyk\ i\ kV\ Hk\#u\ dakhp\ tsw?kkyk;\ ph\ Ugk;\ -\ eh\ ugeh\ ckgg\ pyr\ ekekP;\ k\ ?kjh\ fdbk\ eG;\ kr\ tsk;\ pks$

eh vkthP; k ?kjh d/kh tok; yk xsyk] rj eyk f'kG&ikda okMk; ph vu o#u Eg.kk; ph]^ckck] rwtok; yk; rwdk Ugk; ekfgr ul Y; keGaEkh dk; p dsyaUgk;] FkkMaf'kGagk; [kkrwdk** eh rs[kk; pk] c&; kp oGk rh eyk f'kGarqMarkdkr fHktow [kkÅ ?kkyk; ph] fttkbpk vl yk LoHkko vl Y; keGaeh vktkGh vl rkuk frP; kdMad/khp tkLrjkgk; pksUgk; -ckgjp psyr ekekP; k ?kjh jkgk; pks fdok l Whr c&; kp oGk l qkbP; k xkoh jkgk; pks fttkbyk ugeh ugeh boGk; ph [kkM Qkj gqrh-rh ugeh Eg.kk; ph]^^ekb; kdMadkghp Ugk; -** ngk , djkpamRiUu rh , dVhp [kk; kph] ij ekb; kdMadkghp Ugk; Eg.kk; ph] rsugeh vedk rl k Eg.kyk] redk rl k Eg.kyk vl augeh jMxk.kaekb; ki qs2kkyk; ph-

vkEgh frijh i ki gksåu pk6khr xsyks; ko″kh2∨kEgkyk f′kdok; yk nLrnj [kmpn gMekLrj fHk-dw pki Msgyrs pk6khpk ox2e/; sgyrk-, dk cktnyk ndjh vkf.k, dk cktnyk frijh-pki MsgMekLrj Qkjp dMd gyrs I kGk I e# Ogk; P; k ∨xknj pki Ms xe#th ∨kEgkyk g\$r Eg.kY; koj ∨kEgh Qkj?kkcjyngyrw

twe/; slkR; {k 'kkGk | # >kyh vku vkB i ákjk fnol >kyarok vkeP; k y{kkr vkya dh] pki Msx#th tp<sdMd f'kLrh psvkgr- rp<p rsenwvir%dj.kkpsvkgr- xkj xjhckcnny R; kB; k vr%dj.kkr Qkj lkæ gra rsf'kdok; psQkj pkaxys f'kdorkuk R; kuh Hkki V i l kjk d/kh ekMyk ukgh-vfr'k; 'kkWdVusf'kdok; ps R; kpaf'kdoysyapkaxyay{kkr jgk; pa dmh dmh oxkir rsvkEqkyk #Gkuaekjk; pj rsugeh dkekr eXu vl k; pj vkEqkyk oxkir cl k; pk ckdMaqrh]

vkeP; k oxkir I okir gqkkj I ki ku xoGh ukokpk i kj xk gqrk-rksugeh vkeph xf.krao 'kqny{[ku rikl k; pk-Hkkxor] d™.knp] foëy Vqysvku eh , dk ckdM; koj cI k; pks vkeP; k oxkir tkLr o; kphgh eqyagqrh-rh eqya/kkrkj ?kkywu I kGayk ; k; ph-R; kauk nk<h] fe'kk vkyy'; k gR; k-rs e/; p 'kkGk I kMy; keQa fdøk ukikI >kY; keQa vkeP; k oxkir f'kdr gqrs R; kauk ckykoeu vk.k.; kpadke vkeP; kdMagqra

vkep; k xYyhryk i kMk ukokpk , d fo | kFkhl v l kp o; >kysyk grpk- nnj jk pkhlkljkpk fxMMk jkek rkgh v l kp o; >kysyk grpk- pk5khr vkY; ki kl uavkEgh 'kkGk deh chlok; pks ?kjkrhy ek.kl a 'kkGk chlo vku Egl j koj tk Eg.kk; ph] i j Ekh l kGk chlok; pks Ugk; - fHk-dw pki MæGa vkep; k okx.; kr] cky.; kr] j kg.khekukr fu; feri .kk; Å ykxyk grpk- Vki fVi] LoPNrk gsxqkgh vkeP; kr fHk-dw pki MæGp; Å ykxysgrps ek>k ptyrHkkÅ d".knp ?kjkr >kMykt/ djhr grpk- rs pki Msx#thp; k i HkkokeGp- eh l nnk ek>h og; k i nndauhV di kVkr fBok; yk ykxyw x#thpa c?kw di MsLoPN okij.; kpk i i; Ru d# ykxyw l kc.k ykowykxyw l kc.k d/kh oGpj feGk; pallgk; i j fgdMw frdMw i s stGok tGoh d#u l kc.k vk.kwykxyw Lor%ph dki MaLor% /kpwykxyw jkst vakG d# ykxyw x#th i fgY; k rkl kyk dqkh dqkh vakG dsyh\ dqkh dqkh nkr ?kkl ys\ dqkh dqkh l Mkl yk tkÅu vkys\ rslkr; clkyk mHkk d#u bpkjk; pj R; kenGavkEgkyk [kjacksykoaykxr grpa [kkVacksyyarj x#th oG[kk; pj [kkVacksy.kij kyk rsl et | k; pj gkrkph i k; kph u [karsLor% ri kl k; pj vku rsykpdkukuaLor% dk-k; pj MkD; koj i kajh Vki h rs?kkykyk ykokps [kkdh pMMh] i kajk 'kVZ pk5khr vkY; ki kl ua vkEgh ?kkyr grps o; >kyY; k i kj kuk QdLr /kkrja?kkyk; yk i jokuxh grh- x#th oxkir ejkBk] ds jh] l ekpkj] l pkj b- i sij vk.kk; pj vkf.k okpk; ps R; kit; k eGavkEgkykch i sij okpk; ph l o; ykxyh-

rsi i jkryaokpk; psvkf.k vkEgkyk i i jkryh ekfgrh I kakkps^i kjkuljvkrk phu Hkkjr; «(n I # vkg) phuusHkkjrkyk Qkj ekßk /kkalk fnysyk vkg) phu Hkkjr Hkkbl Hkkbl Eg.kwu phuus Hkkjrkpk fo'okl ?kkr dsyk vkg) i Mhr tokgjyky ug#; kwh phupsi ri l/kku pkS, u yk; ; k0; koj fo'okl Vkdyk] R; k0; kcjkcj e\$h dsyh i jrqR; kwh ug#wk xkM cksyw Hkkjrkpk fo'okl ?kkr dsyk** jkst l k8; kyk yksdacRrhP; k Mksck[kkyh ter \lor l r-cRrhpk Mksc Egath T; k [kksckoj xW cRrh ykoyh tk; ph R; kyk cRrhpk Mksc EgVyatk; pa xYyksvYyh \lor l sMksc \lor l k; ps xYyhryh yksd jkst jkrP; kyk \lor 'kk Mksck[kkyh cl w xlik ekjk; ps teyY; k yksdkauk dqkkykp fygkyk&ok; pkyk ; k; pallgk; -

vkeP; k e/kY; k pgyR; kyk ukukyk phu& Hkkjr; qnkP; k ckrEkh, sdk; ph Qkj vkoM gqrh-dqkhrjh i sij vk.kysyk vI k; pk- ex eyk /k#u vk.kyatk; pā vku rks i sij ok; pkyk ykoyk tk; pk- phu Hkkjr; qnkP; k ckrEkh, sd.; kI kBh yksdkph frFkaxnhZ 0gk; ph- Ekh ckrEkh okpuu nk[kok; pks] i j eyk R; kryk vFkZdGk; pk Ugk; - eh QdLr okpk; pks frFkateysyh 'krdjh ek.kI a /; ku nsÅu, sdk; ph-

vkEgkyk vkeps x#th phu&Hkkjr; qinkl cakh oxkir oGkoGh ekfgrh |k; ps xkokxkoke/kwu vQokgh Qkj i I jY; k gq; k- 'krdjh ykad ?kkcj ysgqrs nq &; k egk; qinkr T; k lkek.ka telu I 0; kyk ukekgje dj.; kI kBh jf'k; u I 0; kwuh R; k0; k Hkqi ns kkr fofgjhe/kwu] rykoke/kwu o u |ke/kwu fo"k fel Gysgqrs R; keqGsyk[kksI sud rs i k.kh fi Åu eysgqrs r'kkp i jdkjsvkep; k xkokrl qink dkqph vQok mBr gq; k-fpuh I sud xfeuh dk0; kpk; qin uhrhpk voyoc djhr vkgsr-gs fpuh I sud xqri .ksHkkjrkr; srkr vkf.k vucd xkok0; k i k.kh i joBk gqkk&; k fgjhr fo"k fel Grkr-R; keqGsegkjk"Vkrhy [kkN; kirhy yksdatke ?kkcjyh gqrh-jkrP; kyk yksda, dVanqdVafQjk; phukghr-xkokr I eqgkuacl wu; qin okrkoj ppk2djk; ph-vkeP; k xYyhrl qink th ppk2pkywgqrh-rh ppk2eh/; ku fnÅu, sdk; pks

, d 'krdjh Eg.kyk]^^ \vee ki yk i jkHko >kyk rj gsfpuh ykd xkokxkoh ; sÅu \vee ki yh ?kjj \vee ki Y; k ftehuh] \vee ki Y; k ck; k] \vee ki ya I kua uk.ka rkC; kr ?krkr \vee ku rs \vee ki .kkyk R; kB; k gkrk[kkyh \times gykekI kj [kaokxorkr**

nd jk'krdjh Eg.kkyk]^^ \lor l afpuh ykdkuh \lor ud ns kkr?kd w dsy; Eg.k** frl jk Eg.kkyk]^^ Egkrk&; k ek.kl kpadk; djrr**

ifgyk Eg.kkyk]^^ Egkrk&; k ek.kl kpk R; kauk dk; ch mi; ksz ul rksEg.kau rsR; kauk xkG; k ek#u Bkj ekjrr**

 $\forall l \ a \ Eg. kY; \ koj' \ kst kj \ i \ kt kj ph \ Egkrkjh \ ek. kl \ agkcdnu \ tk; \ kph \ vu \ jkr Hkj > ksi k; ph \ Ugkbir] \ dkGth \ djr \ cl k; ph- \ dkgh \ urseMGh \ xkokr pkidk & pkidkr \ Vkak \ mHkk \ d#u \ ekbidoj \ Hkk"k. kadjk; ph] R; k \ dkGkr \ i = dkj \ i Hkkdj \ i Mr \ phu \ Hkkjr ; \ (nkph \ cjhp \ ekfgrh \ l kar \ vl \ r- xkokps \ ekth \ uxjk/; {k \ vm- nknkl kgc < oGl \ dj \ vkeP; kp \ xYyhr j kgkr \ grps R; kapk \ i \ r.; k j ke \ vkeP; k oxkir \ grk-$

 $\label{eq:likelihood} $$I$$ kig of dy I$$ kig 'krdjh ykdk#; kig aHkk"k.k|k; ps vu I$$ kak; pg^^vQokopj fo'okI B$^audk] vkiyal 0; ijkdeh vkgg rsI 0; Hkkjrkph bop bop Hkoeh y<ohr vkgr]; ([nkI kBh$

enr djk-l 0; kr Hkjrh 0gk] enr Eg.kw nskkyk i S s | k] /kkU; | k] vki yk nsk Loræ v I sy rjp vki.k Loræ jkgw'kdrkg i kjræ; kr vki.k 150 o"kð txykg fcb/h'khuh vki.kkyk ykfyð vkEgkyk dækky d#u Vkdyð vkrk gsfpuh ykd vki Y; k nskkr ?kwl w vki yk nsk rkC; kr ?ksÅ bfPNrkr-i.k vki yð 0; 'kwj vkgs R; kwuk rsdnkfigh te.kkj ukgh**

R; kupaHkk"k.k , schu ekb; k eukrgh i ji .kk fuekZk 0gk; ph] \sqrt{k} .k \sqrt{k} i u I 0; kr y < k; yk tkoavI aokVk; pa i j Ekh ygku grjl eyk I 0; kr dksk ?kskkj gkgh i t u grkp-

HKX ohl

b; Rrk 5 ohyk f'kdk; yk vkEgh xkokr e/; orhZfBdk.kh vkyw xkokP; k e/; orhZ Hkkxkr , d tiqus Flavij gijns R; k Flavijkin vkepli nikoj ujej i kliGk Hkjik; pli- gs Flavij xkokin eqiyti/kij pladkin c.Mki ar atkis; kaosLVškuih nadku o MkHzkslikvs; kaok tauk noklikkuk; kP; k e/kau vkr., dk ckG tkr qura R; k ckGke/kuu igssxsysdh], d ipM ekBsi^m, kpsxkMkÅu Vkba FkVj qura R; k fFk, Vjkps ckdkdke nxMh gyrs oj nkblgh cktiusmrjrsi =sgyrs ; k Fks VjP; k e/kh , d mHkh fHbar ckdkw ; kpsnku Hkkx i kMysgrrs; k nksu Hkkxkr oxZvkM0; k fHkrh?kkyru r; kj dsysgrrs; k FkVjkpscridax vkMQI th gyrafrFkaqMekLrjpavkMQI gyra 5 oh rs6 ohpsnku&nku ox2gyrs vkf.k 7 ohpk , d ox2gyrk- o 1 yh rs4 Fkh ps1&1 ox/ggrs Fkb/jkP; k if' pe cktnyk 5 rs7 psox/Hkj r ggrso 1 rs4 ox/lip/lcktnyk Hkj r grs vkepk 5 oh v pk ox21 ua [kksyhr Hkir grk-ri 5 c pk ox22 ua [kksyhr Hkir grk- 5 oh v e/; h xYvhrvk eh , dVkp girks ri 5 oh c e/; sd".kmp o Hkkxor girsxYvhrvh I xGh i ki a5 c e/; sqrh- 5 v e/; sckEq.k o brj mPp of.k? kph i kgaqrh- eh , dVkp mPp tkrhP; k i kgkB; k oxkr vkMdywgrks eyk ek÷; k xYyhrY; k ikijkB; k oxkIr tk; psgrs ijrggMekLrjuh ijokuxh fnyh ukgh- eh Qkj n&Fkh qksÅu mPp of.kt, ikjkB; k oxktr cl r grks vkeP; k oxktr gøkkj&gøkkj ikjagrhoxkir oDrRo Li/kir Hkkx ?; kokl k okVsijirgek>h Hkk"kk Qkjp xkE; grh- eyk xkE; Hkk"kr cksyk; yk ybłykt okVk; ph. FktyjkP; k MkO; k vakkyk yckGdk OgjkMk] ekadGh tkxk arh.; k ekadG; k tkxB; k¼QqjkM; kP; k½ i yhaMsmp fHkrh qB; k- R; k ekadG; k tkxr c&; kp oGk oDrRo] xk; u] Li/kk20gk; P; k] dákh dákh brj I kladfhd dk; blegh frFkp 0gk; ps

; kp ekdG; k tkxr, dnk vkepsxkopsfeyVhe/khy dWu pandkr tk/ko; kpsHkkrk.k >kysgrs R; kauk 62 P; k; \mathfrak{q} -kkr; \mathfrak{q} nd \mathfrak{h} h Eg.kau fpU; kauh i dMysgrso urij nksu nskkpk djkj >kyk-R; kr; \mathfrak{q} n d \mathfrak{h} h I kMys dWu tk/koksuh; \mathfrak{q} nd \mathfrak{h} h VI rkuk dk; dk; ; kruk Hkksk0; k ykxY; k rsvki Y; k Hkkrk.kr R; kuh I foLrj I kfxrysrseyk Qkj vkoMys

vkeph 'kkGk cktkjiBrp grh- 'kkGrwu ckgj vkyadh ejjyh/kj pk&d grk-R; k pk&dkyk xoG; pkikj vI gh ykd Eg.kk; ps; kp pk&dkrwu mt0; k cktwyk vkMr cktkj grk-e/; se&ku grs o nk&gh cktwyk vkMrh g&; k-R; kr xqtjkph vkMr] ekjokM; kph vkMr] Mksktdjkph vkMr] dkEkkG; kph vkMr] gk&ukG; kph vkMr v'kk vud vkMrh g&; k-e/kY; k e&kukr c\$yxkM; k] NdMh I kMysyh vI k; ph-vMrhP; k , dk cktwyk ejjyh/kj pk&d rj nq &; k cktwyk eMbZgrh-; kp eMbP; k Q&aEkh i fgY; kmkp xfnekpsxhrjkek; .k , dyagra vkepsxkopsxk; d i ½gkn f'kms; kphgh xk.kh; kp e&hbZI eyj fdrh rjh oGk , dyh grh-ekB ekB; k i &k&; kB; k o ea=; kP; k I Hkk vkMrhP; k; kp e&hkukrp gr g&; k-vdywtP; k 'kdjko ek&gr&i kVykph Hkk"k.ka eh fgFkp , dyh-jktk eaGos:djkpa0; k[; ku fgFkp , dys R; koGpsegkjk"Vkpseq[; ea=h ol rjko ukbd ; kph I Hkkgh

; kp elikukoj >kysyh grph-cktryk , d rší; kph fofgj gkrh-rh fofgj 1942 l kyh ckilkyh grphol irnknk tligk Hkrehxr grpsrligk R; kuh ; k fofgj hpsake Kkukick fíkmallmu ?kryso rsi wklasysgrps

vkeP; k oxklyk baxth f'kdok; yk jatuk xnselle gli; k-5 oh P; k oxklir i pok?k] 'karuuq dayd.kh] vfuy i kV.kdj] I (juy rkjki (ji) e/kqdayd.kh] ger glplyxkGdj gh egyamPp of.kl; kph grh o vH; kI krgh gqikkj grh-R; kposi kyd ekB ekB; k gql koj dke djhr grs vfuy i kV.kdjps ofMy I kaxyh clibbr ellustj grs rj 'karuqdayd.khpsofMy vclu clibbpsellustj grs i pok?kpsofMy i pk; r I ferhr ch Mh vksgrs ger glplyxkGdjpsofMy I jdkjh nok[kkU; kr tukoj kpsMkDVj grr] e/kqdayd.khpsofMy rgl hye/; h grs I (juy rkji ji psofMy i kfyl grs

eh , d vfr'k; vklikk kho fuj {kj cki kpk egyxk grpls ek÷; k vakkoj LoPN dki Mauûgrh-MkD; koj vkdkj ul ysyh eGysyh i ka; jhp i jarqdkGhHkkgi fnl .kkjh Vki h vl k; ph- oxkirhy ckdhph egyaLoPN o pkaxyh dki Ma?kkywu; k; ph- R; ke@aeh; k mPpofx?, egykl egi /khVi .kscksyk; pksukgh-R; ki?; k'kh cksyrkuk ek÷; k eukr U; wuxii fuekZk ûgk; pk- oxkir cip fdøk ckdMh uûgrh- ekriji oxkir dkick dsysyk grpk- vkEgh vkeps Nkbyl scLdj Vkdwu tehuhoj cl k; pks; k l xG; k oxkiry; k fHkirhuk o tehuhyk usjehp oykok fuek.ki>kysyk vl k; pk-

5 oh P; k oxkir ek÷; kc: cjph f'kdr vI ysyh esys xYyhrhy u0grh- R; kenGa eyk oxkir, dVa, dVay; okVk; ps Eg.kw eh 'kkGk Qkj cNlok; pks

; kp dkGkr eh eaxly; kikl w 7&8 fd-eh-nyi vlyly; k vkeP; k 'krkr lokhP; k Vk; ekyk ofMykcjkcj, d efguk 'kkGk clyloop jkfgywgrks 'krkrp [kki ?kkywu eh] cki wvkf.k , d 'kr jk[kk; kyk Boysyk xMh vlsvkEgh fr?k R; k jkukr jkgr grks 'kr jk[k; yk fBoysyk xMh rhu nxMkP; k pwyhoj R; kpk Lor%pk l skd cufor grk-ek>ao cki poato.k xkok dMw; k; pa nksu&nksu] rhu&rhu fnol kpsf'kGsto.k vkEgh [kk; pks dakh Lor%cki wtkÅu to.k vk.khr vls dakh pwyrs 'krkyk; rkuk to.k vk.khr grs vkepa'kr 10 , dj o nksu pwyR; kps20 , dj vla30 , dj 'kr , dyxrp grs njo"khZ; k 'krkr ekygh Hkji ij Ogk; pk-

'ksrkr jkrP; kyk >ki yadh] 'kstkjP; k HkkysokMhP; k i kVykP; k 'ksrkr , d ; Maek.kwl jkrHkj ojMk; pad/khjMk; pad/khxk.kh Eg.kk; paeykR; k; M; kphy; HkhrhokVk; ph-

, d fnl h cki w xkookdMa xsyk- j krP; kyk ek>k o Egkrkjk xMh] fc: ekekpkp 'krkr eDpdke grpk- fc: ekekua'krkryp doG&doGankMdarkMuu vk.kyao HkxW; kr nkMD; kpsdkyo.k cuoya

vkEgh nk%k cl w l k%; kyk 7 oktrk tø.k døya ek÷; k Hkkdjh l dkGP; kp xkokdMua vky%; k g%; k-fc: ekekusdkyo.k pkæyacuoyagra i j fc: ekek 'krkr j kgr v l Y; kerGaefguk

efguk \vee âknG djk; pk UgkbZo nkr ch ?kkl k; pk UgkbZ R; kP; k \vee ackpk okl ; k; pk- eh ybZd: u R; kP; kI uannip cl r grks

fc: ekekusjk=h >ki rkuk l kôrkpagkr: .k ftFkaVkdyi R; ki l uaek>agkr: .k eh FkkMa nijp Vkdya Hkorkyh mp&mp tqlkG; kph rkVamHkh grh- R; k mip tqlkG; krp vkEgh vkeph l kôrkph [kki ?kryh grh- I eij FkkMh ekidGh tkxk grh- R; k ekidG; k tkxrp fc: ekekph rhu nxMkph piy grh- R; k piyhp; k dMyk gijMk [kk.; kl kBh , d vkdVh i kMysyh grh- I dkG&l ki; kyk cki wR; k vkdVhr xo&; k?kkyw vkj djk; pk o R; k vkjkoj tqlkG; kph fgjoh d.kl sHkktk; pk o rh Hkktysyh d.kl agkrkuapkGw gijMk i kMk; pk- rkp xje xje gijMk eh ehBk c: cj o pV.khcjkcj [kk; pks jkrp; kyk R; kp vkdVhr tkG d: u m'khjkjkrp; kyk o I dkGh vkEgh 'kkdk; pks R; k fnoI h eh o fc: ekekuavkdVhr 'kidkVhr; kj dsyh- vkEgh m'khjkjk=h R; k 'kidkVhp; k Hkkorkyh frFka'kidkVhp; k dMayk rki r cl ywfc: ekek Hkurkp; k jktkp; k] jk.khp; k xks'Vh I kak; pk-

R; k fnl h fc: ekekuaemnnke Hkurkph xksV l kūxryh- eh Okjp ?kkcjyw eh 'kodkVhP; k , dk cktwyk gkr: u Vkdya vkdk'kkr pmz cjkpl k oj vkysyk gwrk- rksfnol i ks.kepk fdøk i ks.kep; k , d nksu fnol v?kknjpk fnol vl kokdkj.k pkm.k fViji i Myagwra vktwcktwpal i LV fnl r gwra fdrh oG >kyk vkEgkyk dkøgh dGr u0gra i jargjk=hpsvdjk&l kMsvdjk oktyavl koar vl aokVra

 $> k i \ r k u k \ fc: \ e k e k u a \ e y k \ I \ k i x r y \ a \ i k i V] \ gh \ d k B h \ r \ f g P; \ k \ to G \ ?; \ k - e k > ; \ k d M a n (i j h , d \ d k B h \ g k r P; \ k y k \ d k B h \ g k r : . k k \ to G \ V I \ k o h - d k; \ V k y a f d o k \ d k; \ fn I \ y a r j i \ f g Y; \ k m k \ g k r k r \ d k B h \ ?; \ k; \ p h o \ e y k \ g k d \ e k j k; \ p h - e h \ c j a E g . k y u V k u \ > k i \ y u$

VkEgh nk8kgh >ki h xsyks fc: ekek ?kks ykxyk- eykgh xMn >ki ykxyh- ek>h, d [kPpw >kW >kV; koj] ckth; k tqkG; krw dI ykrjh vkokt; så ykxyk- eh R; k vkoktkua?kkc: u tkxk >kyw uædk Vkbæ dk; >kyk\ dkghp dGr uûgra i jarq>ki rkuk pmxmxorhyk nksu dkI ja oj gnpk- vkrk cf?kryarj pmzekoGrhyk nksu dkI jadyysyk gnpk- vtol pmkpk i dk'k c&; ki idh gnpk- vktocktnyk tqkGankV gnpa rsnkV tqkG cktnyk I k: u okV dk<r dk<r dksk rjh vkeP; kdMa toG toG; r gnpa ex rstukoj vI wfdok ek.ku vI w R; kjkukr ykbNX; kpk okoj ybip vI rij gs eh usgeh ekB; k ek.kl kP; k cky.; krw c&; kpoGk , dyagnpa R; ke@scgnpd: u ykbNxkp vI kok vI aokVya vu cktnoh dkBh gkrkr ?kryh- eh tke ?kkcj ywgnpks dkBh gkrkr ?kryh gnph i jarqgkrkyk ?kkc: u njn: u ?kke vkyk gnpk- R; ke@gagkrkrw dkBh?kI j rsdh dk; vI h Hkhrh okVr gnph- Nkrhr /km/kM gkaå ykxyagnpa ^fc: ekek! fc: ekek!!* Eg.kw eh gkd ekjyh] rjhgh fc: ekek tkxkp gkr uûgrk-

 $\label{eq:ro-poly} $$ro<; kr t(kG; kruu ; skkja dkskrjh QkjtoG ; Å ykxya vu dkugh \{k.kkr , dtkuktini f/klikini dkGkdivi ukxoa ek.kin T; kP; k MkD; koj Vki Y; kl kj [kadi ok<ysys girars] $$$

ek÷; k gkr: .kkP; k cktnyk; sÅu mHkk j kfgya ek>h ckcMh oGwykxyh grph- ek÷; k rkmkruu 'kCn ckghj; r u0grk- rh ukxoh fn1 .kkjh ekuoh vkdrh gh ek.kl kph u1 w Hkrkphp v1 koh] v1 h ek>kh [kk=h > kyh- cj kp oG rh vkdrh ek÷; k cktnyk mHkh j kgnu fgdMnkfrdMsi kgkr grph- ek>aQDr MkGs m?kMagra I oZgkypky ?kkc: u Fkmkoyh grph- vax xkj i Myagra R; k vkdrhdMsc?k.; k f'kok; eh dkghp d: 'kdr u0grw gkrkryh dkBh ?kkc: u dokp ek÷; k gkruu xGw i Myh grph- gkrkyk i k; kyk vaxkyk njn: u ?kke vkyk grpk- >ki rkuk fc: ekekuaHkrkphp xksV I klixryh grph- R; kerGa eh R; k vkdrhdMsi kgw yb??kkcj r grpks

eyk rh vkdirh Eg.kyh] ß, \cdots ! , \cdots !! ÅB dh] eyk , I y R; ky nhdh- , \cdots ! , \cdots !! ÅBdh- eyk , I y R; ky nhdh-Þ

eyk dkoghp dGsuk gh vkdrh, o<; kjkrP; kyk, lsy rsy dk ekxrh gk; \cjkp oG rh vkdrh eyk, lsy rsy ekxr grh- eh tkxo: u vftckr gkypky djhr u0grw >ksipal kax?ksåu esy; kokuh i Mywgrks FkkkM; k oGkuarh ukxoh vkdrh tkj tkjkr oj Mwu, lsy rsy ekxwykxyh-R; kyk R; ky feGr UgkbZEgVy; kurj] rh vkdrh tkj tkjkr vkj Mwykxyh-Fk; k&Fk; k ukpwykxyhygku ysdjkl kj [kavkbJ ragVV djrkuk ysd: tehuhoj ik; vkiVr] rlaik; rsvkiVwykxya oj Mwu tehuhoj tkjkr ik; vknGw]vknGw rsy ekxwykxya

R; k \lor koktkuafc: ekek tkxk >kyk o tkxk >kY; kc: cj gkrkr dkBh ?ks^Au mBrkuk Eg.kkyk] Bre; k \lor kbiyk----ykoyk\ fgFkad'kkyk ckcyk; yk \lor kyk; \ \lor kEgkyk dk; >ki wnrwdk ukgh\P Eg.kw mBw rksR; kyk dkBhuaekj.kkj] brD; kr rh \lor kd'rh^[kW- & [kW- * f[knGr o fpjdr takG; kr i Gw xsyh-

fc: ekek Eg.kyk] Brsu0gadk 'kstkj pai kVykpa; Magk; -Þ

ikVykpa; MaEg.kY; koj ek÷; k MkD; kridk'k i Myk o eh ?kkcjk; pksFkkcyw i fgY; kmkp eyk rs; Magk; okVyavI rarj eh fcYdøy ?kkcjywuI rw , [kn÷ koGh R; kyk eh dkBhuan.kdkgh fnyk vI rk-ij eyk ek.kw gk; dk Hkwrgk; dkøph dGruûgra

ehfc: ekekyk Eg.ky] Brh ugehp fgFkar@gP; kdMa; radk; \P

fc: ekek] ß Og; ! ugehpa; ra] rh; Mavl plxG; kjkukrjkrHkj fQjra \Þ

eh] Bex rs, I sy rsy d'kkyk ekxra \Þ]

fc: ekek] BR; kP; k MkD; kr mok] fydk] dkMk Qkj >kY; kyk gk; - R; ksdkMk R; kyk jkrHkj >ki ; A nr UgkbZP; A y R; ky ykoyarj Mkda[ktok; patjk deh ; A nr UgkbZP; A y R; ky ykoyarj Mkda[ktok; patjk deh ; A nr UgkbZP; A y R; ky ykojkr fQjr; - gs; MavIY; keGaásyk oG dkG dk; p dGr ukgh-fnol k >kMk[kkyh >ki ra vujkrP; kyk ojMra] jMra fdøk; A y R; ky ekxr fQjra]P

eh] Bex fc: ekek] rsy rfight; d sy R; kyk FkkMansr tkok-Þ

fc: ekek] $B \lor k$ jckck! eh dkyo.kkl kBh FkkMackVyhr R; ky \lor k.kwu fBor \lor l rw , d fno'kh eh ásyk dkyo.kkl kBh fBoysya; s sy R; ky MkD; kyk ykokyk fnyð ij FkkMafnÅu ásyk I ek/kku gr ukgh\ ckVyh I á hi rý I kj [kaekxrð p- , dnk dk ásyk R; ky fnyðrj gh ; Majkstp fuEE; kjkrP; kyk ekxk; yk ; sÅu ek>h > kW ekM djhy\Þ

eh] Bex ekek] gsukaxo dk cjafQjra, \ ásyk dki Maukghr dk**

fc: ekek] P dki Mavakkoj fBora dBA QkMuu fpj x Wad: u Vkdra - P

xlik ekjrekjr∨kEghi**l**dgk >k**i**h x**s**yks

nq &; k fno'kh I dkGh cki wxkokdMuaHkkdjh dkyo.k?ksÅu cSyxkMhr vkyk-

vkY; kc: cj cki wEg.kyk] ßi ki V] ryyk v t wd, d HkkÅ >kyk; -Þ, o kys ek÷; kl fgr vkEgh l gkt.k >kyw ek>k l gkok HkkÅ dl k v l hy* i kg.; kl kBh eh mrkohG >kywgnrks

ckinyk I klixryaeh vktpk fnol xkokdMatkÅu ; srw ckinph gks;] ukgh i jokuxhph okVgh eh u i kgkrk 'ksrkP; k ckghj i Myw

 $gs \lor keps'kr \lor fr'k; \lor kMoG.kh o \lor kMokVyk \lor kgs e kMokWh&Hkky o kWh dP; k c SyxkMh o kVoj gs'kr \lor kgs ák 'krkruu Hkky o kWh 1 & 2 fd-eh- \lor kgs c kg kGsj L kgh 1 & 2 fd-eh- \lor kgs \lor kEgh 'kD; r kscký kGsj L R; koj ua; k; pkso t k; pks; k c kj kGsj L R; ko: u e x Ma7 fd-eh- ∨ r j koj - ∨ kgs e h u ye h; r k & t kr k fd-eh- psn x M o kpr ∨ I s$

eh 7 fd-eh- i Grp , dk rkl kr xko xkBya ?kjh i kgpyw d/kh , dnk l gkok urplrkp tlleysyk HkkÅ i kgkok \vee l a>kyagkra

?kjkr xY; kc: cj vkbP; k l ekj cktoj >ki ysyaygku ckG cf?krya vu eyk vkun >kyk- vkbZyk Eg.kyNj BvkbI vkbI vkrk gk l gkok Hkko vkiY; k ?kjkr vkyk; - gkgh Hkko ekBk HkkX; oku vkgs cki wauqlrhp xYyhryh tkxk bZlr ?kryh; k- R; kyk fgl kj fnyk; - l qkh >kY; koj [kjnh gqkkj vkgs R; k tkxoj cki wEg.krw] ^vki.k ekBk okMk ckZkq k-* ^^[kjp vkb] vki.k R; k uohu tkxoj okMk ckZkk; pk dk\ ukukual ekj ckZkyk; vl kp-**

l qchl j kbZ > kY; kuarj ek \div ; k l gkO; k Hkkokpk ukedj.k fo/kh xqchi kMO; kP; k eggrkōj > kyk- R; kpauko egi yh/kj \lor l aBo.; kr \lor kys; kp l qekj kl cki quau0; k okM; kpackalkdke pkywdsya gqra

lokh >kyh- ek>h i kpohph i jh{kk >kyh- 'kkGyyk lokYh ykxyh- ,d fnol vkEgh egjyh/kjP; k nopkuktoG xkV; k [kGr gorks egjyh/kjpsnopku con gors ,d dkskrjh xYyhryk o; Ldj ek.kl nol &; ko; Ldj ek.kl kykEg.kkyk] ßrkrock roykdk; dGyadk\Þ

rkruck]Bd'kkcnny Egarw Kkuuck**

Kkunck]Þeh vkrk cktkjkrua; r gyrð ekjokMhodhykP; k nkjkr dkikkil P; k dk; blR; kiþh y; xnhlteyh gyrh- xnhldk teyh] Eg.kw eh frFlaFkkklaFkkcow pkbd'kh dsyh] rj , d dkikkl dk; blrklEg.kyk] Bnskkpsirilkku i Mhr tokgjyky ug: ; kps ggj | k jkxkuafu/ku >kya \ I xGk nsk n&[k I kxjkr cylkyk; Þ

rkarack] B \vee kjå \vee kjå okbM >kyadh jå fpU; kauh Hkkjrkoj \vee kdæ.k dsya; kpanfk[k R; kauk Okj ekBagara ijok I ksyki jiyk rs; såu xsys R; kos6h R; kapa Hkk"k.k , sd.kkjh ek.kl a Eg.kr garh] ^^ug: \vee krk ybZFkdys-cksy.; kr i fgY; kl kj[k tksk j kfgyk UgkbZ phuuaHkkjrkpk fo'okl ?kkr dY; ki I u i -ug: pk txkcnay o 'klarrs cnay Fkklikl k \vee kRefo'okl <GY; kl kj [k okVr gark-**

ykodkuk okVyach] \lor krk ug: uarj i ari /kkukph tckcnkjh; 'koarjko p0gk.kkoj; skkjug: uarj 2 uapsea=h; 'koarjkop gars phu&Hkkjr; ankr; 'koarjkokuh \lor ki Y; k dkekph pkakyhp pakapl nk[koyh garh-**

 $xYyhr nksu fnol vkrk ns kkpk i ari /kku dksk gkskkj \; koj Qkj tkjkr ppk/pkywgkrh; k ppir xYyhrys FkkkhQkj f'kdysyh nksu&rhu ek.kla, d=; k; ph- cRrhP; k Mksck [kkyh l kiP; kyk clk; ph- vkf.k ns kkcnny xlik ekjk; ph- l xGh vkMk.kh 'ksrdjh] i kjaR; kph ppk/, dr clk; ph-$

R; k fr?kki îdh Kkunck R; k nk9khuk Eg.kyk] Bnskkpsi $\,$ ari /kku 0gk; ph I $\,$ akh ; $\,$ koarj kokukp gk; !Þ

?kkMxsvkck Eg.kky} Bgsc?kk Kkurck]; 'koarjko pûgk.k gsljG o i kekf.kd ursgkbiriari/kku gks; kl kBh, d ?kjk.kavkf.k nn| jafgmh Hkkf″kd jkT; kryk vl .k] xjtpavl ra pûgk.kkdMsgh nkklgh o\$'k"VsUgkbir-Þ

 $n\phi kunkj \ ukx\phi kR; \ k \ Eg.kkyk] \ Bex \ ykycgknej 'kkL=hpa uko , d ?krya tkra-R; kR; kdMarjh \ dBa?kjk.; kpk okjlk gk; \ 'kkL=h \ link i kekf.kd \ vkf.k \ ljG \ ursgkbir-fjYoh vi?kkr >kyk] rj R; k vi?kkrkph \ laiwkZtckcnkjh \ Lor‰j ?ksÅu R; kuhjkthukek fnyk-ekfgr gk; uk**$

?kktMxxvkck] Bgs c?kk] \vee ki Y; k egkj k"Vlrhy ulk; kyk i ar i /kku i n feG. ka dfB. k gk; \backslash fnYyhoj mRrj i ns kpp op Lo gk; $\cdot \vee$ ki Y; k egkj k"Vh; u ykclkuk rs, o<aegRo ns Ugkb/ \backslash P

'kob/h vkck Eg.krr rl p >kya ug: uarj nskkpsiari/kku ykycgkneg 'kkL=hp >kys vkf.kxYyhrhy'kgk.; k ek.kl kB; k ppibj i Mnk i Myk-

HWx, dohl

nknkpk not &; k ck; dkpk Fkkgyk egyxk nxMwgk gjgtfujh grpk- rksvkeP; k vk..kkP; k o; kpk grpk- ygkui.kkil uaR; kyk vud Nm grps i Syokudh djhr grpk- nknkcjkcj dMcabidk; yk I kaxyh] I krkjk] QyV.k] doBsegadkG; fkstkr grpk- dMck Vide/; sur vI rkuk] R; kyk Vid pkyfo.; kph Egath Mik; Oghaxph y; vkoM fuekik >kyh grph- dakh dakh rksMk; OgjP; k cktnyk cl w LVsvjhax fQjok; pk-

x Y y hr R; k pankl r e M G g h e k B ag r a LoHkkoku a F k k hi k f n y n k j v l Y; k e G a H k ko d hr y h o H k ko d h P; k c k g h j p h i k j a n x M w H k k p h c k j g e ś k k tey y h v l k; p h x Y y hr] ? k y s i s d h e k f . k d] r p k j k e [v c k n k l] c k c k l k g c] g s R; k B; k o; k p s f e = g r s r l p ' k s t k j p k M k D; k p k K k u j p k b k k j k p k K k u j p k b k k k j k p k K k u j p k b k k k j k p k k k k j k p k K k u j p k b k k k j k p k k k k j k j p g k k k k j k j p g k k k k j k j k j k r t k L r f e = k r j k g k . k j k E g . k u R; k p h o G [k g r h ' k k G k l k M u l x G ; k x k s V h r R; k y k j l g r k - r k s c S y x k M h p k y o k; p k - j k u k r y b Z e g u r d j k; p k - f ' k o k; R; p h f ' k k; k j k; "V h p k x y h g r h -

r: .kkbir vkY; kuarj nknkuaR; kP; k yXukP; k okVk?kkVh pkywdY; k- R; kyk LFkG vusd fBdk.kh pkywu; sr gnrh- eakM; krhy 'krdjh]' kudj i MoGph egyxh R; kyk i l ar i Myh- nknkuaR; kpa yXu Bjoya R; kP; k yXuke/; svpkud nnja, d yXu d: u ?; k; paBjya nknkph ygku egyxh: Deh.kh ghpayXu nknkpk eAg.kk i kMk txnkGs; kpk egyxk Jhjax R; kP; kcjkcj djk; psBjys [kja rj Jhjax o: Deh.kh nk9kgh ygku gnrs i jarnxMM; k yXukr yxhu gnra Eg.kwu R; kpmgh yxhu nxMM; k yXukrp djk; paBjya

nknk gk vfr'k; gk1 h grk- nknkP; k nkjk QMp ekBk eMi Vkdyk- Hkkodhrhy I olikj kauh feGw eMi ?kjP; k ?kjhp Vkdyk- oGij i MnsQDr eMi okY; kdMw vk.kys eMi Vkd.; kpadke pkj fnol pkywgra; k pkj fnol kr i kjanku Vkbe nxMB; k ?kjhp tøk; ph-

 $e Mi \ cuo.kkjh \ nx Mm; \ k \ o kj xhryh \ i k ja, \ desdkph \ p s V k \ e L d jh \ y b Z d j k; \ ph- \ nx M m d a k h R; kuyk \ x ij p ii g kr H k V V h p h d i d i n k: \ ch I; k; y k | k; p k- R; k e G a nx M p h n k L r d a u h e t k y b Z d j k; p h- e h i k; ku a v / k m V I Y; k e G s i R; { k e M i c k a k r k u k c ? k k; p a d k e d j k; p k s }$

 $nknkua \lor keP; \ k \lor kbJyk \ o \ e/kY; \ k \ pyrhyk \ l \ kfixry \ i^nxMipayxhu \ gipi ; \ ir \lor kB \ fnl \ rigP; \ k ?kj kr \ pyrh \ i \ yok; \ P; \ k \ llgkb \ ir**$

yXukP; k \vee xmj 15 fnol if=dk dqkk dqkkyk | k; P; k; kph, d; knh cuoyh \vee ku l ok".khpafuea=.k dqkk dqkkyk | k; pa; kph, d; knh cuÅu?kryh-; knh fygk; padke ek÷; kdMa gqra; knh fyfgrkuk]dk; pwd >kyh rj ukuk eyk Qkj f'k0; k nr \vee l s

enGkr ek÷; k tUekikl wup ukuk ek>k Qkj jkx jkx djk; pk- rkseyk ugeh f'k0; k |k; pk- ; knh fygrkuk ek÷; kp c: cjP; k R; kP; k egykyk] fdl ukyk rks d/kh ; knh fygk; yk cksyok; pk Ugkb] dqkkpgh yxhu vl yadh R; kseykp oBhl /kjk; pk-

e/kwu e/kwu nknk Eg.kkpk] $^{\v}$ kj \d cGh i kjkyk d'kkpk f'k0; k fnrw $\$ i kjkpj [koGr tkÅ uxI - rjhgh; k| k fygrkuk eyk ukuk yk[k VDD; kP; k f'k0; k | k; pkp-; knh fygk; yk tk; p \d Egath ek÷; k \d cuÅu fnY; k dh] yXukrya ek>adke I i k; p \d ex eh yXukr fuokr fQjk; pks

 $y \texttt{XukP}; \texttt{k} \checkmark \texttt{Rmj} \texttt{nknkuafrUgh} \texttt{?kjkrY}; \texttt{k} \texttt{i} \texttt{kj} \texttt{kuk} \texttt{i} \texttt{kj} \texttt{huk} \texttt{clki} \texttt{Ma?kryh-ck}; \texttt{clkj} \texttt{e} \texttt{gyh} \texttt{cfg.k} \texttt{l} \texttt{vkb1} \texttt{l} \texttt{kkot}; \texttt{h} \texttt{l} \texttt{cfg.khP}; \texttt{k} \texttt{e} \texttt{gyh} \texttt{l} \texttt{l} \texttt{ukl} \texttt{j} \texttt{kkuk} \texttt{y} \texttt{qkMh} \texttt{?kryh-l} \texttt{x} \texttt{G}; \texttt{kph} \texttt{clki} \texttt{Ma} \texttt{gfjck} \texttt{'kB} \texttt{thP}; \texttt{k} \texttt{n} \texttt{qkkukrp} \texttt{?kryh-tk}; \texttt{kph-}$

cki w v kEgkyk dki Ma ?krkuk] gfjck' kBthpk Fkkg yk egyxk xaxkjke v kEgkyk gydh gydh dki Mank[kok; pk-ij nknk v kEgkyk dki Ma?kr v I rkuk] xaxkj keua pkaxyh pkaxyh dki Ma nk[koyh-eyk i fgY; kmkp pkaxyh dki MafeGr grh-'kVI v ku b?tkj-dki Ma?ksÅu I xG; kph dki Ma v feu eqtkoj VsyjdMaVkdyh grh-

yXukP; k v?kmj 4 fnol nknkpa?kj i Sikgq; kuaHkjysysgqrj nxMppayxhu gs vkeP; k nkjkryaeyk dGr vlY; kil uaifgyp yxhu gqa l blkkvlikpayxhu >kya R; koGhpaeyk dk; vkBor Ugkbł R; kuarj nknkph nxMh; k i kBph cfg.k Hkkxkpayxhu HkkxkP; k l kl jhpa>kysyagqra rl a ek÷; k dGR; ki.kkryanxMpayxhu gsifgyp yxhu gqra yxhu esefgU; kr gqravkEgkyk 'kkGsyk ch l kV; k ch gli; k-R; ke@avkEgh; k yXukr tkLrhr tkLr vkum ?kr gqrks yxhu vkB fnol gqra

R; kp njE; ku eh vku vk..kk iæjijnyk , dkn'khyk xsyksgrrw tkrkuk vkEgh l d; kdkGh 4&5 oktrk fu?kkyw okVsr l k; dy idDpj >kyh- vkEgh nk8ksch iæjijnyk pkyr jk=h 9 oktrk ikgpyks [kja Egath vkEgkyk fiDpj c?kk; pk grks vdjcj VkMbltyk 'kEeh dijn o l k/kukpk 'jktdækj* gk fiDpj ykxyk grk- m'khj >kY; ke@avkEgkyk frfdVafeGkyh ukghr- U; wvdcjyk 'l ace* fiDpj ykxyk grk- R; k fiDpjyk ch vkEgkyk frfdVafeGkyh Ugkbir- vkEgh [kin ukjkt >kyw

n() &; k fno'kh vkEgh eax(i); kyk vkyw nxMi); k yXukP; k eMi kr vkEgh xyks vkEgkyk i kýkuh fopkjy] Bolipk fi Dpj cf?kryk\Þ

eh [kkt/sp | kfxry] ^l axe fiDpj cf?kryk-** i kj kuk | axe e/kya , d xk.ka Eg.kuu nk[koya] ß; sejk i ei = i < dj repukj ktu gkuk b

 $n \times Mpay Xu Fkk Vek Vkrikji Myay Xu > kY; kuarjnku rhu fnolkual R; ukjk; .kkphintk > kyh-R; kuarjr Gtki ji yk okoj t=k djk; ph Bjyh-r Gtki ji yk okoj t=yk tk; pk fnolfuf'prdj.; kr<math>\vee$ kyk-

vkeP; k xkoh ckj geskk dehr deh , d fl unekpk rogrj vl k; pkp dákh&dákh , dk oGh rhu&rhu fl unekps rog vl kps ; kå; kr uohu vku xktysyk fl unek yko.; kl kBh Li/kkZ pkyk; ph-eyk vxnh 2&3 o″kki kl w fl unek i kgk; ph Qkj vkoM gmph-?kjkr fl unekph vkoM vkbJyk gmph-ij cki nyk vkoM uûgrh-ydjkckGkP; k /kcMD; kenGavkbZfl unekyk tkÅ 'kdk; ph UgkbZ ij d/kh&d/kh vkEgkyk fl unek i kgk; yk i \$ a | k; ph-ydjatkLrh vl Y; kenGai R; dkyk i \$ a nska l kj [kakl kj [ka'kD; uûgra eh Qkj gVV dsyk dh] eyk Tokjh fdook dMcabJdk; yk | k; ph] vku R; kruafl unek eh c?kk; pks i \$ sckj geskk feGk; psukghr-ex d/kh d/kh e/; rjyk ?ki µ tkÅu v/kkZfl unek c?kk; pks

, dnk nkekthph t=k grph-ipk; r I ferhP; k I ekg ekGkoj nku raqykxysgrps , dk racr Hkxok >Mk gk fl urek ykxyk grpk vku nd &; k racr ekfuuh gk fl urek ykxyk grpk-nkbghdMa rhu&rhu [kG pkyngrps 6 rs9 i kfgyk [kG] 9 rs12 nd j k [kG vku 12 rsi gkVa3 i ruj fr I j k [kG-nkbghdMafeGnu fno I kyk 6 [kG $t=k \lor I Y$; kerGapkyngrps

eyk nkbigh fl urpsc?kk; psgrs vkbiyk is sekfxryaij vkbieg.kkyh] Bek÷; kdMadk; is allgkbir-rq; k ck·yk ekxp-ij eh ckinyk is ad/kh ekx; pksuk; - dkj.k ckinjkxhV grk-fl urpkyk is ad/kh | k; pk llgkbi ckinyk is aekfxryarj ckinEg.kk; pk] Bvkj i ki V] vkl yk flkdkj ukn dk; mixkpk\ R; kijhl R; k iskkpadk; [kkYyarj cjaij blukdkj.kp R; k ropkY; kyk is a fnÅu ud rhfp=ac?k.; kr dk; mix vl rnkp

t=k vIrkuk , dfnlh I kB; kyk eh 8 oktrkp ?kjkckghj i Myw vku nkbgh roch; ke/; rjhP; k Vk; ekyk Mksvjhdij Mksvjoj uI yk dh] ?kd k; paBjoys ij 6 P; k [kGkyk Mksvjfdij e/; rjkyk Mksvjo: u gkyykp Ugkbł Eg.kya9 rs12 P; k [kGkyk pkUI feGrwdk c?khkEg.kwu roch; k I eji vakkjrp Fkkcyw FkkbNsFkbNhpsfnoI graR; kerGsgkrkph ?kMh Nkrhoj ?kkywu vakkjkrp Fkkoyw mtMkr vkyarj MksvjfdijP; k utjd vki.k i Mwgh Hkhrh grh- dkskrj Eg.kył i pk; r I ferhP; k Lybto: u nkbgh rochy fl urpsikgk; yk feGrs-* Eg.kY; koj eh vakkjkr i pk; r I ferhP; k Lybtoj p<w i kfgył rj , o<; k ykowu QdLr fp=afnI r grh- vkokt ; r u0grk- R; kerGaud rh fp=i kgk.; kr etk u0grh-

9 rs12 P; k [kGkpsnktlgh rocpty e/; rj l k/kkj.k 11 rs11M oktrk >kys ij nd &; k [kGkP; k e/; rjkyk l dnk nktlgh rocpsMksvj fdij Mksvjojuagkyyp Ugkbir- vkrk ekBh i pok; r vkyh grh- jkrh vkB i kl w eh e/; rj urj fl urpk c?kk; kyk feGay] Eg.kw Fkkocywgrq ij nktlgh oGayk e/; rjke/; svkr tk; kyk dk; pkUl feGauk >kyk grk- eh l kB; kyk toywch u0grw Hkoc [kPpw ykxyh grh-, d eu Eg.kr graßtk?kjh vku ftÅu >ki fuokr- nku [kGkyk vkr tk; yk feGkyaUgkbł vkrk frl &; k [kGkyk rj vkr tk; kyk d'kko: u feGay** nd jaeu Eg.kr gra³/^vkrk 12 rsigkVa3 frl jk [kG gk; - frl &; k [kGkpk e/; rj 2 oktrk grq -, o<; k m'khjk Mksvj

fdij Mksvjoj Fkktck; pk Ugkbł frijk [kG viy; keGadVkGw rhitkÅu >kikyk tkbły-rkwkyk vkysyk?kki brdsvkcnw feGr virkuk dk?kkyok; pk**

 $Eg. kw \ eh \ frl \&; k \ [kGkP; k e/; rjhr ?kd].; kl kBh \ rl kp \ FkMhr \ dMpldMr \ MkD; kyk : eky ckdkup gkr Nkrhoj ckdkup vdkkjkr cl yw vkrk; ko.Gh dk; ch d: u vkr ?kd k; pp-gseh i Dd Bjoyagq-t=k vl Y; ke.G] jk=Hkj ek.kl kph xnhZgrhp-R; ke.GaxnhdMac?kr xnhTY; k ek.kl kdMac?kr-jk=hP; k vdkkjkr frl &; k [kGkP; k e/; rjkph okV i kgkr Fkkucyw$

jk=hpanku oktya nkligh reph e/; rj 5&5 feuVkP; k Qjdkua>kyh- ifgY; kmk dlβyk e/; rj glpßy] R; k rep ?kd k; paBjoya t; Jh xMdj o pmcdkr xktkys; kpk ekfuuh fl unek T; k rep ykxyk grk R; k reph e/; rj ifgY; kmk >kyh- ákoGh ek÷; k l m&kuaMksvjfdij Mksvjoj Fkkeysyk fnl yk Ugkbł

cki w?kjh gk; dk xkomjP; k 'krkr\ gseyk dk; p dGkyk I k/ku uûgra eh ckgs u dokMkyk dku ykoyk-cki w?kjkr vI yk rj cki @; k bûgG.; kP; k vkoktko: u cki wyk oG[k.kal ki vI k; paeh dokMkyk dku ykoY; koj ek÷; k y{kkr vkyadh cki q?kjhp ûgrk-cki w?kjhp vI Y; ke@s eh vkbiyk gkd u ekjrk rI kp ek?kkjh fQjyw jk=hpsI kMrhu oktysgmrs Hkmd rj ûkj ykxyh gmrhvkrk dk; djkog dkmghp I etr uûgra. d@ach >ki rk vkyavI raj ij i kb/kr Hkmplpk vkX; k Mkmc mI GY; ke@s>ki ykx.kav'kD; gma eh mi kI h rI kp xkomjh xwyks jkst cki w[kki hr >ki k; pk ij vkt cki w?kjkr >ki yk gmrk-R; ke@ [kki ekdGhp gmh- [kki hr tkåu, d fjdkeai kra[kkyh Vkdyao, d i kravakoj i kak: u ?krya vkt Hkmd Hk; ndj ykxY; ke@s>ki ykxr uûgrh-

MkD; kr , d rjdhc I ppyh- mByw vkdVhtoG xsyks vkdVhtoG 4&5 'kskP; k okGyY; k xo&; k i MY; k gB; k- R; k?krY; k- R; kpsrplMsdsys cki wugeh ugeh dkM; kph i Yh [kki hr oj [kÅu fBorw gh eyk ekfgr gIpa [kki hr oj rh cki quadkMhi Yh [kÅu fBoysyh gMldqu dk<yh-4&5 xo&; k vkdVhr ?kkywu i YoY; k- tkG pkaxyk ykxyk- roj toGphp 5&6 Bkl kj Bkl kj tqkG; kph d.kl adk<w vk.kyh-vkdVhr tkG l i Y; koj vkdVhr rh 4&5 d.kl a?kkywu pkaxyh Hkktyh-vku i kB; koj rh gkrkuapkGw [kkYyh-i kYkr qiMk xY; keG i kY FkkMa'kkr >kya toGp

[kkijkP; k d:Ghr FkM i k.kh gr] rh fiyks ∨krk cjaokVwykxyagra ijr tkÅu [kkihr >kiywʻkkar >kiykxyh-

fluekpabrda; M v I.; kph dkj.k 2&3 gmh-, d Egath fluekryafgjkMidupaiæ eyk yblvkoMk; pa fluekryh ij R; sduVh eh ^vk/MP; k*: i kr c?kk; pks vki.k ch fluekry; k ij ek.kp ^vk/Mk* c: cj i e djkoa fr P; k c: cj l a kj djkok- fluekryk fgjkstlk fgjkMiduyk vfyaxu nsw r l p vki qu vk/kkyk vfyaxu | koa v l a okVk; pa vk/kk gh ek>h fnydh /kMdu l i ukr cuyh gmh- fluek cf?kryk dh vk/kkyk Hkb/k; yk tkoa v l a yblokVk; pa i j v/kh&e/kh l ckbP; k xkoh vkblo cki w tkå | k; ps l gkbP- f/kok; , l - Vh- fr fd Vkyk i S ach u l k; pa ex eh vki ya l i ukr p vk/kkc: cj i e djk; pks l i ukr p fryk fluekry; k l kj [ka v fyaxu | k; pks fnol su-fnol ek÷; k eukr vk/kkcnnyph v ks ok r gmh-

 $\label{eq:ckiwa} $$ \text{ckiwa} < \text{kg i VV}; $$ krhy < \text{oGI okVph 4 , dj ftehu 1000 : Ik; kyk ?kryh $$ kf.k I krok $$ Hkko tUekyk $$ kyk- toGikI i R; $$ ckP; k tUekP; k oGh cki $$ \muaftehu fdook tkxk $$ kyk- toGikI i R; $$ k tUekP; k oGh cki $$ \muaftehu fdook tkxk $$ kyk- tkxk $$

vkrk vkEgh I kr HkkÅ >kyngrplsvkf.k tehu ch 33 , dj >kyh grph- Eg.ktsi R; sdkyk 4&4 , dj tehu okV.khyk ; sÅ 'kar grph- I oZHkkokuk i ijsy brah tehu >kyh grph-

ij vkEgk dkykjkjkgk; yk tkxk Qkj deh grh-ukukpadkync ygku vl w ch ukukua ndjk ekBk okMk ckikyk grk-'krkryh I xGh [kGh >kY; koj nknk , dsfnI h ?kjh vkyk vku nknk cki w o ukukyk Eg.kkyk] BcGh vu r@'khjke] eh dk; Eg.krq rh uhV , dk- , dt.kkpk ykdMkpk I kbk y; I Lr feGrq - >kMapkaxyh gk; rh- R; kyk FkkMh i škkph xjt gk; - r#gh nk9kkr R; ks I kbk ?; k-7&8 [k.k bækjrhpaykdM fu?kay] ckikkjk I rpkj ch vki yk pkaxyk nktr gk; - dkMkth I rpkjkdMa ckikdke nså; kr- nk9kkr rp<al ki; kpackikdke d: u ?; k- nk9kkpa3&3 [k.k v I a6 [k.kkpackikdke gra - d: u ?; k- pk9kkpa3&3 [k.k v I a6 [k.kkpackikdke gra - d: u ?; k- pk9kkpa3&3 [k.k v I a6 [k.kkpackikdke gra - d: u ?; k- pk9kkpa3&3 [k.k v I a6 [k.kkpackikdke gra - d: u ?; k- pk9kkpa3&3 [k.k v I a6 [k.kkpackikdke gra - d: u ?; k- pk9kkpa3&3 [k.k v I a6 [k.kkpackikdke gra - d: u ?; k- pk9kkpa3&3 [k.k v I a6 [k.kkpackikdke gra - d: u ?; k- pk9kkpa3&3 [k.k v I a6 [k.kkpackikdke gra - d: u ?; k- pk9kkpakikdke gra - d: u

ukuk Egukyk] ßnknk] eh fuEeai \$ afnrw rwBjho-Þ

VkEgkykyk ch y; tkxph xjt grh- vkrk tehu i kVki jrh >kyh grh- ij jkgk; yk tkxk l kr t.kkl kBh r; kj djk; yk vkrkp l q okr djkoh ykx.kkj grh- tkxpk i i u xblkhj vl Y; ke@s cki uugh gkckj fnyk- ykdMkph [kkMafe'khue/; h dki u r; kj >kyh grh- cki yk ykdMkrya tkLrh dk; dGr u0gra ukukyk ykdMkrya Qkjp dGr gra ukukua dkgh fnol ykdMkpk /kmk ch dsysyk grk- f'kok; ukukpk u0; k okM; kpk vublko R; kP; k i kBh'kh grkp- u0; k okM; kr 12&13 [k.kkpk bèyk Vkdyk grk- R; k bèy; kP; k oGh ukukuafuoMd&fuoMd ykdM bèkjfrl kBh oki jyagra R; ke@aák l kt; kP; k l ekbid ckilkdkekP; k Vk; ekyk ch ukukuabPpho bPpho ykdMafuoMyho R; kP; k l kt; kl kBhoki jk; yk dkMkth l rkjkyk l kixrya

 $\label{thusukjkthusukjethusu$

R; kuanknkyk I klixry $\frac{1}{2}$ foBkck nknk] r $\frac{1}{6}$ fkhjke ek.kul xjhc o I jG I kulkkokpk gk; - R; kuavkti; $\frac{1}{6}$ r dqkkykch QI oyaUgkb $\frac{1}{6}$ ij gh cGh r $\frac{1}{6}$ fkhjkekyk QI orw - pkaxyh pkaxyh ykdMa R; $\frac{1}{6}$ F; k cktuyk okijk; yk rksI kaxrk $\frac{1}{6}$ - eh dk; d: **

 $nknk]^{n} \ gsc?k \ dkMkth] \ cGh \ ifgY; \ kikl \ w \ NkVdk \ gk; - tehuhP; \ k \ okV.; \ k ?krkuk \ ch pkaxY; \ k \ pkaxY; \ k \ ftehuh \ R; \ kuaLor%uampyY; \ k \ vu \ gyD; \ k \ ftehuh \ vkEgkyk \ nk8kkayk] \ eyk \ orG'khjkekyk ?; \ k0; \ k \ ykxY; \ k- fpekthvklik \ ejk; P; \ k \ v?kmj \ eyk \ toG \ cksykowu \ Eguyk \ grk] \ BbBrck] \ ek÷; \ k \ ek?kkjh \ rG'khjkekyk | \ kHkkG- \ rh \ l \ xG; \ kr \ ygku 'kMQG \ gk; - R; \ pk \ l \ kHkko \ l \ k/kk \ o \ l \ j G \ gk; - cGhpk \ l \ kHkko \ NkVdk \ o \ FkkMkl \ k \ vkxko \ gk; - rnFkksj yk \ Hkko \ Eg.kwu \ cki \ kph \ Hkwehdk \ oBho-**$

 $\label{eq:continuity} $$ \text{dist}^{\circ} \exp bBrck \ nknk] \ r\ fgh\ r\ f'khjkeoj\ dk\ vU;\ k;\ djrk;\ k;\ kykftehu\ gydh fnyh\ fgrk;\ - fgFkaák\ okM;\ kr\ cGhi\ kk,\ d\ [k.k\ tkxkgh\ deh\ fnyh\ gk;\ -\ vku\ r\ fg'\ khjkeP;\ k\ l\ kt;\ koj\ cVV;\ kph\ [kkM\ okij\ Egrk;\ - gsc:\ cj\ gk;\ dk\ ,\ [kk\ k\ xjhckoj\ r\ fgh\ vU;\ k;\ djrk;\ v\ l\ aokVr\ ukgh\ dk\ r\ fgkyk\^**$

^gsclkMkth] c?k cGhyk I kaxk; yk xsyarj cGh dk; , tdk; pk ukgh- \vee u rG'khjkekyk dGyarj blekjrhpadke cm i May- rG'khjkeyk ytdjatkLr gk; rh- \vee u tkxk ybp \vee i gk i Mrq-rhu [k.kkr I xG; kauk > ksi k; yk tkxk i gir ukgh- rok eh Egurwt I a \vee 'khy r I aj okM Vkda dke cm i kMwuxa nk%kaph HkkM.k ch I kj [kh I kj [kh gli; krh- rok , dnk I ksi k Vkdyk \vee u e/kh i Mnh oMyh Egath HkkM.kkpadkj.kp i Mr Ugkblc?k-p-clkMkthual gk [k.khph blekj r Vkdyh-

tij; k?kjki gpk I ki k >kY; koj cki quauohu?kryv; k okM; kpackikdke pkywdsya nxMa ekrh vk.kyh xoMh Bjfoyk- rksxoMh ij xYyhryk grk- ij ckj geskk vkeP; k xYyhrp grk-xoMh vkxko grk- rksckbP; k uknkuadkep djr u0grk- I kj [kai \$ aekxk; pk- dkekP; k ukokuackuc- cki wa ofrkxw xoMh cnyyk- ojP; k dkekyk uohu xoMh feG.kaeqdhy gra ij , d i kFkjoV tkrhpk xoMh feGkyk- R; k i kFkjoV ukokP; k xoM; kuaokM; kP; k Hkhrh ckikr vI rkuk] xYyhrY; k , dk [kkMI kG o QWdG ek.kI kwauxji kfydr rdkj dsyh dh] ^^r\G'khjkeph jLR; kcktph fHkr i gs : rh; k-**

cki pok LoHkko gj.k dkGthpk o ljG grk R; k ek.kl kuackákdke vkMuu i MkoaEg.kuu empske rdkj dsysyh grhcki pokolok Egyla dj Rokok Ev nufl i la dVkr tkå u llagola d llagola k llagola k Rick ok kl kusompska ekdkdka

cki wnknkyk Egukyk] Bnknk E; qufl i kyVhr tkÄu l kgckyk l kakwyk-R; k ek.kl kuaeqnake ckalkdke vkMfoya Eg.kmu-Þ nknk o ckiwE; wff i kyVhr xsyso I kgckyk Eg.kkyjBI kgc] dkxnk i ek.katkxk ekstw c?kk- Qjd i Myk rj vkEgh ckákdke r@gh I kark; frFkua?krwÞ

I kgckuatkxk ekst.; kI kBh Egknk ukx.ks; k depk&; kyk o , d nku f'ki kbZdepk&; kuk i kBoya tkxk ekstyh-

 $\label{eq:continuous} \mbox{Egknk ukx.ksEg.ky} \mbox{Br} \mbox{G'khjkeph dkghp pudh Ugkbλ myV jk$MP; k dMayk T; knk tkxk ekdGh I k$Myh; k rua**$

I kgckuackákk; yk i jokuxh fnyh-jkMP; k dMph fHkar ckákwu ?kryh- okM; kP; k mRrjsyk vI yY; k vkeP; k payr Hkkokual ekb2d fHkar vkMoyh- nknkuaR; kyk l käxryaij dk; ch misk >kyk ukgh- 'kovh vkiY; krY; k vkiY; kr HkkM.kaudwEg.kwu cki waR; k cktoph fHkar ckákk; padke Fkkacoya mjyY; k rhu cktN; k fHkarh ckákwu ?krY; k- nf{k.k cktoph fHkargh jkMP; k dMsykp gqrh- rh fHkar vkMo.; kph ppk2Hkkodhrhy dkgh yksd; kN; kr pkyw>kyh- cki wa?kkc: u R; k cktoph fHkar fcxj i k; kph ckákyh- frFkai wohph i fMd fHkar gqrh- R; k fHkarhojp nxM /kkMl; kph uohu fHkar p<oyh-cki wyk ykdMkryadk; dGr uûgra ykdMkP; k 0; ki k&; kuacki nyk ykdMkr i giraQl oya gqra I xGh ykdMao [kkMacVV; kph fnysyh gqrh- cki wad'kh rjh xMcM d: u I gk [k.kkph bækjr mHkh dsyh-bækjrhoj i Mch xMcMhup Vkdyk-thj; k okM; krys4&5 i =sf'kYy[k gqrsR; k i =; kph [kksyh u0; k okM; kr eyk vH; kl djk; yk Eg.kwu ckákyh-rh [kksyhgh xMcMhr pqhhph ckákyh-i kÅl vkyk dh i k.; kpk yksk R; k [kksyhr okgwu; k; pk-

okM; kpackakkdke i wkl >kya QDr mRrjph , d fHkar vkeP; k o vkeP; k pgyr HkkokP; k oknkrjkfgyh grph R; k dkGkr dqkkpagh dpygh ckakkdke rdkj d: u Fkkaco.; kph i Fkk y; p grph

uohu okMk r; kj >kY; ke@svkeph divakph tkxxnnyph vMp.k deh >kyh- Egl hyk o cSykuk ckilkk; kyk tkxk >kyh- la la yk cki wo vkbZbeyk VkdyY; k [kkY; ke/kw EgS ckilkk; ps R; kdkGr Egl hyk Qkj ti kosykxs varLFk 'k=w dakk rjh okbW ek.kl kyk l kaxw Egl hP; k nko.khr fo"k oS.khr ?kkyw fBor vl r- Egl huars [kkYyadh EgS ikV Qaxw ejr vl suohu okM; kr th $i=\div$ kph [kkyh ckilkyh qarh- R; k [kksyhr eh l nk vo?kMso brj vkepsfe= vH; kl djhr vl s

cki gyk I nk vo?kMsQkj ?kkcjk; pk-cki pk o: u I kblkko tjhjkxhV vI yk rjh vkruu Qkj gGok grk-gsvkEgk HkkbNokuk pkaxyaekfgr gra cki gyk fdrh tjhjkx vkysyk vI yk] rjh rks d/khgh vkEgkyk ekjgk.k djhr uI k; pk-cki pk jkx c&; kp oGh ukVdh vI k; pk-d/kh&d/kh pg&; koj o cksy.; kr brdkjkx nk[kok; pk] brdkjkx nk[kok; pk dh] I ekj pk i kj xk ?kkc: u xkj >kyk Qkfty-

 $\label{eq:cki pand ja, dos'k"V vi agqradh] rksQDr ?kjkrY; k ek.ki koj jkxok; pk-ckghjP; k ek.ki koj] egykoj vftckr jkxok; pk ligkbł cki qeyk ugehp jkxkr ckyk; pk-, dnk cki qek÷; k$

vakoj /kkow ekj k; paukVd djhr grpk- R; kp oGh I nk ek÷; k cktnykp cI yk grpk- cki qek÷; k vakoj /kkow; rks] Eg.kY; koj I nk ?kkc: u i Gw xsyk-

rok i lual nk eyk Eg.kk; pk] ßukjk; .k] rq; k ck- P; k rkoMhr eh d/kh l ki Mrkş dqkkl Bkond\Þ

eh] $\beta \vee j$ sl nk] $\vee k$ epk cki wryk d'kkyk ekj $sy \vee ku$ ryk d'kkyk f'k0; k nb $3y \vee k$

 $\label{eq:ckiwc&} $$ \text{ckiwc&; kpoGk \lorkeP; koj ?kjh [kii jkxor \lorls \lorkf.k nqdkukQMatkÅu clyk dh] R; pk jkx l xGkp ekoGr \lorls rksnqdkuki&sclY; kuarj Qkj bLiknh cksyk; pk- d/kh bLiknh udyk djk; pk- d/kh fgmh cksyk; pk- R; koGh cki qdMacf?krY; koj okVk; padh] $$ FkkM; k oGki mbli \lorkEgkyk f'k0; k nsÅu ekjk; yk \lorakoj ; sklijk gkp \lorkepk cki qdk\P$$$

Hkkx ckohl

 $\label{eq:cki_gyk} cki_gyk = \text{cki_gyk} \text{ ewkj_atukpk , no<k ukn u@grk-rksfiDpj d/kh i kgk; pk UgkbZ ekruj mj I krY; k o t=rY; k dluR; k c?kk; pk-$

rlarj vkeP; k xkookyk duR; kpaybip ; M gma o"kkimu 7&8 oGk uew l keokjP; k cktkj fno'kh duR; k Ogk; P; k- duR; kpadækjkV ?kskkjh ek.kl gh vkeP; k xkookr iqdG gmheYyklik 'kGd] nkenpOgk.k] f'kokfFkV] b dækVnkj duR; kpsQM frdhVkoj Hkjok; ps

extyn; kr vuid fBdk.kh vkjokMs%rkyhe%gyrs vkeP; k xYyhrp vkeP; k ?kjkP; k ybp toG t; eYgkj rkyhe gyrh- R; k rkyehr jk=u&fnoI ek; mG i \$yoku ?kpr vI r- xYyhr R; k dkGkr t; eYgkje/khy dkgh i \$yoku i fI /n gyrs vkeP; kI ekg Hkxoku I koath] xki kG ykM] tuk I koath] xki kG I koath] HkkÅ tkoGsrkyehr tkr gyrs vkepk Fkkjyk Hkko ckckI kc ch rkyehr tk; kpk i jrq, dnk dlyrh [kGrkuk R; kP; k i kBhr djd HkjY; ke@srksrkyehr tk; pk cm >kyk-

 $\forall k \text{Egh ygku vI rkuk ek: rh p0gk.k] nkeqvk..kk xkskhokMhdj] rk; klik m1gkG \cite{gan rhg} n'kjfk \\ I koath] ctjax nRr \cite{gan rhg} xksikG vkMI \cite{gan rhg} rkR; k okdMg ckcgiko vk6rkMg I ksiku ?kgyg vkck vkorkMg gs i $yoku gqrs vI svkepsofMy vkEgkyk I kakk; ps$

t; eYgkj rkyeh f'kok; xkokr ekuxYyh] pkhlkkj xYyh cghj pk okMk] f'kokth rkyhe] ákgh rkyeh gN; k- R; k dkGkr ^nkeknj eMy\$ gk f'kokth rkyehrhy i \$yoku xkokr , d ucj gN; i Gtpk 'kQh beke 'kGk vkf.k nkeweMyph d\prh frdhVkoj ugehp \Qgk; ph-

ugeh frdhVkoj dlpR; k ykoY; k tkr] riggk cktwad.kkr ykoyh tk; ph-eq[; dlprh 'koVh \lor l k; ph-ckdhP; k \lor ?kknj 0gk; P; k-iR; rd QMkr 10 , d dlpR; k usewu 0gk; P; k-iQptP; k 'kQh 'kq[k gk \lor fr'k; pyk[k iSyoku glpk-R; kuaeaxlpl; krY; k HkY; k&HkY; k iSyokukwuk \lor Leku nk[kfoyaglps \lor keP; k xYyhryk xki kG ykbNso 'kQh 'kq[kph dlprh nku rkl pkyyh- \lor k[kjhyk xki kGuagkj ekuyh-

'kQhpk ijkHko dj.; kIkBh ykoc&ykocps iSyoku eacNj; kr cksyoys tkr gqrs R; kauk 'kQhyk ikM.; kpk foMk fnyk tkr gqrk- I kacyhpk ikMqIqrkj vack fiMkuackjhdp gqrk- ijarqfpoV gqrk- 'kQh vkf.k ikMqph dlurh cjkp oG pkyyh- vk[kjhyk ikMqagkj ekuyh-

'kQhyk ikM.; kI kBh nku&pkj ftYákrY; k vud i Syokukuh Ik; Ru dsysgrs i jarq'kQh I gI k i jkHkr gr u0grk-dukVde/khy bMh rkyrdk 0gkrhipk oMj y; xktysyk i Syoku grk-R; kyk 'kQh 'k[kyk i kM.; kI kBh nku efgusv?kmj dlµrhP; k r; kjhI kBh I i kjh fnyh grh-dlµrh uæyh dh [kijkdkI kBh v?kmj p i 3 adkWVIDVj ns vI r-

Ogkrhipk oMj mpoki jik i Syoku grpk- eqktin; krY; k ykadkuth R; kyk cf?krY; kutrj EgVysgrpj Ogkrhipk oMj ge[kkl 'kQ; kyk i kM.kkj- oj .k oGhyk dtj LR; kpk QM r; kj dsyk grpk- dMyk d.kkr ykoyh grph- oj .k oG vkMrtP; k cktnykp eqytB; k 'kkGB; k cktnyk grph-; k dtjrthyk vQkV xnhiz >kysyth girth- yksd brds fu; æ.kkP; k ckgj teys girs dth] 'kbVth OkStnkjkP; k l kax.; kud kj dækVnkjkauk d.kkr dk<w Vkdkoh ykxyth-'kQhyk yksd ^'kb¶; k* Eq.kk; ps

 $\label{eq:continuous} $$ 'k\P; kps, dos'k"V gradh] ifgY; k5 rs7 fefuVkrp rksdlurh phriV djhr $$ 5\&7 fefuVkurj ifrLi/khZi Syoku ukgh i Myk] rj illgk' k¶; kyk rksi Syoku ikM.kav'kD; 0gk; pa$

QMkr xkdkG > kyk- QgkrhP; k oMjkpsbFkseakM; kr [kii i kgqksgrs R; kuh 'kt; kyk ?kj ya i jarqQkStnkj i kVhy Qkj dMd grs rsvky] EgVY; kuarj I xGh oMkj I ektkph ek.kl acktnyk gVyh-

nksu&rhu efgus>kysrjh eaxM; krhy oMkj lektkyk OgkrhP; k oMjkpk ijkHko dk; ipork vkyk ukgh-'koVh'k¶; kph dk; ephftjo.; kl kBh oMkj xYyhrhy loZyksdkuh nkeweMysyk'k¶; kcjksjy<k; ph xG?kkryh-R; koGh nkeweMysQkekT vkysyk iSyoku grk-

nkeqeMyph \vee kf.k 'k¶; kph d\u00e4rh ykoyh- 2 efgus \vee ?kmj nk9kkukgh [kijkdkl kBh i\u00e4 s fnys nkeqeMyseax\u00e4l; kpk i\u00e4yoku g\u00e4rk- R; kyk eax\u00e4l; kph 'kku ekuystkr g\u00e4rs nke\u00e4k ijkt; gks\u00e4 u; sEg.kw eax\u00e4l; krhy dk\u00e4h d\u00e4rh i\u00e4e eMGhuh no i k.; kr fBow cl ysg\u00e4rs

nkegyk vusd olrknkuh l klixry $\frac{1}{2}$ ^nkegrwQDr ifgys5&7 fefuVsdkgh xMcM d: udw u\(\frac{1}{2}\) ra'k\(\frac{1}{2}\); kyk [k\(\frac{1}{2}\) or fBo-'k\(\frac{1}{2}\); kpk ne QDr 5&7 fefuVkpkp vIrks R; ku\(\frac{1}{2}\)j 'kt; kd\(\frac{1}{2}\)Y; kgh i Syokukyk fpri V d: 'kdr ukgh-**

nkewarl p dsya i fgys7 fefuVs'kl; kyk tkLrh toG; Å fnysukgh- 5&7 fefuVkurj' k¶; kpk ne l á yk- i lýgk nkewa'k¶; koj Qkjp vkdæd pky dsyh- 'k¶; k i Myk ukgh i jrq'kl; kps gky nkewaybþ dsys 'kl; k $v\{kj'k\%' kboVh HkMdkGk; yk ykxyk- rligk dlyrh tkMhoj l kMyh-ykdkph bPNk grh- nkewa'kl; kyk fpri V djkoa i jrqnkeyyk eakll; kP; k QMkr rjh teyaukgh-$

uarj i a ji ji yk guneku t; arhyk T; k diµR; k Hkj k; P; k R; k diµrhr nkeqealyyyk 'k¶; kua i jkHkmr daya yxp 1&2 efgU; kr dkYhP; k t=r ekB; k diµR; k Hkj Y; k-R; k QMkr nkequa 'k¶; kph \vee kcnk d: u d: u i kMya 'k¶; k \vee usd diµR; k oknxir gkr qi; k-

dtriP; k v?kknj gkyxhoj 'kt; k Qkjp gok fuekZk djk; pk- dtfrl kBh rksvkdæd lgk; pk- R; kpavax Qqxk; ps rksQMkr vkY; kurj l ekjP; k i Syokukyk l ykeh u djrkp i Syokukoj rtytu i Mk; pk vkf.k i fgY; k 5&7 fefuVkr dtfrh fpri V djk; pk- c&; kp oGk rksi Syokukyk fpri V djk; pk- i Syokukl h rksuhV dtfrhp djk; pk ukgh- i Syokukyk i wki .ksu i kMrkp i kMY; kpk nkok d: u QMkr xkalkGkpa okrkoj.k fuekZk djk; pk- FkkMD; kr i qp; k i Syokukyk Hk;] vkdædrk nk[kowp 50 VDdsxkj djk; pk- gh R; kph furh T; k T; k i Syokukwh oG[kyh rsrsi Syoku l gl k R; kP; k dtyhy furhyk cGh i Mysukghr-

 $nkeqe \textit{Mypk} \ [kG' \textit{kMar} \ grk-rks \times McM \ u \ djrk; \ sc; \ sc GsMko \ i \textit{k} \textit{k} \textit{kak} \textit{u} k \ nk \ [kok; \ pk-R; \ kp \ eGsnkeq' \textit{ko3} \textit{h} \ egkjk"V^a \ ds \ j h \ -kys \ u \ ds \ j h \ d/khp \ grk \ vkys ukgh- \ dp \ rks \ nc \ [kkok \ gkoHkko] \ Hkhrh vkdedrk \ bR; \ knh ukVdsd: \ u \ dlurh ftadk; \ pk-R; \ keGsegkjk"V^a \ ds \ j h l \ kBh \ xqkkapj \ th \ dlurh \ gkr \ grh] \ rh 'kQhyk \ d/kh \ teyhp \ ukgh- \ ekrij 'kQhuagkoHkko o \ ukVdad: \ u \ ek; \ mkG \ i \ Syokukauk \ vLeku \ nk \ [koya \ ek; \ mkG \ i \ Syokukauk \ dk; \ epstk; \ cmh \ dsya$

vkeP; k xYyhr 'kQhP; k rkMhpsrhu pkj i Syoku grs Hkxoku I koathj xki hukFk ykMj Egknk I krirso HkkÅ tkoGs 'kQhyk i kM.; kph rkdn o Mkoip vkeP; k i SyokukdMsgrs i j 'kQhP; k ukVdh gkoHkkokerGavkepsi Syokugh 'kQhi safVdko /kjr uûgrs HkkÅ tkoGscjkcj 'kQh [kGrkuk 2 rkI dlurh >kyh- i jarqdlurh 'koVh vfu.khrp jkfgyh- ek= HkkÅP; k xG; kryscnke 'kQhP; k Hkp; kP; k oj P; k cktnyk ykxyso 'kQhP; k Hkp; kP; k oj t [ke >kyhojDrcjp i Mys

R; kuarj vkeP; k xkokr vtm , d i Syoku rkdnoku grk-R; kpsukmo fgnk; r dk>h-gk i Syoku rkdnhua tkLrh grk- I kaxyhP; k i kMq I rkj ph 3AA rkI Okj vkcnk fgnk; r dk>hus dsysyh gkrh-'koVh dkrh tkMhoj I kMyh-

R; kp dkGkr dpjøkMhpk ; kno \lor koGidj gkgh i \$yoku c&; ki \$dh Qkekir grpk-rks I kaxyhykp jkgup dluR; k [kGk; pk- ; kno \lor koGidj o 'kQhpk HkkÅ \lor QIj ; kphgh dlurh mjl kr >kyh grph-rh dlurh tkMhoj I kMyh xsyh-

'kQhc: cj I ksyki ji ftYákrhy vud i SyokukP; k diµR; k >kY; k- R; kr 'kQh dkgh fBdk.kh i jkHkr >kyk o dkgh fBdk.kh fot; h >kyk

eachl; kP; k HkkÅ tkoGusl (Ink vuid dluR; k fpriV dly; k- HkkyokMhP; k nkeqxoGh cjkcj tkMhr I kMyh-mjl kr rGl achP; k ek: rh 'kskosyk rl p ekpujP; k dkGh i Syokuyk HkkÅ tkoGusijkHkur dlys rj I jdkyhP; k nxMmHkkd yscjkcj tkMhr I kVyh- ek= HkkuqHkkd ysyk i jkHkur dlys rl p i aj i jikr vicknkl i okjuaHkkÅyk, dnk i jkHkur dlys rj I kacksyk; k=r HkkÅuavicknkl i okjkyk, dnk i jkHkur dlys i kBdGe/; sf'kj I hP; k fdl u dk'khnyk gh HkkÅuai jkHkur dlys HkkÅ tkoGscjkcjp eachl; kr vgen elyk.kh Egknk I kri (r) ej ej yk dkj Mj nkeqpOgk.k f'kj I hpk fdl uk xk; dokM] Egknk cki qukx.k vkc eq 'kklh Egknk I kri (r) ej ej yk dkj Mj nkeqpOgk.k f'kj I hpk fdl uk xk; dokM] Egknk cki qukx.k vkc eq 'kklh i kidj I kl .k eyykli k 'kGdj [kV; kG ek: rh I koath] foBBy Hkxj rkR; k xk; dokM] djkli k i MoGj I qlk pOgk.k dkdk 'kGdj i kjkli k dksVh fo".kq pOgk.k xykc cicV ckcwcicV jke dkrkGj foBqxoGh vuxjpk nxMweyk.kh i (Gdptpk 'kQhpk HkkÅ vi I j] i aj i ji pk beke] i suji i kVdnypk i j HkqpkSkjh bR; knh i Syoku QMkr mj I kr o t=r pkaxy; k dlyR; k djhr gqs

 $\label{thm:linear} HkkÅ tkoGi \{kk o; kusdeh \lor I y Y; k i \$yokukph frIjh fi < hgh R; k dkGkr pkxyhp xktr grph-R; ke/; sxki kG I koath] jkek I koath] ek: rh okdMj ejjyh/kj I jdGj jktmz <math>\lor$ kki kG Hkkl y J \lor ′kkcl i MoGj unwi MoGj \lor ′kkcl gtkj gjh ekj ygwekj KkuqHkxj j foykl gkueku J \lor tiµ gtkj Q \lor DkMhhpk f ′kmj ccu \lor kr Mj fo".kr \lor korkMsox sgrs

Hkx rehi

ukukip; k uohu okin; kr , d [kkg/h o R; k i iępk l ki k ukukua , dk 'krdh [kkr; kP; k l kgckyk Hkkin; kuajkgk; yk fnyk-; k l kgckpauko pkskg/sl kgc gkrs pkskg/sl kgc vfr'k; i kekf.kd ek.kd gkrk-R; kph ck; dkgh LoHkkokuai eG o l ołek.kl kr fel G.kkj h gkrh- pkskg/sl kgckpauplrip yXu >kysyagkra rsl kaxyh ftYákrhy gkrs rst & vl Y; keiGs'kkdkgkj h gkrs nkikgh uojk ck; dks xYyhrhy l okākh feGw fel Gw j kgk; ps vkeP; k vk..kkphi/kckckl kc½ o pkskg/sl kgckph nktrh Okj pkaxyh teyh gkrh- rsvk..kkyk ugeh pkaxyaekxñ'klu djhr vl r- vkEgh 5 oh & 6 oh yk vl rkuk rsjkgk; yk vkysysgkrs R; kpajkgk.kheku c?kw eyk okVk; pāj ^vki.k ch ukbdj h ykxY; koj vl pjkgk; kpa R; kB; k ck; dkl kj [khp l f'ky l toHkkoh o l npj ck; dksvki.kkykgh feGkoh-

engh R; kð; k cjkrj l kt; kr tkÅu xlik ekjk; pks R; kdkGkrl; k; yk i k.kh nkekthÞ; k vkMkpsvk.kkosykxs rsl kgr o en ugen nkekthÞ; k vkMkpsi k.kh vk.kk; yk tk; pks

vkM vkeP; k xYyhik l w r l k nyip gkrk- Qyhax nku Qyhax nyi gkrk- , o<; k varjkr rs eyk f'k{k.kkcnny cjpal ekxħ'kū djhr vl r- ckyrkuk eh R; kB; k'kh 'kkn ckyr; kpk iz Ru djhr vl so R; koGh ek>s'kCnkposmPpkj xkojku fu?kr- uædk dkskrk 'kCn ckyrkuk dB okijk; pk] gsy{kkr; r u0gra l kgc 'kkdkgkjh ek.kul rsEg.kky\$^

v/kuu&e/kuu l kgckac: cj eh] d".kno] jkek ca(nhcG [kGk; pks l kgc ukukP; k u0; k
okM; kr j kgk; yk vkys rs vkeP; k Qkj Qk; | kps >kys vkEgh l kgckeGs l a(kkjr xsyks
vkpkj&fopkjkr l kgckaeGs Qjd i Myk-vkeph vkbZ vkEgkyk l oZ yadjkauk Hkji ji nak [kkÅ
?kkyk; ph-jkfgysysnak ojok ykonu bZdk; ph-rh nakkr d/khp i k.kh fel Gk; ph UgkbZ dkjanak emxays
l kgckauk ?kkyk; ph-R; keGsl kgckB; k eukr ?kjkrY; k vkeP; k l okicnny vknj o i e gkrs l kgc
c&; kpoGk l kB; kyk ckckl kgckyk c: cj ?ksÅu tak; ps vkeP; k ?kjkr x0gkP; k i kG; k
l .kkokjkykp dY; k tkr- ugeh Tokjhph Hkkdjhp dsyh tkbZ l kgckP; k ?kjh jkst l dkG l kB; kyk
x0gkP; k pikR; k½i kG; k½ dY; k tkr- v..kk vkbZyk Eg.kk; pk] ^^vkb] l kgckP; k ?kjh Hkkdj ?ksÅu
tk; kyk ykt okVrs rwek÷; ki jiR; k pks u pikR; k l kB; kyk djr tk-** vkbZcj Eg.kk; ph- vkbZ
vk..kkl kBh pks u pikR; k d: u yi u fBok; ph- eh dakh&dakh yi onu fBoyY; k pikrhe/khy
dkj&prdkj pikrh pks u [kk; kpks ex vk..kk eyk cnMu dk-k; pk- eyk vkbZuao cki uuad/khp
ekjya UgkbZ cki w QDr Qkj jkx vkyk dh f'kojkG cksyk; pk- vk..kkekruj eyk usgeh&usgeh
cnMk; pk- ek÷; k i kBhoj cfg.k gkrh- frpa uko i k: - HkkM.ka > kyh dh i k: eyk gkrkP; k u [kkua
vkjcMu dk-k; ph- vk..kk cnMk; pk] i k: ckpdjk; ph- nk9kkP; k e/; sek>h Qkj xkph 0gk; ph-

 $\label{lognormal} I \ kgckP; k\ ?kjh\ \lor k...kk\ jkstp\ tk; pk-I\ kgckP; k\ QMatkrkuk\ pkaxyh\ LoPN\ dki\ Ma?kkynu tk.; kI\ kBh\ \lor k...kk\ \lor kb3yk\ jkstp\ I\ kc..kkuadki\ Ma/kpk; yk\ ykok; pk-eh jkstp\ rG; kyk\ tkr\ \lor I\ s$

ikjkph ckGkrh /kpk; yk- R; kcjkcj eh ek>h Lor%ph diMgh /kqr vIsijarqdiM; kyk Ikc.k feGk; paUgkbZ

Egl hyk o§.k Vkd.k@ik.kh ikt.k@ikk.k&?kk.k dk<.kaeykp djkoaykxk; pa /kkj ekrij vkbZdk<k; ph- vkbZtjh oyh ckGrhu vl yh] rjhgh Egl hph /kkj dk<k; ph- vkbZnvlkr ik.kh d/kh fel Gk; ph UgkbZijarq d/kh&d/kh MkGk poplou fttkbZnvlkr ik.kh fel Gk; ph- fttkbpa okx.ka c&; kp oGk [kkYkjMi.kkpavlk; pa vkbZTokjh fodnu ydjkok [kpZHkkxok; ph- fttkbZekrij Tokjh fodnu i\$ k vki Y; k xkBhyk ykonu fBok; ph-

ckckl kc%vk..kk½ c\$/koj tk; pk- ?kjh vkyk dh mH; k mH; k c\$/xklMhrwup c\$/kps nkj l kb/lw | k; pk- ex ehp c\$/al kb/lw nko.khyk ck/lkk; pks xkMhryal xGal keku ?kjkr vk.kw ykok; pks l ki R; k f[kGk ?kjkr vk.kw Bok; pks c\$/kouk o\$.k dki w Vkdk; pks l ki; kyk i b/ [kijkd pkjk; pks c\$/kouk o\$.k dki w Vkdk; pks vk..kk c\$/xkMhrw mMh ekjk; pk rksFkb/ Ugk.khr tk; pk- vk..kk; k; P; k v?kkonj vkbZvk..kkyk vikoG dj.; kl kBh xje i k.kh] f'kdokbij pMMh] Vkb/sy Ugk.khr uonw Bok; ph-vk.kk nxMkwarkl &rkl i k; ?kkl k; pk- uarj MkD; kyk f'kdokbij ykok; pk o L0kPN Luku djk; pk-l kc.kkwa/korysysika; jskh/kz di Ms?kkyw l kgckP; k ?kjh tkÅu cl k; pk- vk..kk 'krhpsdke djhr vl yk rjh , [kk|k wkodjnkjkl kj [kkjkgkr gkrk-l ki; kyk l kgckcjkcj tok; pk- eh R; kpsto.kfrFka usÅu | k; pks d/kh&d/kh R; kP; k MC; kryh pikrh dk<w ?; k; pks urj rs?kjh vkY; kurj pikR; k deh dk ?kkrY; k Eg.kw vkbi/k HkkM/k; pk- vkbZEg.kk; ph]^^ 5 pikR; k ?kkrY; k gkR; k-**

∨k..kk Eg.kk; pk^^pkjp pikR; k gkR; k**

ex vk..kk eyk cn/mu dk<k; pk-rocryk fl usek cnyyk dh] vk..kk o pk\$kgyd kgc jkrP; kyk 9AA oktrk fl usekyk tk; ps eh R; kB; k ekxaykxk; pks i jarqvk..kk eyk d/khp fl usek c?kk; yk cjkcj ?ksÅu tk; pk Ugkbł vk..kk fl usek c?kk; yk xsyk dh] eh ekxkow pks u tk; pks e/; rj >kyh dh QqlV fl usek c?kk; pksvl sfdrhrjh v/kBv/kBfl useseh cf?krysgkrs dakh&dakh pk\$kgyd kgc ek÷; k frdhVkpsi\$ s | k; psijarqvk..kk eyk R; kB; kcjkcj d/khp; sÅ | k; pk Ugkbł nkjkfl ak] efgi kypsv/kBv/kBfl Dpj fdrhrjh eh i kfgysgkrs

, [knk xkokar fdaxdklik fl uæk ykxyk gkrk- R; kr nkjkfl ax o fdaxdklik ; kaph dlurh i kgk.; kl kj [kh gkrh Eg.kwu vusd yksd rksfi Dpj c?kk; yk tkr gkrs , dsfno'kh vkbidMwu gVV d: u i \$ s?ksåu eh fi Dpj c?kk; yk xsyks fi Dpj c?kk; yk xnhicjhp gkrh-

 $fi\ Dpj\ c?kr\ \lor I\ rkuk\ \lor keP;\ k\ 'kstkjP;\ k\ ek.kl\ kyk\ ,\ dk\ ek.kl\ kuatfic;\ kua\ HkkrdI\ ya\ R;\ k\ ek.kl\ kph\ \lor krMh\ ikVkrwu\ ckghj\ \lor kyh-\ rksek.ku \ \lor krMh\ gkrkr\ ?ks^Au\ rctl;\ k\ ckghj\ xsyk-\ [kuph\ i\ Gw\ xsyk-\ ,\ o<h\ I\ xGh\ ?kVuk\ ek÷;\ k\ toG\ ?kMwugh]\ eyk\ dkghp\ dGyallgkbl\ dkj.k\ fi\ Dpj\ c?k.;\ kr\ eh\ Qkjp\ rYyhu\ > kyksgkrks\ o\ fi\ Dpj\ P;\ k\ \lor koktke\ Gseyk\ dkghp\ dGysukgh-$

esysyk eu(); ok.; kpk gkrk- n() &; k fno'kh R; kpk nQufo/kh e&; kbP; k i kBhekxP; k Le'kku Hknehr >kyk- rksesysyk ek.kn dl yk gkrk] c?k.; kl kBh eh frFksxsyks ekBk [kMMk i kMyk gkrk- R; k [kMM; kr R; k ek.kl kyk cl foysgkrs urj R; kP; k Hkkorkyh fEkBkph i krh vkryh- R; kyk feBke/; siwkZ>kdnu Vkdyso urj ekrh <dynu rks[kMMk cqtoyk- rksi kfgysyk nQufo/kh eh y; fnol foljynUgkbZ

ek>ao; 16&17 o"kkipagqra gso; /kkD; kpaEg.krkr R; kph tk.kho eyk gkså ykxyh gqrh-ekb; k eukr fHkUu fyakh \lor kd"kIk fnol finol ok<r gqra eh ekb; ki {kk tkLr o; kP; k eŋyhdMa \lor kdf"kir gkr gqrw rl po eyk okjøkj Loluai Mr gqrh- R; k Loluke/; s eh dlpY; krjh ekb; ki {kk tkLr o; kP; k eŋyhcjkcj xli k ekj r \lor l Y; kpk Hkkl gkr gqrk- \lor k'kk rj ekb; k Lolukr ugehp; r gqrh- R; keqGa ek>a y {k uhV \lor H; kl kdMaykxr u0gra eh l §Hkf \lor f/kd >kysyksgqrks

v/kww e/kww eh l k/h feGkyh dh ckHkr@xkoyk tk; P; k , toth l qkbP; k xkoh tkÅ ykxyks ckHkr@xkoyk tk.kaFkkkMadeh >kyadkj.k ckHkr@xkoi {kk l qkbP; k xkoh tkLr djer gra R; kyk nkw dkj.kagrh-ifgyadkj.k Eg.ktseko'kh ckHkr@xkokrjkgk; yk vky; ki kl wackHkr@xkoyk tk; yk ifgY; kl kj [kk vkwn okVwkl k >kyk grpk-dkj.k eko'kh ek>k Qkjp jkx jkx djk; ph-nt ja dkj.k Eg.kts l qkbP; k xkoh vk'kker@s eh tkLr vkdf"kir gkr grpks frija dkj.k Eg.kts ckHkr@xkoi {kk l qkbP; k xkoh tk.ka; skadj.kal ki agra dkj.k rsxko jkMoj grpavkf.k eaxly; ki kl w toG gra eh pkj vkB fnol kyk d/kh ch vk'kkyk HkV.; kl kBh l qkbP; k xkoh tkÅ ykxyw, l -Vh-yk tk.; k; s; kpai \$ a eyk vk'kkdMw fdok l qkbZdMw feGr vl r-c&; kp o@k vk'kk eyk p&hyk i kp&ngk #i; snr vl s R; kr ek>k tk.; k; s; kpk [kpZHkkxr vl s

vkrk eyk vk'kkP; k vkf.k ekb; k HkWhxkBhph Loluai Mr girh- frpa#i ekb; k MkG; ki i ka okjokj; r gira fryk i kg.; kl kBh o HkW.; kl kBh eh vfr'k; vkriji gkr girkseyk d/kh d/kh ekÖ; k eukr; skk&; k fopkj kpk j kx; r gkrk] r j hgh eh udGr vk'kk cnny udksrksfopkj djrp j kfgyks

Eg.kw. eh l çkbl²; k xkoh xsyks ijesojnknk²; k uklî; krhy dqkkparjh ijxkoyk yKu gkra R; kdkGkribkl dj.kaQkjp [kMrj gkra okgkukl²; k l ks h ulgR; k-jLrspkaxysulgrs unhoj o vks; koj iny ulgrs ibkl paed; l k/ku csyxkMh gp gkra

eyk vk'kk R; k yXukyk cG cG ?ksÅu xsyh- 20&25 cSyxkM; k yXukyk fu?kkY; k-eh]vk'kk]vk'kkph , d psyr l kl [] frph nku ygku esy $\frac{1}{2}$ vk'kkph vktr l kl [] vtu , d nku ek.kl a

, dkp c\$yxkMhr clyks vkeph xkMh l oZxkM; k0; k i qagkrh- R; kfno'kh i gkVao l dkGh R; k Hkkxkr Qkj ekBk i kÅl i Myk gkrk- R; k i fj l j krhy l oZunh o ukysrtNnc Hk: u okgr gkrs okVr, d vksk gkrk- rkgh Hk: u okgkr gkrk- R; k vks; kyk i ny u0grk- vks; kpk vnnkt u ?krk vkeP; k xkMhokukua xkMh vpkudp vks; kr ?kkryh- ugehP; k okVnaxkMh u tkrk] okVB; k cktnyk vl yY; k [kM; kr xkMh xnyh- i k.kh xkMhP; k l kB; kr vkys vkEgh tke ?kkcjyks {k.kHkj dk; djkoars vkEgkyk dGnk\ ckdhP; k xkM; k vkeP; k i kBhekxp gkB; k- R; k xkMhrysykclgh tkj tkjkr vkjMnykxys i kBhekxP; k xkM; kne/kY; k ek.kl knuh R; k0; k xkM; ke/knuai Vki Vk mM; k ekjY; k vkf.k rsvkeP; kdMa vkEgkyk okpo.; kl kBh /kkÅ ykxys

 $brD; kr \lor keph xkMh i yVh > kyh- \lor keP; k xkMhr ck; dk e gyagkrh- eyk o xkMhrhy brj nk8kkuk pkaxyai kgrk; r gkra \lor k'kk o nq &; k nku ck; dk \lor kf.k nku e gykuk i kgrk; r u0gra rs tke ?kkcjysgkrs \lor ksk tkLr [kksy u0grk- mFkGp gkrk-I k/kkj.k Nkrh brdsi k.kh gkrs R; keqGaeh ek>k Lor%pk tho <math>\lor$ xnh I gt okpow'kdyks \lor I rks i k.; kyk \lor ks brdh tkjkr gkrh fd] dkgh {k.kkr \lor k'kk] nku ck; dk o nku e gyai k.; kr xk; c > kyh- dkgh {k.kkr rsnku dkl &; kP; k \lor rjkoj fnI wykxys QDr R; kpsgkrp fnI wykxys

eh ekxpk i grpk fopkj u djrk o Lor%P; k thokph i jok u djrk] I j G v k'kkd Maoxkr i k.; kruu i Gro i ksgr xsyks xkMh ft Fkai y Vh > kyh gkrh] fr Fkuu rhu pkj dkl &; kP; k v rjkoj v k'kk my Vh&i ky Vh gksåu okgkr pkyyh gkrh-rsv rj eh dkugh {k. kkr i k.; kruu pkyro i ksgr i kj dsya R; ko Ghekö; kr, o < h v pkud 'kDrh dkpu v kyh-rseyk v tuugh letr ukgh-eh v k'kki; ir i kgpyks i fgY; kunk v k'kkP; k f> T; k e kö; k gkrh y kxY; k-eh R; k ? kVV i dMY; k v kf. k R; k f> T; k i dMuu ckgj v kswykxyks i k.; kyk v ks. O kj v I Y; ke Gav k Eghnkökgh i k.; k cj k cj [kkyh [kkyh okgkrp pkyyks {k. kHkj eyk ok Vy] v krk v k Eghnkökgh okp. kadfB. k v kgs v k'kk ftor v kgs dk eysyh v kgs gsdkughp d Gurkdru ûgra

vktucktupk QDr xydk , sdw; r gkrk]^^okpok! (kpok! /kjk!** i.k okpok; yk vkysysdqkhp fnl r u0gra de]/ke]l a kskuavkEgh i k; a, dk Nkb/; k dl Y; krjh >Mikyk vkMdyks eh 'koVi; ir vk'kkP; k f>T; k l kMY; k ukghr- ekxP; k xkMhrhy pkj i kp ek.kl a vkeP; kdMa i k.; kruu i Grp vkyh-^/kjk! /kjk!** Eg.kuu vkj Mwykxyh- eyk dkghp fnl r u0gra brD; kr nk9kk fr?kkuh vkEgkyk i dMya vkf.k vkEgk nk9kkuuk i dMuu i k.; kP; k ckgj vk.kya

 \lor k'kk i wkZ cskuln \lor oLFkur gkurh- eh i wkZ'kulnhr gkurks eyk {k.kHkj okVy3] \lor k'kk esyh \lor I koh- eh i ψ rk ?kkcjyksgkurks ekxP; k xkWhrhy 10&20ek.kI a \lor keP; kdMai Gr \lor kyh-

dqkhrjhcksyyaj^R; kikjhP; kikVkryavxmjik.khrjdk<k-** Hkkorkyhyksdkoh xnhZ Okj teyhgkrh-^cktnykljk-cktnykljk-**vladkskrjhEg.krgkra, dkek.klkuavk′kkyk mFkkuatehuhoj>kioyanqk&; k, dkek.klkuavk′kkP; kikVkojtkjkrnkcfnyk-nkcfnY; kcjkcj vk'kkP; k rkMkruu i k.kh ckgi i Mwykxya vlacjkp oG dj.; kr vkya plaxyacknyh nksu cknyh i k.kh i kVkruu ckgi dk<.; kr vkya tlai k.kh i kVkruu ckgi i Mr xsyi rlarlavk'kk gGwgGw'kqnhoj; r xsyh-v[kj vk'kk i qkl'kqnhoj vkyh-

vkeP; k xkMhrhy ek.kla okpyh dk esyh rs eyk ekfgr u0gra dksk rjh cksyyimvkeP; k xkMhrhy , d ygku i kgixavkf.k , d Egkrkjh ckbil th vk'kkph vktr&l kl qgkrhl rsokgkow xsysgkrs ckdhph ek.klaokpyh gkrh- eyk gh ckreh dGY; kuarj Qkj n&[k >kya nkblgh cSy xG; krhy nkoh rkMnw okpysgkrs ftdMafrdMajMk; pk dkyok pkyngkrk- vk'kkP; k?kjkrhy , d ckbZo , d esyxk okgkow xsysgkrs dkogh ek.klaR; kwk ykci; ir 'kkdk ?kr xsyh gkrh- ijarqR; kpk 'kkdk dBp ykxr u0grk-

n(jadkskrjh cksyy $3^{^i}$ kj xa15&16 ojl kpp gk;] ij ikjkpa/kkMl adl yaEg.kkobdk; chEg.k \lor k'kk] rgyk ák i kj kua[k: [kj p uok tUe fnyk-**

vk'kk ekÖ; kdMaikgkr gkrh- eh frP; kdMaikgkr gkrks frP; k MkG; kruaik.kh; sr gkra okgkonu xsyY; k Egkrkjhpk o R; k ygku i kjkpk yksdkuh [kii 'kks'k ?kryk i jarqrsl ki Mysukghr- 'ksvVh 3&4 rkl ku l oZcSyxkM; k ek?kkjhfQjY; k-yXu u djrk o&gkM vk'kkP; k l kl jh ek?kkjh vkya

 $xkoh \lor kY; kurj \lor k'kkps of My \lor k'kkyk HkVk; yk \lor kys \lor k'kkyk eh okpoyags R; kuuk I etyao eyk rs Eg.kkył^ikjk] rwdqkkpk dksk\ ekÖ; k egyhpk i k.k okpoyk- [kjip rps vkf.k \vkepsdkgh rjh ekxP; k t Uekps_.kkuplk <math>\lor$ I ysi kfg tr- \lor k' kk] gk 'kkGr t krksdk***

 $\label{eq:clik} $$ clik]^{k} ky =

 I çkbiyk dkskp uûgra eh I çkbidMaxiyks dh rh ek>k Qkj ykM djk; ph-vku ekb; kcjkcj vk'kkpkch ykM djk; ph-vkEgh I çkbP; k nijP; k ukR; krysgkrks ij eyk o vk'kkyk rh tho dk i ik.k djhr gkrh-vk'kk nik[kh gk; fryk uojk dok cksyr Ugk; - rjhch vk'kk I kl j I kMwu ekgi yk tkÅu jkgkr Ugk; - vk'kk Qkj I kf'kd vku pkfj=; oku vkgs uojk cksyr Ugk; Eg.kwu rh dißY; kgh i j i ¢#"kk'kh I yxh I k/kr ukgh-QDr ek>avku frpa e\$hi wklukrat@ysyavkgs gs I çkbiyk pkaxya Bkmd gkra I çkbiyk okVk; pa ^vk'kkP; k thoukr eh dk; epk vI kp jgkok-; k vkeP; k ukR; kyk uædadßyauko | koags ek= vo?kM gkra vkeP; k I cakkr fnol finol ok< 0gkoh vu vk'kk I ([kh 0gkoh v'kh eukeu bPNk I çkbiph gkrh-rh ekb; k o vk'kkP; k e\$h I cakkoj d/khp vk{ki ?kr uûgrh-

 $eh \lor / kuu e / kuu , [kkn not jh l \nstruct{v}h feGkyh rjh frP; k \lor ks: huafrP; k xkoh tk; pks ro< kp fryk fojacGk okVk; pk- <math>\lor$ kEgh \lor / kuu e / kuu frP; k eko'khdMatk; kpks ekb; koj frpk brdk tho i kguu okM; krY; k ck; dk \lor kf.k frph eko'kh Eg.kk; ph]^^dk xa \lor k'kk] i ki Vyk dk; rwoVhr ?kskkj q\$ dk; \lor **

 $\label{eq:continuity} rh\,eyk\,,d\,fno'\,kh\,Eg.\,kkyh]^^\vee krk\,bFhuu\,i\,\epsilon_aNkb/h\,Nkb/h\,i\,\iota_{\!\!L}rdaokpr\,t\,k-\,eh\,r\,r_{\!\!L}yk\,nb\,Lu\,okpk;\,yk^{**}$

eh Eg.kykg^^vkeP; k xkoh , d Qkj ekBauxj okpuky; vkgs frFka Qkj i l μ rda vI rkr-frFkatkÅu eh okphu**

 $rh \ Eg. \ kkyh]^^rwtj \ okpwykxykl \ rj \ rph \ Hkk"kk \ l \ (kkj \ y) \ rwpkxyk \ fopkj \ d\#' kd'khy \ vkf.k \ thoukr \ dkgh \ rjh \ d\#u \ nk[ko'khy**$

 $eh \ Eg. \ kyk]^{-} \ eyk \ ; \ ko; \ kr \ okp.; \ kpaoM \ deh \lor kgs \ \lor kf.k \ r \ yk \ Hkb'.; \ kpaoM \ Okj \ \lor kgs$ rjeh dk; d#**

eh Eg. kkykg^^eyk vkRrkp rsokpY; koj R; kryk vFkZdGk; pk ukgh**

rh Eg.kkyh]^^i øgk i øgk okp] I etø; ir okp- Eg.ktsvki ksvki røyk dGsy**

eh Eg.kkyk]^^rwdk; fyfgr vI r1 **

rh Eg.kkyh]^^dFkk] dfork fyfgr vI r**

eh Eg. kkykg\^^ ex; k dFkk dfork fyguu rudk; djr vI rd **

rh Eg.kkyh]^^; k dFkk dfork eupbZiq; kP; k ekfl dkr NkiY; k tkrkr-ex cjp'ksyksd okprkr] dFkk dfork vkoMY; k Eg.kwu yksdkuph i =a; rkr] vtw rwygku vkgs - ryyk ekb; k dFkk vkf.k dfork vkRrkp dGk; P; k ukghr- ekb; k dFkk dfork T; k fnokGh vidkr vkf.k ekfl dkr vkyy; k vkgr-rh ekfl daQkj rj rwc?k-**

eh Eg. kkykseyk R; k dFkk okpk; yk ns eyk R; k fuf'pr dGrhy- fruaeyk ekfl da nk[koyh- R; kr dFkB; k [kkyh o dforB; k [kkyh frpauko Nki ysyavl k; pa rseh okpk; pksvkf.k R; kryh fp=ac?kk; pksNkV; k NkV; k xksVh okpk; pks

 $frpsoMhy\ ekBsi\, (kkj) h\ gkrs \ R; kill; k\ ?kjh\ [kii \ okguagkrh]\ VMDVj\ gkrk]\ ekB'kj \ I \ k;\ dy gkrh]\ thi\ gkrh]\ d/kh\ d/kh\ eh\ vk'kkcjkcj\ R; kill; k\ xkohgh\ tk; pks\ riligk\ eh\ frP; k\ oMfykP; k\ thi\ e/knu\ fQjk; pks\ frP; k\ oMfykpk\ eGk\ Qkj\ ekBk\ gkrk-eG; kr\ ckxk; r\ nkMxagkra\ xMh\ dkekyk y;\ gkrs xkV; kr\ tukojay; gkrh-fgj\ y;\ ekBh\ gkrh-vku\ xkokr\ ekBa?kj\ gkra\ frP; k\ oMfykyk HkVk; yk\ i (dG\ ek.kl\ a; k; ph-frpsoMhy jktdkj.kkr\ dkPY; k\ rjh\ ekB; k\ i nkoj\ gkrs\ ijrqueD; k dkPY; k\ i nkoj\ gkrs\ gseyk\ I\ etr\ u0gra\ ehp\ , dnk\ vk'kkyk\ fopkjyij^n vk'kij\ rpk\ ck\cdot\ dkPY; k\ i nkoj\ vkgs^**$

rh Eg.kyh]^^ukjk; .k]ck- Eg.kwh oMhy Eg.kkoaek>soMhy >Mi hoj \vee kgr-** eh fopkj y3^>>M i h Eg.ktsclk; \vee I r3x**

 $\label{likelihood} $$ rh Eg.kkyh]^> M-ih- Eg.ktsftYgk ifj"kn- rh, dftYákryh ekBh xkeh.k lk.Fkk vkgs gh lk.Fkk xkeh.k Hkkxkpk fodkl djhr vl rs jLr jik.kh i joBk] 'krh l (kkj.kk b- dkeaftYgk ifj"kn djhr vl rs**$

eh EgVy3^^rpsoMhy uedadk; dke djrkr frFka**

 $\label{eq:continuous} $$ rh Eg.kyh]^ek>soMhy>M-i h-r I Hkki rh $\lor kgr^{**}$ I Hkki rh Eg.ktsdk; $\setminus gseyk ekfgr u0gra eh xIi cI yks$

, d fno'kh vk'kk eyk I ksyki ji yk frP; k eko'khdMa?ksÅu xsyh-frP; k eko'khpa?kj pkGhr gqra vkEgh frFkaxsyksrok frFkysyksd vk'kkdMaMkGsQkMuu QkMuu c?kr gqrs dkj.k vk'kkpa I kbh; Z vkf.k j kg.kheku-frpk dkdk dl\$arjh feye/; sdkekyk gqrk-frP; k eko'khph vkfFkd fLFkfr crk ckrkphp gqrh- vk'kkpsvkbZoMhy t I sf'kjear gqrs r I seko'kh&dkdk u0grs

vkEgh I kykinjnyk xN; kuarj [kni /keky vkf.k etk dayh- vk/kMP; k i I iz/; s Hkjinj i S s vI k; ps frP; k vkbZoMhykph f'kjerh vI Y; keGs fryk i Skkyk dkgh deh u0grs rh vfr'k; I <G gkrkuaekb; koj i S s[kpZdjr grh- vkEgh I kykinje/; svkbJ dhe [kkYy]nuk"Vk dayk vkf.k Hkkxor fFk, Vje/; sfi Dpj c?kk; yk xyks eh vk/kk vkf.k vk/kkpk , d eko I HkkÅ tksekb; kp o; kpk grk- R; kpauko ^fnyhi * gra rksekb; k o; kpk vI yk rjh ekb; k vI ay {kkr vkyadh] R; kyk fi Dpj] uVuV; k] xk.kh] fi Dpjph dFkk; kcnny brdkjI u0grk- f'kok; R; kyk ekb; k brda ckgj pavkd"kZkgh u0gra ekb; k vk; (j; kr fFk, Vjyk [kphbj fi Dpj i kg.; kpk , d n(je)G; kx grk-nokum ofgnk j gekupk ^uk3nksvkj x\lik* gk fi Dpj Hkkxor fFk, Vjyk ykxysyk grk-

ofgnkpal kin; Zc?knu eh R; k o; krgh \vee fr'k; gjj Gnu xsyksgqrks ek>h l kin; \hbar ~Vh i kgqu \vee k'kk pfdr gkr gqrh-o \vee /knu e/knu ek>h ps*Vkgh dj r gqrh-

Hkkx pkohl

b; Rrk 7 ohyk jkenkl x#th f'kdok; yk grps R; ker@sek>svkf.k d".knopsvodxf.kr Okj pkaxys>kysgrps vodxf.krkrhy dkg]dke]ox gh i dj.ksvkEgkyk Okj I ki h okVk; ph-eh jkenkl x#thP; k?kjh jkgrup vH; kl djk; pks rs, dek>svkn'kZf'k{kd grps rsxf.kr f'kdohr vl rkuk oxoxGsfoukn I kaxr-fo | kF; kibj thokikM i ie djhr vI r-R; k i iek.ksrsLor%; k dkGkr vákJ/nk fueilyukpsdkegh djhr vI r-; k dkGkr vákJ/nk fueilyu dj.ksbrdsl ki sulgrs rsOkj/kkMI kpsdke grps dkj.k I ektkr 90 VDdgru vf/kd ykd vákJ/nk eku.kkjsgrps, o<; k ekB; k ykdki; k fojkkr tkÅu dke dj.ksl ki sulgrs

eh rj tUeY; kikl wp valkJ/nB; k fojkskrp gyrks ek>s vkbł oMhygh valkJ/nB; k fojkskrysgyrs vkeP; k I a wkł x Yyhr ODr vkepp ?kj valkJ/nB; k fojkskr gyrs vkf.k rs I a dkj vkeP; koj >kysysgyrs eyk vkti; irP; k thoukr Hwrk[krkp] dj.kh&/kj.khp] Hkkukerhpsi (dG vut)ko vkysgyrs o vtw; r gyrs ijarq 'kovh eyk R; k vut)kkokrw vl sdGw prdysgyrsdh Hkur[kr] Hkkukerh] dj.kh/kj.kh I xGs[kkt/svkgs tUe >kY; kurj ek>si k; myVsc?kw ykod eykp Hkur Eg.kkys ijarqeh Hkur u0grksgsdkGkvrh fl /n >kys HkkysokMhrhy 'krkr oM; k ek.kl kykp eh Hkur I etw ?kkcjyksgyrks ijarqurj dGysrksek.kh oMk gyrk- vkeP; k ?kjkoj nxMai Mr gyrh- I xGa xko Hkkukerhpk i dkj vkgsvl aEg.kr gyra ijarq'koVh rksHkkukerhpk i dkj u0grk gsm?kM >kys cyk txrki; rkGckP; k ekGkoj vekokL; B; k jk=h ek.kl kP; k vakrhy Hkur dk<hr gyrs R; kauh vkeP; k 'kkGr; såu I ktxrysHkur&[kraul rkr- rks, d ekufl d [kG vkgs th ek.kl aeukuaQkj nriy vl rkr R; kauk ekufl d vk?kkr I gu u >kY; ke@sHkur ykx.; kpsekufl d idkj gkr vl rkrgsR; kauh vkegk fo | kF; kil ekj dcy dsysgyrs; k I olvut)koke/kw o I adkjke/kw ek>aeu dVVj valkJ/nB; k fojkskr cuysgyrs eh jkenkl xr#thdMsf'kdo.kh ykoY; kurj xr#thB; k vl ay{kkr vkya dh] eh valkJ/nB; k fojkskr vkgs Eg.kwp R; kuh ekb; kdMw xkokr , d y; ekBa valkJ/nsyk rMk nskkjadke d#u ?krya R; kpavl a>kya

, d fnol vkeP; k xkokr , d Hkknnwckck vkyk gyrk-rksEg.kr vI sdh eh dqkkoj dj.kh&/kj.kh >kyh vI yr j dk<w'kdrks dqkkyk Hkur ykxyavI yr j rseh dk<w'kdrks fdæk Hkkukerhph v?kkjh fo | k >kyh vI yr j eh rh nji d# 'kdrks R; kI kBh rks dj.kh&/kj.kh >ky½'; k ckf/kr 0; Drhyk fdæk Hkur ykxy½'; k 0; Drhyk , dk i ½/y½'; k vkdVh²; k toG cI or vI s frFka , dk vkdVh²; k 'kstkjh rkscæk fyævBør vI s vkf.k rksifgY; kmk eukrY; k eukr dkghrjh eæ Eg.kr vI s rkseæ R; k fyækøj Vkdr vI s eæ VkdY; kuærj fyæv vpkudi.ks10&15 Q½ nji nji gGwgGwi Gr tkr vI s ex rkscæk nkok djr vI sdh] eh R; k Hkurkyk fædæk Hkkukerhyk ; k fyækr dkælysgyrs o R; k fyækyk eh i Gow ykoys rsfyæv10&15 Q½ nji gGwgGwtkr vI s R; koGh R; k

fyscke/khy Hknrkpk \lor kRek nij i Gw xsyk \lor l srksHkkl ohr \lor l s fyscwi Gr \lor l Y; kelGsl xGk xko \lor k' Pk; ibfdr qn qnrk-

 $eh \ Eg. \ klyklj^{\wedge} \lor keP; \ k \ xYyhrysyktd \ Eg. krkr \ ijarqeh \ rksiz, \ kx \ \lor tuu \ i \ kfgysyk \ ukgheh \ \lor kt \ i \ kqk. kkj \ \lor kqs^*$

jkenkl x#th Eg.kky}^eh gh R; k copkph pkyckth i kgk.; kl kBh rlp; k xYyhr vkt; skkj vkgs rj rwvkf.k rops pkj i kp fe= ekb; kcjkcj pyk- vkf.k eh l kxrks ro<a dke djk; på*eh fopkjy}^dk; djk; på**jkenkl x#th Eg.kky}^nrwvkf.k rops pkj fe= frFka Fkkock; på vkf.k fyocw10&15 Qw i Gkyadh >Vfn'kh rsfyocwpyw i Gk; pavkf.k rsfyocw?kåu i kfyl LVskuP; kl ekj ; k; påeh ropP; k ekxkockx ; rkp ex rsfyocwvki.k QkStnkjkP; k l ekj Båu R; kr dk; pkyckthvkgsrsQkStnkjkouk nk[kå-**

eh rhu fe= xkGk dsys Hkkxor ?kgy] nkek ykMi] fo".kwxoGh- vI svkEgh pk8ksfe= ftFks copkpk i; kx pkywgrk- frFksxsyks FkkMi; kp oGkr frFksjkenkI x#th vkys jkenkI x#thuh vkEgkyk MkG; kua [kqkoya vkEgh fyœwftFki; ir i Gr tkr grafrFkaR; k Vkcdkoj Fkkœyks jkenkI x#th copkP; k i kBhekxstoG mHksjkfgys rsckjdkbiusfufj {k.k djhr grs gk copk uedh gkrpyk[kh dk; djrksr3\ x#thB; k fufj {k.kkruu nksu rhu xksVh i &svkY; k- rkscopk R; k i VyY; k vkdVhtoG R; k P; k toGpp, dp fyœwBorks nq &; kuh fnysysfyœwBor ukgh-x#thuk I ak; vkyk-T; kvFkhl vki Y; k toGpa, dp fyœwBorks nq &; k i VyY; k vkdVhtoG Borks R; kvFkhl R; k fyœke/; s dkghrjh oLrwvI .kkj-f'kok; rkscopk R; k fyækyk dqkkykgh gkr ykok; yk i jokuxh nsr u0grk-rks I karr grpk dh] ^tks dkskh ek.kh vtk.kri.kkusfdok empakei .kkus; k fyækyk gkr ykosy R; k ek.kl kpsMkGstkrhy-fdok R; k fyæke/khy Hkurkpk vkRek R; k ek.kl ke/; si osk djsy-* v'kh fHkrh rkscktnyk mHkkjkfgyY; k c?; kuk ?kkyr grpk-R; keGsc?ks R; k fyækik kl uu nji mHksjkgkr-

ifgY; kmk Hkur ykxyY; k , dk ckbZyk R; k copkua vkdVhP; k 'kstkjh cloya R; k vkdVhikl w 15&20QW ykoc Qj'kh Vkdyyh gnph-Hkur ykxyY; k ckbZysukrokbZd o c?ksvl snksu rhu'ksyksd Hkkorkyh mHksgnps ifgY; kmk copkus vkdVh i Yoyh- R; k Hkur ykxyY; k ckbZyk vkdVh 'kstkjh cloys R; kusR; k ckbP; k vakoj 'Nw·* eRrij Eg.kw dk; rjh ea= Vkdyk- R; k ckbP; k vakoj vakkj k Vkdyk- R; k cjkcj rh ckbZ?knewykxyh] vkjMwykxyh- vkf.k Eg.kwykxyh-^vjs·copk! eh; k >kMkyk l gk efgus/kjysvkgs gh >kM Qkj pkaxyavkgs eh gs>kM l kMw tk.kkj ukgh-** vl sEgVY; kurj copkusvkiY; k dk[kr vl yY; k >kGhrw , d Lisky fyncuckgj dk<ys vkf.k rs

fyrowokdVhP; k 'kstkjh Broys I xGh ek.kl a?kkc#u ekxal jyh- vkEgh , dne 15&20 QWkoj Vkdkyk mHksgrks crokusvkiY; k >kGhrhy fyrownku rhu feuhVkr ea= Vkdw vkdVhikl w nji i Goys fyrowtkxro#u i Gr vkEgh T; k fn'kdMsgrsfrdMsvkys vkEgh dkgh {k.kkrp rsfyrow mpyysvkf.k fyrov?ksÅu i Gwykxyks crok vkjMyk]^R; k i kj knuk vkMok- rsfyrov?ksÅu i Gwykxyks crok vkjMyk]^R; k i kj knuk vkMok- rsfyrov?ksÅu i Gwykxys-rh i kj aej rhy-**

dkgh ykodkuh vkepk i kBykx dayk-i jarqvkEgh, dk {k.kkr ok&; kI kj [kh gkypky dayh vkf.k xYyhrp fo".kh; k ?kjkr tkÅu yi u cI yks vkepk i kBykx dj.kkjh ek.kI ar'khp i qai Gr xayh- fo".kh; k ?kjkr eh 'kVZcnyyk- oxG; k jakkpk 'kVZeh ?kkryk- R; kenGs fyncumpy.kkjk eh gurks gsi kBykx dj.kk&; k ykodkuk vkG[krk; skkj u0gra jkenkI x#thikfyI LVskudMsi Gkyso i kfyI LVskue/; stkÅu cI ys R; knuh cgurd vxknjp QkStnkjkyk vkEgh vI j vI adj.kkj vkgkr; kph dYi uk fnysyh gurh- vI aokVra vkEgh HkheuxjdMu] gtkjsxYyhru i kfyI LVskui qssvkyks i kBykx dj.kkjsykod frFka Fkkncyp gurso Eg.kr gurs^P; k ek; yk- rh fyncumpy.kkjai kjxadnga xsy; dqkkI Bkmd**

R; kryk, dt.kEg.kkyk]^^rhfyœv?ksåu i Gkysyaikjixayky 'kV/?kkrysyagqrac?kk-** eh gGqp R; kikBykx dj.kk&; kek.klkP; kekxstkåu Fkkœyks vkf.krsdk; Eg.krrrs, ødya^rsfyæw mpyysyaikjixay; cuagkb/c?kk-cuai Gwu xsya dqkhdMaxsyadqkkl Bkåd**

ndjkEg.kkyk]^^ x#thrj vkrikfyl LVskue/; scl yr-** frljkEg.kkyk]^^vki.kek#Eg.kwlHkuafksuafrFkatkÅucl yr-**

pk/Fkk Eg.kkyk]^^rsfyrcw?ksÅu i Gkysyacsuaeyk fnl w|k rj] Ugk; R; kyk mpyru Vkdhuk rj eh ukopk Hkxokup Ugk; -**eh R; k xnhirru gGrp i ϵ sxsyks o udGr i kfyl LVskue/; s?klj yks ekb; k i kBki kB ckdhpsvkepsrhu fe=qh vkr vkys

vkre/; sdayd.khiQkStnkj clysgips QkStnkj x#th'kh vrh'k; uerusckayr gips eh vkf.k ckdhpsrhu fe= vkEgh frFkaikgpY; koj x#th vkEgkyk Eg.kky}^^'kkCckl! ukjck]nkek] fo".kmvkf.k Hkkxor-righvkty; Hkkjh dke daya - ukjck rsfytciil kgickdMsns**

eh ekb; k f[k'kkrw rsfyœwdk<w l kgœkP; k Væykoj Bøys vkEgh pk9kscktnyk vknchus cktnyk mHksjkfgyks l kgœkwh rsfyœwgkrkr ?krys vkf.k ckjdkbûsikfgys vkf.k x#thP; k gkrkr fnys x#thwh rsckjdkbûsikfgys x#thwk fyœkyk , d ckfjd pk8dkwh phj vl ysyh fnl yhx#thusvrh'k; gGøkji.ksR; k fyækph ckjdh pk8dkwh OkM cktnyk dk<yh-rj R; k fyæke/kyk dkGk inkFkZ R; k Væykoj i Myk-rksinkFkZdkGk x@x@hr o vrh'k; vfLFkj vl k grk-rksckjD; k xkBhP; k vdkjkpk grk-

 $\label{local-condition} I kgckauh rks inkFkZ , dk i kfyl kyk ckVyhr Vkdk; yk l kfxryk-rh dkGh xkGh i kfyl kua , dk ckVyhr ?kkryh vkf.k ckVyhparkM cm dsya l kgckauh x#thauk fopkjya]^^gsdk; vl koax#th**$

jkenkl $x \notin th xf.krke/; s vkf.k l k; Ul e/; s Qkj gqkkj gqrs R; kauh FkkMk fopkj dsyk o rs Eg.kky<math>\S^n$ l kgs: Fkkack] eh , dk $\{k.kkr l kxrks gh dkGh xkGh d'kkph vkgsrh- eyk , d eskcRrh vk.kau | <math>k^{**}$

I kgckuh, dk i kfyl kyk ckgjP; k nqlkukru , d eskcRrh vk.kk; yk I kfixryh-ckgj c?; kph gh· xnhlteyh grh-i kfyl kuh, d eskcRrh o dkMhi Vh, dk nqlkukru fodr ?ks^u vkre/; s us^u Vcykoj Boyh- xe#thuh rh eskcRrh i Vou I kgckP; k Vcykoj Boyh- o eskcRrhikl u fdphr virjkoj rh vkre/; sdkGh xkGh vl ysyh ckVyh Boyh-dkgh feuhVkr R; k eskcRrhP; k m".krekGsR; k ckVyhrhy xkGhps#i kirj dkG; k ok; qi nkFkkir >kys vkf.k tl t'kh m".krk R; k ckVyhyk feGsy rl srl sR; k ckVyhrhy ok; qi nkFkkips i il j.k gks^u ykxys vkf.k ckVyh tkxoj gywykxyh-rh brdh gywykxyh dh] Vcykoj vkMoh i Myh-vkryk ok; qi nkFkl2vf/kdk f/kd i il j.k i kor gkrk-rsc?ku j kenkl xe#th, dne vkj Myj^^1 kgc·! I ki Mya eh tksfopkj djhr gkrksrks'kkkk eyk I ki Myk-** I kgc vk'p; ipfdr gks^u R; k ckVyhdMsc?kr grs Hkkorkyh vkEgh pk\$kso i kfyl mHksgrks vkEgkykgh vk'pk; ZokVya

x#th I kgckuk Eg.kky}^^I kgc] gk i kjk vkgs fyrcke/; sth dkGh xkGh vki.kkyk I ki Myh] rh xkGh vki.k ckVyhr ?kkryh] I ekjP; k eskcRrhP; k m".kræ@sckVyhrhy dkGh xkGh i il j.k i koyh o vf/kd ekBh >kyh-R; ke@srh ckVyh tkxo#u gkyyh-i k&; kpk, d xqk/keIvI rks rksm".krus[kii i il j.k i korks i k&; kph NkVh kh xkGh m".kræ@sekB; k Qil; kguu ekBh gkÅ 'kdrs i k&; ke/; sbrj dBY; kgh /kkrui {kk vkdpu i il j.k gks; kpk xqk vf/kd vI rks i Fohoj vI k, deb gk/krvvkgsdh] rksno#i kr I ki Mrksvkf.k FkkM; k'kk m".kræ@si il j.k i korks gh i k&; kph xkGh R; k cpkua fyrckr ?kkryh gkrh vkf.k fyrcw tkGkP; k dMsyk Bbys gkrs R; k tkGki kl uu feG.kk&; k m".kræ@sfyrckrhy i k&; kph xkGh i il j.k i koyh o fyrcw tkxo#u gkyys Qj'kh vI Y; ke@srs xjaxGr 15&20 QW nij xsys gk cpk HkkcM; k o vMk.kh ykcdkuk QI orksvkgs; k cpkP; k fo#/n QI o.kudhpk nkok Vkdk vkf.k R; kyk rkcMrkc i dMuu vk.kk-**

 $\label{localization} I \ kg \ c \ kukl \ kf x ry \ a^* t \ kok \ vkr k \ R; \ k \ c \ kyk \ i \ d \ kuk \ vk. kk-pkj \& i \ kg \ i \ kf y I \ R; \ k \ c \ pkyk \ i \ d \ ku.; \ k I \ kBh x Y y h d \ ks \ s \ c \ pkyk \ i \ d \ kya$

i kfyl copkyk Eg.kkył]^^pyk] rfęgkyk I kgockouh cksyoyavkgs** copk Eg.kkyk]^^dk**
i kfyl Eg.kkył]^^rep?; koj Qlo.kodhpk xbłgk nk[ky >kyk vkgs** copk jkxkusEg.kkył]^^rsfyocw
i Gowu uskk&; k cbł; k i kgłkyk eh l kbł.kkj ukgh-R; kyk eh ekb; k eækp; k t kgłkoj Bkj ekjou-**

ikfyl copkyk?ksÅu ∨kys l kgsckuth [kophō: u mBnu fopkjy}]^^gsfyscnreppp uk**

I kgc mBysvkf.k R; kuh copkyk nksu rhu QVdsyxkoys copk vkj Mwykxyk- o I kgckyk 'kki ns²A ykxyk- I kgckyk 'kki ns²k; EgVY; koj pkj & i kp i kfyl kuh R; kyk tehuhoj [kkyh i kyf-ka i kMya vkf.k ykf-kkuh v{kj'k% rtjlAu dk<ya copkyk dkBhpkgh i il kn cl yk- copkus vki yk xtjlgk dcy dsyk- I kgckuh copkyk QI o.koph?; k xtjlg; [kkyh vkr Vkdys I kgc x#thuk o vkEgkyk Eg.kky]^rfigh vilkJ/nk fueijyukpsQkj ekBsdke dsysvkgs i kj kukt rfigh vilkJ/nß; k fo#/n vI pa /kkMI h i kmy mpyr j kgk- I ektkyk vilkJ/nk gh , d ykxysyh ekBh fdM vkgs eh vki Y; k I okipa vkHkkj ekurls vki .k HkkG; k HkkcM; k ykclkuk QI o.kochi kl w okpoY; kcnny-**

Hkx ipohl

I rh'k ukokpk , d ckeukpk ekő; k oxkiryk ek>k fe= girk- R; kpsoMhy ekBsvf/kdkjh girs fdYyk Hkkxkr , d ekBk okMk girk- R; k okM; kr rsjkgkr girs R; k okM; kr Hkjiji [kk¥; k gił; k-R; k eißavkEgh nk8kafr?kafe= jkrP; kyk I rh'kP; k ?kjh vH; kI kyk tk; pks vkeP; kI kBh nksu Lora= [kk¥; k fnY; k gił; k- R; k nksu [kk¥; k , dkr , d gił; k- I rh'kyk , d ekBk HkkÅ girk- rks vdjkohe/; sf'kdr girk- , d cfg.k girh- rh ngkohr f'kdr girh- rh fnI k; yk vfr'k; I inj fnI r girh- jax xkił k girk- deuh; ckikk girk- mip girh- vkf.k o; ki (kk rh tkLr ekBh fnI r girh- frpsdł gh yks girs [kksyhe/kw tkrk; rk eh frP; kdMspks#u i kgkr girks ekb; k eukr frP; kcnnygh [kii vkd"klk fueklk >kysgirs dok dok rh ekb; k Lolukr; k; ph- eh fryk cksy.; kpk i z Ru djk; pks i .k rh ekb; k'kh cksyrkuk frP; k vkblkoMhykyk ?kkcjk; ph- rjhl i(nk rh frP; k [kksyhrw tkÅu ekb; kdMapks#u i kgk; ph- eh frP; kdMapks#u i kgk; pks ek>avH; kI kdMay{k u0gra; krp oG ek>k tkr girk-

, d fno'kh nijkjh eh I rh'kP; k vkrY; k [kksyhr >ksi yksgnrks I rh'k tkxkp gnrk- eh i .k tkxk gnrks i .k eh >ksi Y; kpal kax d#u MkGs>kdwu pknj i kak#u i Mwu gnrks [kkY; k rksyl vl Y; kenGseh vkrY; k [kksyhr gnrks e/; snjoktk gnrk- I rh'kua e/kyk njoktk ykoyk vkf.k rks frdMP; k R; kB; k ?kjh xsyk- R; kuarj I rh'kph cfg.k o frP; k pkj&i kp e\$=.kh uR; kpk I jko dj.; kI kBh frFkaR; k [kksyhr vkY; k- e/kY; k njoktkph dMh ykoY; kenGaeh i fydMa>ksi yksvkgs; kph tk.kho R; k enyhuk vftckr u0grh- i jarq R; kupacksy.kaek= eyk I xGa, xdw; x gnra frFkaR; k ukpkph i nDvhI djhr gn; k- cgnrxl R; kuh xWfjaxe/; sukp xk.; kr Hkkx ?ksrysyk gnrk- R; k enyh I oz mPp of.ki gn; k- k; k ryh I rh'kph cfg.k i nek Eg.kkyh]^^vxauohu vkysyk rksI j fdrh gnMI e fnI rksukoh dk**

 $\label{eq:normalize} $$ n(j) u; uk Eg.kkyh]^dksk uohu Ij\ v* 'kkGr IxGp f'k{kd uohu vkf.k r\#.k vkgr-R; kryk uedk dkskrk**}$

frl jhjatuk Eq.kkyh]^^vxarh ejkBhP; kljkacnny cksyrh; k-**

u; uk Eg.kkyh]^^ gks xil iæk] rwR; k ejkBh f'kdo.kk&; k ljkmnny l karh \lor kgs dk; \lor **

i lek Eg.kkyh]^^gks] rp lj fdrh l nj f'kdorkr! fdrh l nj cksyrkr- R; kph rh dd kphLVkbJy fdrh l nj vkgs eyk okVravki.kkyk Hkkoh dkGkr uojk rl kp fgjksfeGkok-**

pk/skh emk Eg.kkyh]^^ eyk ckb/rh Eg.krsrksejkBhpk f'k{kd vftckr vkoMr ukgh-rks [kkb/acksyrksvkg] vlaokVra rksikekf.kd okVr ukgh-f'kok; f'kdorkuk lkj[kk lkj[kk eyhdMac?krks R; kyk eyhb; k?kkGD; krjkgk; yk Qkj vkoMra eyk fgmhpslj Qkj vkoMrkr-

fgmhpslj fdrh l $\,$ nj f'kdorkr! $\,$ vkf.kf'kdorkr rseuki kl $\,$ u $\,$ o $\,$ v $\,$ r%dj.kki kl $\,$ u $\,$ f'kdorkr-Eg.ku $\,$ eyk rs $\,$ vko $\,$ Mrkr **

u; uk Eg.kkyh]^eyk ejkBhpsIjgh \vee koMr ukghr \vee kf.k fgmhpgh Ij \vee koMr ukghreyk [kGkpsf'k{kd \vee koMrkr-dk; R; kpk \vee kokt ! dk; R; kpk #ckc ! bu dsyh dh eyk fl uekryk fgmh fgjksoKVrks eyk R; kP; kr \vee kf.k nokume/; s dkghp Qjd okVr ukgh**

u; uk Eg.kkyh]^^ vxai æk] bFkadksk rjh ek.kN vkr >ki yk; c?k-**

ek>k fe= I rh'k frFka \vee kyk o Eg.kkyk]^\ \vee xafnnh] \vee kre/; s ek>k fe= ukjk; .k >ki yk; -**

enk , dne ukd QQk#u Eg.kkyh]^^/kh!---'kh-! ckb1 ukj k; .k d1 yauko gs\ ukj k; .k dlsk dkeokyk xMh \vee kgsdk; \setminus **

I rh'k Eg.kkyk]^^ \vee xa emk ekb; k oxkîryk rks ek>k fe= \vee kgs rks bFka \vee H; kI kyk \vee kyk; -**

i nek Eg.kkyh]^^I R; k] ∨kEgh bFkaMkUI phinDVhI djrks EgVY; koj] rwR; kyk bFkadk Fkkocwfnyà rwR; kyk mBow ckgġ dkikBoyaUgk; \ vkEgh bFka e\$h.kh e\$h.kh xIi k ekj r grks∨kf.k; k eġnkMkua vkeP; k I xG; k xIi k dku nsåu , dy¥; k vkgr-gk >ki yk ukgh] >ki hpal kox?ksåu i Myk; - eh nknkyk I koxrs vkEgh bFkainDVhI djrkuk R; kpsfe= vkepacksy.kapks#u , odrkr Eg.kw-**

I rh'k Eg.kkyk]^^tkÅ nsuk fnnh] , o<k Hkko d'kkyk [kkrl] - rksek>k toGpk fe= \vee kgs rksræpacky. kadqkkykgh I kax.kkj ukgh- R; kyk eh mBÅu ckgj i kBorks**

LdkNyjf'kiph ijh{kk T; k fno'kh grh- R; kP; k vknY; k fno'kh ,I-Vh-cl us vkEgh I kykinjyk tk; paBjoya R; k dkGkr eaxNy; krmu I kykinjyk Mk; jDV ,I-Vh-cl tkr u0grh-cxeinj ; kkhy fHkek unhojhy iny uIY; ke@sfHkek unhP; k vfydMs cle/kmu mrjkoaykxk; pa urj ukornu fHkek unhikj d#u ifydMatk; pa vkf.k ifydMscxeinj xkokr I kykinjyk tk.kkjh ,I-Vh-idMk; ph-dnnh dnnh fl uk unhyk inj vkysyk vl hy rok fl uk unhyh ukornu ikj djkoh ykxk; ph- Egatsl kykinjyk tkrkuk nku &nku &nku] rhu&rhu fBdk.kh ,I-Vh-cl cnykoh ykxr grhiajino#u ek= Mk; jDV cl grh-ijrqrsvrj tkLr gra R; ke@axjhc ykd R; k ekxkluatkr u0grs vkepsoxIf'k{kdjkenkl x#thvkEgkykijh{ksyk; kok^2ku tk.kkj grs

fu?kk; P; k vxmj R; kuh ?k#u dk; dk; ?; k; parsl kūxrya nku oGpato.k] nku fnol fVdy vIsinkFk] d".knous-ki.; kI kBh pknj I rjath] vkf.k di Ms eho d".knous dki U; k] [kMlcGh] 'koxknk.; kP; k i kG; k] I tx4; kP; k i kG; k cj kcj ?kvrY; k- vrjk; yk, d NkVh I rjath vku i kakjk; yk, d pknj ?kvryh- vkeP; k ?kjh pknj ch u0grh vu I rjath ch u0grh- rok vkblua vFkj.; kI kBh QkVyY; k i kI Mhpk tkM rpdMk fnyk o i kakj.; kI kBh QkVda/kkrj fnya

VkEgh LdkNyj'khi ijh{k0; k vknY; k fno'kh I dkGh ngk oktrk eaxhl; krw ekpunji i; ir xsyks vkeP; k c#cj 'kkGk ua1 ps'ks[k x#th gnrs R; k0; k 'kkGr I kr vkB enyaLdkNyj'khi yk cl ysyh gnrh- R; k0; k c#cj dkgh p&nh ikjøn [kkl I ksykinjyk p&n dj.; kl kBh vkysyh gnrh- R; kr, d HkkÅ p&dj gkgh gnrk- vkeph rhu ikjao R; kph I kr vkB ikjav'kh ngk ikjavku nkm f'k{kd vl k vkepk rkQk fu?kkyk- tkrkuk; srkuk vkEgkyk I oyrhph frdhVagnrh- rh x#thuav?kknjp dk<yh gnrh- cxeinj vksykMnu ckjk oktrk vkEgh I ksykinj cl idMyh- vku I ksykinjyk fu?kkym tkr vl rkuk cl e/; svkEgh ikjaQkj xeR; k djhr gnrks vkEgh fr?kao jkenkl x#th istP; k I hVoj cl ymgnrks vkf.k 'ks[k x#th vkf.k R; kph i kjaikBhekxP; k I hVoj cl ysgnrs R; kr Jhdkr enkigh gnrk- R; kpsoMhy eaxGosk rkynp; krys, d ies[kinskjh gnrs

vkeph cl btxko o lkgkG; kP; k e/; svkyh vkf.k vpkud pkyR; k xkMhyk ekBk gknjk clyk-ekBk vkokt >kyk- cl jLR; kP; k dMsyk MkO; k cktnyk tkÅu , dk vaxkoj iMyh-{k.kkrgs?kMya dqkkykp dk; dGyallgk; -dk; uneda>kya. MkO; k cktnoh ek.kl a[kkyh vu R; kB; k ckdkMh mtO; k cktnoh ek.kl ai Myh-, dne i pk/ kkr Qkj ekBk xkakG >kyk-vkEgh Qkj ekB; kua vkj Myw x#th ykda?kkcjyh gnh- del/kell a kxkuacl e/; sQkj xnhluOgrh-rjhl (lnk vpkud gh ?kVuk >kY; kenGscl e/khy l xGsi pk/ kh Qkj ?kkcjysgns cl MkO; k cktnyk dkyeMnu i Mysyh gnh- FkkM; k onGkua l xGsi pk/ kh f[kMdhe/knu Mk; ojP; k dichue/knu l ki Msy R; k ekxkluacl P; k ckgj i Mr gns vkEgh ch f[kMdhe/knu ckgj mM; k ekjY; k- R; k dkGkr f[kMD; knuk dkpk uOgR; k-R; kenGavkEgkyk ckgj i M.kal ki a>kya

I xGsipk'kh dIsuk dIsukgi vkys, dealkph pk@d'kh d# ykxys dqkkyk dkghgh xblkhj na[kkir >kyh u@grh- fdjdkG [kjpV.k] ekj ykx.ka, o<piidkj >kysysgars, d nkgkky; k MkD; kyk VaxGa vkyh garh- x#thp; k xky?; kauk eaplk ekj ykxyk gark- vkEgh mt0; k cktayk vIY; keaGanal &; kB; k vaxkoj i Myw dakkyk MkD; kyk ykxya dakkyk gkrkyk ykxya dakkyk jk; kyk ykxya ij I xGk eaplk ekj gark- I xGst.k, dk >kMk[kkyh tkÅu Fkkacyks vkrk nal jh, I-Vh-vkY; kuarj R; k, I Vh ual ksykinjyk tk; paBjya rki; ir x#th Eg.ky] ^htb.kad#u ?; k-** vkEgh fr?kapk8ka, dk toG vI yY; k ckHkGhP; k >kMk[kkyh tkÅu cI yks vkf.k frFkatp.kadsyhtoG fQjdhrkß; ke/kmu o ckVY; ke/kmu i k.khgararsfi yks

 $\label{eq:final_sykinjo} FkMM; k o Gkual ksykinjo \# u nq jh , I - Vh-cI \lor kyh- rh fr FkaFkkscyh R; krysMk; oj \lor kf. k dMDVj Eg.kky]^^ \lor kEgh c e i jiyk tkÅu ; bi ; ir Fkksck- e k?kkjh \lor kY; kurrj r fgkyk \lor kEgh I ksykinjyk ?ksÅu tkrks**$

rkl kHkjkuarh , I-Vh-csveijignu ek?kkjh vkyh vkf.k R; k , I-Vh-r clnu vkEgh I ksykijiyk xsyksl ksykijiyk ydh pk&dkr jkenkl x#thpsikgqksgqrs R; kB; k?kjhjkrP; kyk eDpdke dsyk vku nq &; kfno'khfl/ns'ojgk; Ldnye/; sLdkNyj'khipsrhu isijfnys

x#thauhfopkjy] ^^isij dlsxsys** vkEgh lkfixry]^^lkisxsys** lk/kkj.k80 VDds ekdZiMrhy vlk vmkt dsyk-la; kdkGh xq th vkEgkyk vkumHkoue/; stok; yk?kåu xsys gkWsye/; stok Qkj #pdj gqra vkEgh; FkBN toyksvkf.kjkrP; kyk 9-00 oktrk fluekc?kk; yk xsyks 'kfk x#th vkf.k R; kph ikja ^vkjt*wfiDpj c?kk; yk xsys vku vkEgh ^Jheku Q&/kk* fiDpj c?kk; yk xsyks

 $Lclk W j'khi ijh \{kk ns^Au \lor kY; kurj ek>k \lor kRefo'okl ok< yk grk-; nnk l krohph ijh \{kk ckkl kph grh-R; k ijh {kph r; kjh eh t kjkr l # dsyh-l gkekgh ijh {kr Jhdkarpk ifgyk o ek>k frljk uncj \lor kysyk grk- nnjjk dqkkpk grk rsvkBor uk; - ekrnj u Åekgh ijh {ksyk Jhdkarpk ifgyk ∨ ku ek>k nnjjk uncj ∨ kyk grk- ∨ krk i pZijh {ksyk ifgyk uncjp feGok; pkp gh ek>h ftnn grh-$

R; k uarj [kwi \vee H; kl dsyk- \vee kf.k i ϕ Zijh{ksyk i fgykp uarj dk<yk-jkenkl x#th Eg.kyg^ukjk; k] \vee H; kl kph i xrh \vee 'khp i gs pkywBa-l kroh ckMZijh{ksyk r ϕ -k i fgyk uarj fuf'pr; sÅ 'kdsy-** R; kosGh l kroh i jh{kspsckMZdmz QDr eakM; krp gwrs l xG; k rky ϕ ; kryh i kjaeakMadmkoj i jh{kk | k; yk; r gwrh-eh y; y; \vee H; kl dsyk- \vee rdxf.krkr eh \vee ku d".kno gøkkj gwrks \vee rdxf.krkph f'kdo.kh jkenkl x#th ?; k; ps R; k dkGkr eh \vee H; kl kyk jkenkl x#th P; k ?kjhp tkr gwrks jkenkl x#th jke e\$njkr jkgkr gwrs R; k e\$njkr \vee ucd [kk½; k g%; k-

R; krY; k , dk [kksyhr eh vkf.k vkepsdkgh fe= vH; kl kBh jkgk; pks i qv2 i jh{ksr pkaxyh ekd2 feGkY; kurj eh ckbv2 i jh{kspk vH; kl Qkj eu ykonu djhr grks

i pZijh{kwarj ckMZijh{kk 21 fnol koj vkysyh grph- uedaR; kp o"khZcki wa y; [kkR; k ?krY; k gR; k-?kjph 42, dj tehu vu nd &; kP; k 40, dj kP; k [kkR; k v'kh 82, dj kph l qxh i kj i kMkoh ykx.kkj grph-?kjkrY; k l oZykodkoph enr feGkY; kf'kok; rh l qxh i kj i M.kav'kD; grpa ek>a rj Loluagradh] ^eh ckMZijh{kk dankr i fgyk ucj vk.k.kkj-ij ekb; k nqnbkuai moZijh{kkurj 'krkr l qxhph dkeay; ok<yh grph- cki w, dk 'krkyk tk; pk vku vk..kk nd &; k 'krkyk tk; pk- nk9kch l dkGh yodj mBnu Hkkdjh cjkcj u ?krk tk; ps R; keqGsekxkonu R; kuuk l k; dyhoj Hkkdjh i kgp dj.; kpadke eyk djkoaykxr grpa xkoki kl ua i kp&i kp fd-eh- 'kraykoc grph- l dkGpk l xGk oG R; kuuk Hkkdjh i kgp djk; P; k vu ijr 'kkGpk oG xkB.; kl kBh i kp i kp fdeh i Gr; såu 'kkGk xkBk; ph- rl arj ek>si k; vtnu pkaxys>kysyp u0grs eyk poM; koj uhV cl rk; ru0gra pkyrkuk eh QxMaQxMapkyk; pks rjhl (nk gh dkeaeyk djkoh ykxr grph-

 $ij\ cki\ wEg.\ kk;\ pk]^^\lor kjackck]\ jkrP;\ kyk\ rkl\ Hkj\ \lor kxko\ \lor H;\ kl\ djkok-\ ij\ \lor keP;\ k\ Hkkdjh\ ,o<;\ k\ pqlor\ tk^\Delta\ uxl\ -\ Hkkdjh\ ukgh\ \lor k.kY;\ k]\ rj\ d''Vkph\ dkea\lor kEgh\ d'\ kh\ djk;\ ph\^*^*$

 $\label{eq:charge_energy} Ekh \lor kb \c k ch x; ko; k ch k; pks \lor ku Eg.kk; pks \c kk; pks \c k vkb \c k ch x; ko; k ch k; pks \lor ku Eg.kk; pks \c kk; pks \c kv kb \c k ch x; ko; k ch kk ch ks kv kb \c kb \c kv kb \c

 $c\&; kp oGk \lor kbZyodj i gkVamBk; ph-ij ckjdayd# \lor kbZyk Hkkdjh d# | k; paUgk; - \lor kbZ Hkkdjh d# ykxyh dh] ckjdayd# HkkdlM i I j k; pa R; keGafryk Hkkdjh dj. ka <math>\lor$ c?kM tk; kpa ck- ch'krkyk tkrkuk y; xMcM djk; pk-Hkkdjh yodj ukgh \gt kY; k rj \lor kbĎj jkxok; pk \lor ku'krkyk tk; pk- Ekh I \lor Cacf?kr grks ij Ekh dkghp d#'kdr uUgrks

, dk cktkj fno'kh] I keokjh dke cm gyra jkukr dMcaekMuu i Myagyra Egath [kGai Mya gyra xM; kyok o ck; kyok jkstxkj ns; kI kBh cki myk ?kjkdMa; k; pagyra Ekh cki M; k Hkkdjh | k; yk xsyks cki waeyk I kaxryaj^Ekh tp.k djhi ryi rugFkaFkkoc.**

 $eh \ Eg.kyij^{\ \ \ \ } kxk! \ cki ij \ eyk \ tkoaykxra \] \ ek>k \ I \ kGipk \ Vkbie > kyk; - ek>h \ i j h \{kk , dk \lor kBijl; koj \lor kyh; k-**$

cki wEg.kyk]^^FkkMk oG Fkkrc- ex tk-**

Ekh Fkkncyn) ckiwtoY; kuarj Eg.kyk]^^ vkjalikiV]ek>a,sd] rgyk vktpk fnl gFkpo [kG; koj Fkknckoaykx.kkj gk; -**

eh Eg.kyı]^^ \lor kxk! ckiı] ek>h ckMkph ijh{kk toG \lor kyh; k] eyk l kGk c<code>Mowu</code> dla pkyə \lor ^**

 $Ekh bpkj \ dsyk- \lor krk \ i \ R; \ \{k \ ckip \ eyk \ gkr \ t \ kkluu \ l \ kaxru \ k \ Eg.kY; \ koj \ \lor krk \ i \ gadk; \\ cksyk; \ pallgk; - \ dl \ aglp \ j v \ rl \ aglp \ j v - f' kok; \ cki u v k x kokr \ tk.; \ kf' kok; \ nq \ j k \ ekx Zu \ 0 grk- \ \lor ku \ eyk \\ [kG; koj \ cl \ .; kf' kok; \ nq \ j k \ i; k \ u \ 0 grk-$

Nd ekjr l kGk chlowu fnol Hkj [kG; koj cl yw ijh{kk pkj i kp fnl koj \vee kyh grhojpoj 'kkGk ek>h chlr grh] \vee H; kl chlr grk] jkenkl x#th Eg.kk; pj\^ukjk; .k] ropk i fgyk ucj dl k; k; pk**

eh Eg.kk; pkg\^eh dkgh d# 'kar ukgh- ek>k ukb J_y kt \lor kgs 'krkr ofMykP; k gkrk[kkyh dke dj.; kf'kok; ekb; kdMan(j j.k dkghgh rj.kki k; ukgh- **

 $\forall k \text{ rk eh l krohikl gkskkj gkrks R; koGh l krohurjik lik kfed f'k \{k \text{ kokpk ih-Vh-l h-dkl } I \text{ nksu o''k kipk gkrk-rks dkl } I \text{ is a fixed gksk-rks dkl } I \text{ is a fixed gksk-rks dkl } I \text{ in kFk fed f'k \{k \text{ kd 0gkoav l ackinyk ok V r gkraijeyky; f'k dk; pagkraeyk f'k dnu dk klyst pkik Qslj 0gk; pagkrae$

 $\label{eq:ckipk} \text{ckipk f'k\{k.kkyk,o<k fojk%k \lor I.; kph dkj.k \lor I h gkrh fd]ifgyndkj.k Eg.ktscki gyk i$ sl kBonu tehuh tkxa[kjnh dj.; kpa0; I u ykxyagkra rl ars0; I u pkxy gkra ijrqvkeP; k egykB; k n<math>^{\text{u}}$ Vhusd/kh d/kh gkfudkj gkra , [kknk nk: fi.kkjk fdøk tokkjh euq; dkymckP; k ikFfed xjtkdMsngy{k d: u dke d: u feGkysyk i\$ k nk: r fdøk tokkjhr ?kkyforks rl po tehuh] tkxa [kjnh dj.; kps0; I u cki gyk ykxysyagkra cki qdkymckP; k ikFkfed xjtk u Hkkxork I xGk i\$ k tehuh] tkxa[kjs] kr ?kkyfor gkrk-

 0; k/kh >kyk rj nok[kkU; kr uskā] frl jh xjt] Eg.kts egykouk l .kk l mphyk pkaxypopxya[kkÅ ?kky.ka vkf.k pkGkh xjt egykouk f'k{k.k nskā] i kpoh xjt egykoj y{k nska

 $\label{lem:ckiwikrhpao''kkZdkBh} \ \, th mRiUu; b \ \, y \ rsmRiUu \lor kf.k \ dMC; kP; k 0; o kj kr fe G kysyai \ \, 3 \ a \ tehuh o tkxa [kj sh dj.; kI kBh ?kkyor gkrk- R; ke G a \lor keP; k o j hy x j tk i wkZ0gk; yk <math>\lor$ Mp.kh fuekZk gkr gkR; k-ek>si k; \lor kthuadkdkP; k ukokoj I kyki ji yk usÅu uhV dsysgkrs

VkbZd/kh d/kh vktkjh i Myhrj cki qfrdMangy {k djk; pk- ex nknk vkb}yk nok [kkU; kr U; k; pk vu uarj dl\$Y; krjh 0; okgkj kruu nknk > kysyk [kpZcki udMuaol gy djk; pk- vkEgk egyk®; k f'k{k.kkdMigh cki way {k fnyaukgh- ex vkepk 'kkGpk [kpZvkbip Hkkxok; ph- cki qual qkhr ?kjkr vk.kuu Boysyank.ki] dMcavkbZfodk; ph vkf.k i kj kuuk i kFkfed xjtd kBh; skkjk [kpZHkkxok; pheykuuk pkaxy&pqxya [kk; yk cki q d/kh ?ksÅu; k; pk ukgh i jrq vkbp Tokjh dMC; kruu egykuuk pkaxy&pqxyafodr vk.kuu [kkÅ ?kkyk; ph- cki qdakh eakh egykuuk dki Mabidr ?; k; pk i jarqvfr'k; gydh dki Mafodr ?ksÅu jLR; kP; k dMsyk cl y½; k f'kli; kdMsf'kykblyk |k; pk v?kkojp di Mk gydk] R; kr R; k f'kli; kuspkaxyk f'koysyk ul k; pk- R; ke(Gsydjkuuk fFkVh&feVh fdok fcu eki kph l \$y <xGh dki Ma?kkykoh ykxr vl s cki qLor%yk l (nk d/kh pkaxyh dki Ma?; k; pk ukgh- [kjarj l xG; kuuk pkaxyh dki Ma?; k; ph cki qph dopr qkrh-

 $\label{eq:ckipk} \text{ckipk , d xqk pkaxyk gkrk-tligk $$ $$ \text{kbl} Tokjh&dMck pks u fodw eykli; k xjtk $$ $$ \text{Hkkxok}; ph] $$ rligk cki $$ $$ sdliguavk.ky\lambda^** $$ $$ ad/khgh pdkj 'klnkuafopkjk; pk Ugkblinku $$ $$ \text{funku vki yh ck}; dksrjh [kpldjrsvkgs$$$$

 $f'k\{k.kkpk \ [kp] \ nok[kU; kpk \ [kpZckinyk fQtny okVk; pk-ckinv?kjkP; k fdnok 'krkP; k I kS| kyk cl yk dh] I kShk d/khp ekMr uI s rksI kShk Hkysegkx ykxyk rjhgh-ckinP; k ; k /kkMl kpa xkokr I o\ dkSrql 0gk; pa xkoryk i R; d ek.knl ckincnny ckyk; pk]^ r\ G'khjkepadkSrql djkoa ro<aFkkMp gk; -, o<h ykdjal hkkGnu r\ G'khjke o"kkJyk , d 'kr ukghrj , d tkxk [kjnh d: rq -*$

 $\label{eq:ckinyktj} $$ ckinyktj dkskh fopkjy ? ^rG'khjke], o<; kftehuh tkxktho ek: u [kjnhd: rqd'kkyk\] $$ d'kkyk\$

 $\label{eq:continuity} $$ \text{rok cki ipamRrj VI aVI k; pa} ^\circ \text{kjackck! i kjatkLr gkbirh- i k; idkyk i kt/ki ji ra'krvu jkgk.; ki ji rh tkxk udksdk** $$$

cki pok ukâdjihyk vkf.k f'k{k.kkyk fojk%k vl.; kpandja, ddkj.k gkm] vkeP; k ukukpk e&g.kk xkokmi kFkfed f'k{kd gkmk-R; kpauko tk/ko xq th!R; kauk lq okmhyk efgU; kyk 15&20 : lk; si xkj gkmk-umjeh 5&6 ohmf'kdmvl mkuk R; kauk i xkj 50&60 : lk; sgkmk-

cki NEg.kk; pk] ^^eh, ddMC; kP; k xkMhekxa100&200: lk; slgtfeGforw vuikjax ekLrjgksåu efgukHkj dke d: u 50&60: lk; si xkjikgikuafeGo.kaEgath R; k 50&60: lk; kr R; pp&R; pp Lor%P; k dN/nckpgh Hkkxk; pa ukgh- ex ikgikyk f'kdonu ekLrj d: u rj dk; mix gkskkj\R; kijkl fg'kkcdj.; kigiraf'k{k.k.?ksåu'kshdj.kadok ch pkaxya**

f'kok; egyatkLr vlkohr vlackinyk dkokVr gkrå rjckinpaer gkraegyatkLr vlrhy rj'krkr dke djk; yk?kjkryk ek.knlfeGrks-ckgjP; kjkstxkjh ek.klkoj'krkr dke gkrUgkbZunjrajkstxkjkpk ckstk-'krdjk; yk?kjkryh ek.klavlY; kfcxj'krh ln(kjrUgkbZ

ek>a i k; ckn \lor I Y; keGs eh Eg.kk; pkg ^i k; ckn \lor I Y; keGs eyk 'krhr dke \lor ftckr gkskkj ukgh- ex eh dk; dj.kkj**

R; k dkGkr ikÅl dkG Hkjij gkrk-R; keGaik.; kph miyCkrk tkLrh gkrh-'krh gh Qk; | kph gkrh-Eg.kw \vee l aEgVyatk; padh] ^mRre'krh] e/; e 0; ki kj \vee kf.k dfu"B ukcljh]**

ckiw dMca fodk; P; k fufeRrkua ckgj ykoc&ykoc fQjk; pk- dMC; kP; k 0; ki kjkP; k fuferkuacki nyk I xG; k i zdkjpsykod xkB i Mk; ps R; kerGaukodjnkjkpathou fdrh vkskrk.khpa vI rarscki nuao GkorGh vuod ukodjnkjkB; k vutlkokrnu, odyagkora dMcafodr ?; k; yk , [kknk ukodjnkj vkyk rj ukodjnkj dMC; kP; k njkI kBh fdrh ftdkI h djk; pk] rscki wvuHkopr gkork-[kM; ki kM; kr ukodjnkj dMC; kP; k njkI kBh fdrh ftdkI h djk; pk] rscki wvuHkopr gkork-[kM; ki kM; kr ukodjnkj dMC; kP; k njkI kBh fdrh ftdkI h djk; pk] rscki wvuHkopr gkork-[kM; ki ki kM; kr ukodjnkj k, deno ek.kn Eg.ktsf'k{kd] R; kr i kFkfed f'k{kd o ek/; fed f'k{kd] cgrod i kFkfed f'k{kdkpai xkjkr Hkkxk; paukgh- Eg.knu rks, [kknannikkpatuokj i kGk; pk-?kjh ck; dksyk R; k tukoj kpa'kk.k&?kk.k dk<k; pa oj.k dkMh djk; pao nnik dk<nu fodk; pa, d dkep gkora FkkM; k i xkjkerGsxq thopk LoHkko vfr'k; datnik cuysyk vI k; pk- rscki ndMcabdk; P; k fufeRrkuavuHkopr gkork- Eg.knup cki nf'k{k.kkyk o ukodjhyk fojksk djr gkork- cki n; k fojkskerGs i kVZVkbe 'kkGk i kVZVkbe ?kjkryh dkeaeyk djkoh ykxr gkorh-

 $\label{eq:ckipi} $$ \text{ckipi}; $$ \text{k myV ukukp} anknkp} fopkj gkrs nknk] ukuk f'k{k.kkyk $$ $$ \text{ch egRo nr gkrs nknkph [kii bPNk gkrh-$$ $$ \text{ki kj kuh 'kkGk f'kdkoh-$} ij n\text{nbkpk Hkkx $$$ $$ \text{l k gkrk ch} nknkP; k , d ch egykyk f'k{k.kkph $$$ koM u@grh-$$$ $$ \text{klik rj 'kkGsykp xsyk ukgh-nxMij l q[kk] 'kadj] f'kokuaifgyh nd jhrup 'kkGk l kMyY; k gkR; k-nknkua[kii i; Ru dsyk ij nknkP; k ikj kuh nknkP; k i; Rukyk l kFk fnyh ukgh- l q[kkyk o 'kadjyk rj pkFkh ikl gksAu ch fygk; yk okpk; yk; r u@gra$

nknkua R; kB; k xq thauk fopkjy $\frac{1}{2}$ xq th] ikja pkFkh] ikl gksÅu ch R; kauk fy0gk; yk&okpk; yk; srulrkuk] ikl dsypdlå.

 $\label{eq:linear_nknkP} $$ nknkP; k i t ukyk xq th fu: Rrj 0gk; ps nknkusiqsbipkjy\delta^\vkrk xq th \(akoj \) biykt dk; \ xq th] $$ foBkck nknk] \(akoj , dp mik; \) gk; -; k i kj kuk i ljgk i fgyhP; k oxkir cI ok; p\dagger* \)$

nknkuh rlpdsya I ([kk&'kadjkyk i lýgk i fgyhP; k oxkir cloyi] ij esyklP; k f'kd.; kr Qkj I k Qj d i Mykp ukgh-

ukuk Eg.k] d".kmo gk xMh \vee km& \vee kdke gk; - R; kyk f'kdokoaykxy- \vee u fdI ukP; k i kBpk j kek /kM /kkdV gk; - R; kua'krh dj.koå*

ek>avkf.k fdl ukpao; l kj [kpp gkra eh i k; kuavknwvkdke gkrks rj fdl uk i kb/kuavknwvkdke gkrk- R; ke@avkEgk nk9kkuuk ch f'k{k.kkf'kok; n(l j k lk; ki, u0grk- Hkkodhryk Hkkxorgk vkeP; k i {kk/kM/kkdV gkrk i j rqR; ksvkeP; k uknkuaf'k{k.k.?kr gkrk-

egkj] ekax] pkockj] xjhc ejkBk; kB; kP;k Pkjkr egykouk f'kdok; ph, ir uOgrh-i.k ckikyk f'k{k.kkph vkoM vl ay rjikjaf'kdr vl r-vkepaR; kB; k myVagkora eyk f'k{k.kkph vkoM gkorh-ckindMs eyk f'kdok; ph, ir gkorh-ijarqckinua ek÷; k f'k{k.kkdMaxkblkh; kZua d/khikfgyp UgkbZ tukojkak kBh vkMkpaik.kh vk.k.kaj oj.k dkinu Bo.kaj 'kk.k&?kk.k dk<.kaj vu d/kh d/kh tuokja jk[k.ka ckini; k l ek/kkukl kBh gh l xGh dkead: u eh 'kkGyk v/knu&e/knu tkr gkorks eh 'kkGyk tkoavl h vkbiph Qkj bPNk gkorh-

ckckl kcyk 'kkGph vkoM vftckr u0grh-R; ke4GsR; kua'kkGk 1 yh 2 jhrp l kMyhijarqckckl kcyk 'krhph ch vkoM u0grh-R; kyk vkoM 0; kikj /ka|kph gkrh-ij ckinyk dMC; k 0; frfjDr bij 0; ikj /ka|kph vftckr vkoM u0grh-R; ke4Gs ckiwo ckckl kcph ugeh&ugeh [kVdk[kVdh 0gk; ph-vk..kkyk ch ek÷; k 'kkGph vftckr dkGth u0grh-?kjkryh dkeaeh uhV UgkbZ dyh] rj rks eyk v/kmu&e/kmu cnMmu dk<k; pk-vkEgh vktkckuh ckakyy; k okM; krpjkgk; pks ikBhekxsekt ?kjkr rhu pkj [k.kkph [kkyh gkrh-, dwk 6&7 [k.kkph tkxk] vkEgk l oZ HkkoMkuk o vkbZofMykmuk jkgk; yk ijrh tkxkgh u0grh-ckiqcSykoj Okj ek; k djk; pk-ikÅl vkyk rj cSyackghj l kt; kr ckakk; pk- nd &; kfno'kh l kik cSykP; k 'kskkuao e4rkua?kk.k gkåu tk; pk-R; kpk okl ghy; ; k; pk-r'kk okl krp vkEgkykjkgkoaykxk; pa

HKX I Oohl

rj vlay{kkr vkyadh ekoʻkh dkdk vku R; kph egya?kjh dqkhp uûgra ?kjkyk dgyii gkra 'kstk&; kdMapkoh BsÅu dkdk o ekoʻkh dk; rjh rkrMhP; k dkekl kBh R; kB; k xkoh xsysgkrs vkʻkkuapkoh ?kryh-vkf.k vkEgh frP; k ?kjkr xsyks riligk jk=hpauÅ oktysgkrs to.k gkNVsykrp >kyagkra R; k fnoʻkh jkrP; kyk vkʻkkcjkcj [kii xlik ekjY; k-

 $\label{eq:continuous} $$ rh Eg.kkyh]^{ukjk; .k rwilprdaokpk; yk I $$ $$ 0kkr dj Eg.ktsrp-h Hkk"kk $$ $$ kip 'kq'n gkbJy** $$$

eh Eg.kkyk $]^{\v}$ vk'kk]eh okpu dj \mathfrak{u} j ij \mathfrak{r} q r \mathfrak{h} ; ki $\{$ kk eh ygku \lor kgs ij \mathfrak{r} q r \mathfrak{u} ekb; koj brdadk i \mathfrak{e} der \mathfrak{r} l \ eh r \mathfrak{r} l kuk(k kuadqkhp dk \mathfrak{g} h ykxr ukgh-**

 $eh \ Eg. \ kykg^^e + n \ gh \ cjkcjP; \ ko; \ kP; \ k \ yksdkne/; \ sgkr \ vI \ rs \ eh \ rj \ rhp; \ ki \ \{kk \ ygku \ vkgs \ ex \ eh \ r_p \ kf \ e= \ dI \ k \ ^**$

rh Eg.kkyh]^^ygku fe= vI w'kdr uI rkr dk**

 $eh \ Eg.kkykg^{\wedge} \lor l \ w' k drkr \ ij \ rq r \ p; k \ o; kP; k \ ek.kl \ kc \# cj \ rw \ es + h \ dsyh \ rj \ rgyk \ \lor f/kd \lor kum \ okVsy- \lor ku \ rw \lor f/kd \ l \ f kh \ qks khy-**$

rh Eg.kkyh]^ekb; k cjksjP; k dBY; k ek.kl kcjksj eh e\$h dsyh rj rksfe= dnkfpr ekb; k v1 gk_; rpk Qk; nk?kå 'kdsy- ekb; k uo&; kpaekÖ; k cjksj i e ukgh] gsl xG; k xkokyk ekfgrh vkgs R; ke@seh ekb; k o; kP; k ek.kl kcjksj e\$h dsyh] rj eyk yksd okbW Eg.krhy] os; kBjorhy] Eg.kw eh rhp; k'khfujkx1 e\$h djrsvkg**

eh Eg.kkykg\^^ eh ygku \lor kgsrki; ir ek>h \lor kf.k rp\h fujkxI e\h yksckuk ekU; gkbiy] i.k eh ekBk \gt kY; koj ykscl \lor ki Y; k e\hoj fo'okI Borhy dk\ \lor kf.k eh r#.k \gt kY; koj rb; k'kh e\hi wkI scák B\Å 'kdu dk**

rh Eg.kkyh]^^ eyk røk LoHkko i kekf.kd okVrks R; keGsrw eyk r#.k i .kkr l kbhu tk.kkj ukghl - vl æyk okVra**

eh EqVyj^^eh ekBk >kY; kuarj rwekb; ktoG e\sh.k Eq.kw jkg.kkj**

rh Eg.kkyh]^^gks] eh rþ; ktoG ehk Eg.kw jkg.kkj- \vee krk tla \vee ki.k , deidkyk lkMw jkgkr ukgh] rlap \vee ki.k ekBsi.kh , deidkuk lkMw jkgk; paukgh**

eh Eg.kykg^^ro>k uojk] ro>h I kI ilj ro>a?kj; kpadk; **

 $rh \ Eg.\ kyh]^{n} \ rsl \ xGaeh \ l \ kMuu \ nskkj \ vkgs \ vkrk \ dnoG \ ek>k \ ukblykt \ vkgsEg.\ kuu \ eh \ R; \ kljhjkgrs \ eh \ ekb; \ k \ oMfykdMsjkfgyh rjh R; \ kph gj dr \ ukgh i jarq \ eh \ oMfykli; \ k \ ?kjhjkg.ka \ gsoMfykauk \ l \ kekftdn"V; \ k \ i fr"Bpagkskkj \ ukgh \ f'kok; \ l \ ekt \ i kBhekxsdkghrjh \ cksyr jkfgy-Eg.kuu \ eh 'knvi; \ ir \ bFkp jkg.kkj \ vkgs \ rpk \ vk/kkj fe= Eg.kuu feGkyk rjp \ eh \ l \ xGal \ kMuu \ rhp; kcjknj; \ blu-vU; Fkk rwfoljykl] rj \ eh \ ek>amoljhr \ vk; \ q; \ bFkp \ ?kkyo.kkj \ vkgs \ vl \ aeh \ Bjoysyavkgs**$

 $eh\ EgVy \cite{h}^n r \cite{h}

 $rh \ Eg. \ klyh]^{*}; \ kl; \ oG \ \lor kl'; \ kuarj \ rgyk \ I \ \times Gal \ kaxu- \lor krk \ I \ kaxuu \ dkgh mi; \ kx \ ukghfoukdkj.k \ rlp; k \ dlepkj \ eukoj \ udksrs \lor kl'kkr \ gkrhy- \lor krk > ksi \ jk= [kwi > kysyh \lor kgs^{**} R; kjk=h \lor kEgh nkskagh \ uhl > ksi \ yksukgh- \lor kEgh nkskagh \ tkxp \ gkrks$

eh l kj [kk fopkj djhr gkrksdh] rh uo&; kyk l kMnu ekb; kcjkcj Hkfo"; kr dk jkg.kkj vkgs\ rh frP; k uo&; kcjkcj jkgk; yk dk r; kj ukgh\ rh frP; k uo&; kcjkcj d/khp dk cksyr ukgh\ rsnk9kgh d/khp HkkMrgh ukghr vkf.k vcksy vl rkr-rs, dealkoj i te dk djhr ukghr\

 $\label{eq:localization} \begin{subarray}{ll} $$ nd_k; k fino'kh eh ekb; k xkoh $$ vkyks ijarqclky jk=h $$ vk'kk eyk tscksyyh rscksy.ka ekb; k eukmu tkr u0grs eh jkrP; $kyk > ki yksrjhgh Lolukr $$ vk'kkp ; r gkrh- tkxa>kyarjhgh ekb; k MkG; k ekj $$ vk'kkp fnl r gkrh- fnol finol eh $$ vk'kkP; k vkBo.khua o frP; k fopkj kua>j.kh $$ ykxyksgirks $$$

 $\lor I \ aokVk; \ pavkRrkP; \ k \lor kRrkk \lor k' kkd Matkoavkf.k \lor k' kkyk \ HkbVkoaijarq \lor k' kkP; \ k \ I \ ekgi x b'; koj eh \lor k' kkyk u wedadk; \ I kaxk; \ parseyk / kkMI gkr u 0gra \lor k' kkyk \ HkbVk; P; k \lor xknj eh [kwi [kwi eukr dkghrjh Bjok; pksijarqi R; {kkr <math>\lor$ k' kkyk HkbVyksdh I x Gadk; fol #u tk; kpks-xkdkGwutk; kpks

I krohP; k ckMZijh{kpk fudky ykxyk-ek>k vi{kkHkax >kyk-ijarqjkenkI xe#thpk vmkt [kjk Bjyk-Jhdkar enkZdmkr ifgyk vkyk-Jhdkar døyd.khZdmkr ndjk vkyk vkf.k eh vkf.k I blkk"k xkMsdmkr frI jsvkyks vkeP; k vkf.k Jhdkar døyd.khP; k ekdkT QDr, d ekdkDok Qjd gkrk-rj dmkr ifgyk vkysyk Jhdkar enkZJhdkar døyd.khBjmu rhu ekdkDaigkagkrk-o vkeP; ki{kkpkj ekdkDaigkagkrk-

eyk Okj okbl/ okVya 'koVP; k 20&25 fnolkr vki.kkyk vH; kl uhV djrk vkyk Ugk; -eyk 'krkyk tkoaykxr gkra?kjkryh I xGh dkeadjkoh ykxr gkrh- I dkGh ckiñ; k Hkkdjh usÅu nski vkf.k I kñ; kyk cýkph oj.k&ik.kh dj.kao?kjdke dj.ka; krp ek>k I xGk oG tkr gkrk- v/kwu e/kwu eyk 'kkGk cýkoho ykxr gkrh- R; ke(Gaeyk pkj ekd/deh i Mys tj ek>k

vH; kI ekb; k eukl kj [kk >kyk vI rk] rj eyk pkj i kp ekdZtkLrh I gt feGw'kdysvI rso dnkr ek>k i fqyk ucj ; Å 'kdyk vI rk-

eh fudkykurj jkenkl x#thuk HkVyks x#th Eg.ky] ^^ukjck] rwifgyk; \$khy vla eyk Okj okVr gkra i jrqrb; k?kj dkekerGarnyk vH; kl kyk tkLrh oG feGkyk ukgh-tkÅ n] vkrk vdjkohyk i fgY; k urcje/; si kl gks ek>srb; k i kBhekxsl nb vk′khokh vkgr-**

eh Eg.kkyk $g^{^*}$ ek>k ck· Eg.krkş \vee krk fgFkuai φ aeyk f'kdok; ph rkdn Ugk; - rw I krohurj x#thpk dkl Idj- \vee ku x#thgit*

 $j kenkl x \# th Eg.ky]^{^rwg (kkj \lor kgd - i \& af'kd - \lor kf.k ekBk b litfu \lor j] M kmDV j] fd b k i kQd j gks**$

eh Eg.kkykj^^xx#th] eyk ekb; kl fgr uÅ HkkoMavkgr-, d ekb; ki{kk ekBk HkkÅ gk; -ckdhph I xGh ekb; k i kBhojph vkgr- f'kok; ekb; k i kBhojph cfg.k yXukyk vkyh gk; -frpa yXu cki myk djkoaykx.kkj gk; -vkEgkyk I okiuk i jihy brD; k i kVki jR; k tehuh vu tkxacki mua ?kryagf] cki weyk f'kdohr cl yk rj ekb; k i kBP; k HkkoMkpadl a0gk; på eyk I find eukeu cki mpk I Yyk i Vrw -**

jkenkl x#th Eg.kky}^^ ukjck] rph tUerkjh[k l kax ikgn* eh] ^^1&6&1952-**
x#thuh FkkMk fopkj dsyk vku x#th Eg.ky}^^vj} vkrk rjh l rjkoal i w rgyk vBjkoaykxya ** vBjk o"kkP; k vkrY; k ykcdkuk frFkaR; k dkl iyk i osk feGr ukgh- eh Eg.kyk}^^xx#th] ek>h
[kjh tUerkjh[k 16&11&51 vkgs pplw 'kkGr 1&6&52 ykxyh vkgs**

x#th Eg.ky}^^rs dkgh vI yarjhgh] tUerkjh[k 'kkGryhp xkg; /kjyh tkrs**

eh fu#Rrj >kyk] ?kjh vkykseh i kl >kyks rkyl); kr eh frljk vkyksEg.kwu vkblyk o ckinyk l klixrya vkb] ckinj nknk] ukuk l oklukp vkun >kyk- ekb; k cjkcj d".knp Hkkxorgh i kl >kysgkrs vkblua?kjP; k [k0; kpk i sk cuow fnyk- xkokrhy l olnokuk okVk; yk l klixryk- nokli; k l enj i sk fBoyk- xYyhr i saokVya

ckiwEg.kyk]^^vkrk;ki@adk;djkpaBjoya **

eh Eg.kyı) ^^cki) rwEg.krksrlaeyk f'k{kdkP; k dkl ½yk tk; pagkraij vkeP; k xq thuh l klixryagk; dh- o; 18 ojhl i jia>kY; kf'kok; dkl ½yk tkrk; r Ugk; - l kGr ek>h tYerkjh[k ykxyh vkgsR; k i jekuavkrk ek>ao; 17 l i w 18 oal # gkra]**

eh Eg.kyi)/^cki i) rwl kax- Ekh dk; d# rh\ **

 $cki w Eg.kyk]^rw \lor ladj- \lor ki \psi gjhck 'kBthdMatkÅ; k-R; kayk bpk#u o ofdyl kgickauk bpk#u ryyk dl$P; k niplkukr fg'kac djkyk ?krsr dk c?kw; k-**$

eh Eg.kyıl/^^ cj [] py] rwEg.krksrl a**

 $ekb; \ k \ eukriskaf'kdk; \ pagkraij \ cki nyk \ Mk; j DV bjk/k \ djk; \ pa/kkMI \ ekb; \ kru0gradkj.k \ cki npk I Hkko j kxhV gkrk-eh myVacksy.ka; k Vk; ekyk rjh; kk; u0graeh vku cki nv gjhck 'kBthdMa xsyks gjhck 'kBthP; k dVV; koj danhdanh ekjokMh ofdy; s^u cIr vIr-cki nua ofdy I kgskP; k i skaekb; k ukkdjhpk vku f'kkk.kkpk fo"k; dk<yk-$

eyk ekjokMh ofdykuh bpkjy}^^ rkyk fdrh ekdZi Myh vkgr**

eh Eg.kykj^^ofdyl kgc] dmkr rep?; k Jhdkrpk ifgyk vkyk;] n(j k , l -vkj-HkkÅP; k i kjkpk ucj vkyk; vku frl j k ek>k ucj vkyk; - ekb; k vku repP; k JhdkrP; k ekdkir vo?; k pkj ekdkipk Qjd qk; **

 $gs,sdY; koj \ ekjokMh \ ofdy \ pfdr \ >kys \ vkf.k \ i \ Vfn'kh \ Eg.kyg^nrG'khjke] \ ,o<; k \\ pkaxY; k \ i kjikyk 'kkGk \ I kMuu \ nrpkukr \ dkekyk \ ykok \ Eg.kuu \ I kaxrk; -dk \ vks \ rG'khjke \ rEgkyk \\ i kjkyk \ f'kdok; \ yk \ dk; \ >kya \ \ ^**$

 $gjhck 'kBth R; kB; k ekjokMh Hkk"kr Eg.kky]^^ rG'khjke o"kkZyk , d'kr fdøk ?kjtkxk ?krksvkgsi jarqR; kyk i kġkyk f'kdok; ph vkoM ukgh-R; keGarksR; kyk ukdjh dj v l aEg.krks -**$

gs, cdY; kurj ekjokMh ofdy FkkMd sfpMysvkf.k Eg.kky}^^ gsc?k r@'khjke] rbp; k i kjkyk ryk f'kdok; yk tM tkr vI sy rj eyk I kx- eh ; kyk ftYákr dBY; kgh ckMhikyk ?kkyrks ex rj rph dk; gjdr ukgh uk**

cki ij^^ gsc?kk ofdyl kgc] eyk ásyk f'kdok; yk \vee o?kM llgk; - i j eyk uÅ ydjag\$fhápac?kwdk R; kpa c?k**

 $ekjokMh\ ofdy\ Eg.kyi]^{n}\ gsc?k\ rG'khjke]\ rgyk\ rj\ vkB\ yrdjavkgr]\ eyk\ rj\ ckjk\ vkgr-Eg.kmu\ eh\ dqkkyk 'kkGk f'kdwudksvl\ aEg.kr\ ukgh- eh\ l\ okiuk f'kdk vkf.k\ ekBaûgk]\ vl\ p Eg.krks -\ rwl\ qnk\ ghp\ Hkljedk?; k; ph- l\ okiuk 'kkGk f'kdok; ph- uf'kckuaf'kdyk\ rj\ R; kyk f'kdw | k; pa**$

gjhck 'kBth Eg.kky \S^{n} rG'khjke] i kjkyk vdjkoh rj i kI gkså ns ex R; kyk ofdyl kgckuk I kaxuu nij jh dByh rj pkaxyh ukBdjh ykony kr-**

eh ofdyl kgckuk Eg.kyk $]^{n}$ ofdyl kgc] x#thpk dkl Zdj.; kl kBh o; 18 i wkZVl koa ykxra Vl ajkenkl x#th Eg.kyr-**

 $of dyl \ kgc \ Eg.kky]^^ rsx\#thl kxrkr rscjkcj \lor kg-sdkyhghljdkjh uksdjh \lor Bjk \\ o''klo; kP; k \lor kr \ djrk; t ukgh- \lor l k dk; nk \lor kgs^{**}$

ofdył kgckuh l klixrY; koj cki w xi xkj cłyk- vku eyk Eg.kyk ?kj kdMa tk- Ekh ekxwu; rw

 $tw\ e/;\ s'kkGk\ l\ q\ >kyh-\ d''.kmo]\ Hkkxor]\ ekakkpk\ l\ nk]\ l\ xG_{\dot{r}}\ kauh\ b;\ Rrk\ \lor kBohyk\ gk;\ Ldwyk\ \lor Wmfe'ku\ ?kyra\ eyk\ ek=\ ?kjP;\ kB;\ k\ fojkg'kkeGs \lor Wmfe'ku\ ?kyrk\ \lor kys\ ukgh-\ i\ qdG f'kdyY;\ k\ yksdkauh\ cki\ wyk\ l\ etkow\ l\ kaxry\ {^rG'khjke}\ i\ kj\ xagqkkj\ \lor kgs\ R;\ kyk' kkGk f'kdwn$**$

 $\label{eq:ckiwEg.kk; pk]^vtw, dojhl R; kyk ?kjhp cl forks urj vBjk ojhl R; kyk >kyh fd] ekLrjP; k dkl Jyk i kBforks rksi rij R; kyk 'krhP; k dkekr , Ddk d: u Vkdrks 'krhpadke ch teyai kfgthy**$

cki w dqkkppp, sdr u0grk- eh cki wi gagVV d: 'kdr u0grksdkj.k cki wvkeok dqkkpkpa ykM djhr u0grk- vkEgh, dwk uÅ HkkoMagkrks vkEgk uÅ ydjkuk I khlkkGrk I khlkkGrk cki ykw ukdh uÅ; r gkravkEgkyk uhV [kk; kyk feGr u0grauhV di MsfeGr u0grs vkeP; k n"Vhus 'kkGsyk tk.ksEg.kts, d p&p gkrh- rh p&u vkEgkyk ijoM.; kI kj [kh u0grh- Eg.kwu eh gh 'kkGsyk tk.; kpk gVV I kMwu fnyk- vkf.k I j G xýsjk [kk; yk pkywdsyh-

njjkst lá; kdkGh xYyhr ikjknojkoj xlik ekjr clk; pks 'kkGsyk tk.kkjsHkkxor] d".kmp oscG; k fBdk.kh xlik ekjr clk; os rsl glk eyk xlikr lkfey d: u?; k; psukghr-rs 'kkGrY; k xlik jacom jacom lkxk; ps R; kB; k xlik , kdm eyk Qkj okbW okVk; ps

eh fopkj djk; pk]^vki.k ejkBk vlw 'kkGk f'kdw'kdr ukgh-lnk ekækpk vlw 'kkGsyk tkÅ 'kdrks R; kph vkbZHkkdjh] dkyo.k ekxw vk.kk; ph- rjhgh R; kP; k vkbZofMykuh R; kyk 'kkGsyk i kBfoysgkrs vkEgkyk, o<h 'krh vlw dk; mi; kækph**

'kkGk l q gksåu nhM&nku efgus>kysgkrs l çkb²; k xkoh m: l gkrk-l çkb²uavkEgkyk ?kjkrY; k l oklukp m: l kyk ckyfoyagkra eh vkeP; k ?kjP; k ykcdkacjkcj l çkb²; k xkoh m: l kyk xsyks

 $frFka\,x\,y';\,kurj\,ek>h\,\,\lor\,kf.\,k\,\,\,\lor\,k'\,\,kkph\,\,x\,k\,B\,\,i\,Myh-\,\,\,\lor\,k'\,\,kkua\,fop\,k\,j\,y\,a\,a^h;\,\,Rr\,k\,\,\,\,\lor\,k\,Bohy\,k\,\,\,\,\,\lor\,Mfe'\,ku\,\,dks\,k\,R;\,k'\,\,k\,Gr\,\,\,?\,k\,r\,y\,x\,^{**}$

eh xli p cl yks fruai kjgk i kjgk eyk fopkjya eh mRrj | k; pksVkGk VkG djrksvkgs gs frP; k y{kkr vkya 'koVh rh Eg.kkyh]^^rgyk dk; rsl kakk; pavkgsdk ukgh- eyk , dp l kak- ul sy l kakk; parjjkgwns vktikl wu ropsek>se\$hps l c/k dV- rwek>k [kjk fe= ukgh vl al etrs** vk'kkparsfo/kku , dY; kuarj ek÷; k MkG; krwu vJq okgwykxysfrua ek>h l etwr dk<yh- o Eg.kkyh]^^vjsukjk; .k] eh rgyk p"Vsr cksyys, o<aeukyk ykowu ?ksÅ udkd - cjatkÅ ns ek÷; k xG; kph 'kli Fk vkgs [kjal kax-**

eheu?kV\d: u | kfixry\]^^\k'kk] eh'kkGk | kMuu fnysyh\kgs**

gs, cdY; kuarj vk'kkyk HkkoGp vkyh-rh [kkyh cl yh-FkkMaik.khl; kyh-i kp ngk feuhV vkEqh 'kkarp cl yksFkkM; k oGkuafruaeyk fopkjyā^^ eyk [kja[kja[kak dk; idkj vkgsrks.**

 $$$ v'(k)^{*} = v'(k)^{*} = v'(k)^{*} + v'(k)^{*} + v'(k)^{*} = v'(k)^{*} + v$

vk'kk]^^ ex txkph, o<hfQdhj vkq{ rj f'kdokuk R; kyk-**

 $$$ $\k _{n}^{\circ} c?kw m: I kojuaexM; kyk xY; koj vkEgh I xGht.kaR; uyk I etkow I karks R; uhy; d: uvkeP; k Hkkothpadk; ekMr ukghr-vkEgh vtw R; uyk Lkfxryalgk; -**$

vk'kk]^^ Hkkoth dksk**

 $\mbox{$\lor$kD]$^$ rfigh Eg.krk; $rh eyk y; $iVra-xkokdMaxY;$koj R;$kyk dk; $ch d: u$ I kGayk i kBorhp-** }$

∨k′kkyk ∨kb/þaEg.ku eukœu i Vya

eakiji; kyk xij; koj vkblua eyk 'kkGs' ?kky.; kl kBh nknkyk l ktixrya nknkua cki wyk f'k0; k nsåu l ktixryav[kj cki wanknkpaukblyktlro , sdya vkf.k nksu efgusm'khjk dk gkbluk eh b; Rrk vkBohyk i ps k ?ksryk- v'kk i /nrhusek÷ks[kblhr >kysys f'k{k.k i lijgk l q >kys