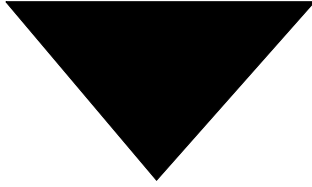


পদার্থবিজ্ঞান

১ম পত্র ব্যবহারিক



cixŋŋ1

c`v_ weÁv#bi cixŋŋv wbiŋŋvi tŋŋî c_v_ŋK ,i"ZcŸ c†qvRb nj m² cŋigvc| m² cŋigv†ci Dci
c`v_ weÁv#bi cixŋŋv wbiŋŋvi djvdj ZvrchcŸfv†e wbfikxj| ZvB th tKvb ai†bi cixŋŋv wbiŋŋv ev
M†eIYv-ch†eŋŋY ii" Kivi Av†MB Avgv†`i cŋigvc m†ú†K mŷúó aviYv Ges cŋigvc wby†qi `ŋŋZv
ARb Ki†Z n†e| GB cixŋŋY Avgiv cŋigvc weIqK wKQyKvħµg m†úv`b Kie|

Avgiv Rvwb t†ŝZ cŋigvc ,wji g†a" Ab"Zg tgŝŋjK iŋk nj ^N" | wgvvi t†j w`†q Avgiv wgvjwgvvi
chŝ ^N" gvc†Z cvwi| wKŝZGi t†K Kg ^N" gvcvi Rb" wgvvi t†j Dc†hwm bq| t†ŋŋî e"eüZ
nq fwbqv†i t†j A_ev gvB†µwgvvi wR|

GB cixŋŋY Avcb fwbqv†i t†j hŷ ঞইড K"wjcv, gvB†µwgvvi wR e"envi K†i ^N" Ges
D`w\_Z wbw³ i m†v†h" e`z fi gvc†Z cvi†eb Ges c`v_ weÁv#bi ZËxq Áv I R"vgwZK m†îi Z†bv
Ki†Z cvi†eb|

cixŋŋYi bvg t wefbcxvZ†Z GKU wmwjŮv†i AvqZb wbyq|

cixŋŋYi D†İK"

GB cixŋŋY m†úv`b K†i Avcbŋ

p ঞইড K"wjcv†mi m†v†h" ^N" cŋigv†ci `ŋŋZv ARb Ki†eb|

p wR e"envi K†i m²Zg ^N" cŋigvc Kivi `ŋŋZv ARb Ki†eb|

p D`w\_Z wbw³ e"envi K†i e`z evZv†m Ges cvwb†Z Wz†q fi gvcvi `ŋŋZv ARb Ki†eb|

p R"vgwZK m†î e"envi K†i GKU (bgbv) wbw†iU wmwjŮv†i AvqZb wbyq Ki†Z cvi†eb|

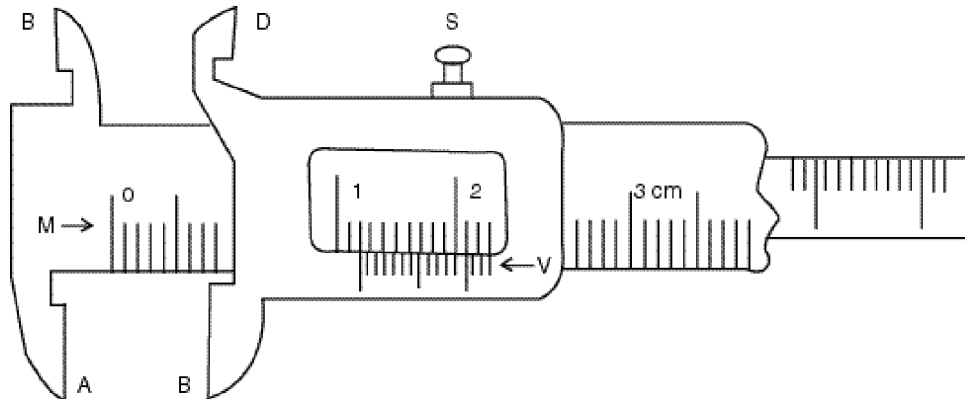
p AvKŋgW†mi m†î c†qvM K†i GKB bgbv e`z AvqZb wbyq Ki†Z cvi†eb|

p ঞইড K"wjcv, wR Gi m†v†h" cvß cŋigvc t†K cvß AvqZb Ges AvKŋgW†mi m†î c†qvM
K†i GKB e`z cvß AvqZ†bi Z†bv Ki†Z cvi†eb| G t†K AvKŋgW†mi m†îi mZ"Zv hvPvB
K†i wmxvŝ wbw†Z cvi†eb|

GKB bgbvi tñî ঞাইড K`wjcvm w`q ^N` I e`vm tg#c A_ev ̄R w`q ^N` I e`vm tg#c R`wgiZK m̂ c#qM K#i AvqZb wYq Kiv hvte [mgxKiY-1] D`wZ w<sup>3</sup> e`envi K#i GKB bgbvi tñî AvKigWw#mi m̂ c#qM K#i AvqZb wYq Kiv hvte [mgxKiYÑ2] GKB e`z AvqZb wZb Dcv#q wYq Ki#j I GKB AvqZb cvIqv hvte| G cixñY hvPvB Kiv n#e wZbU cwigvc h\_vh\_ wKbv| Avmbx Gevi cixñvq c#qvRbxq hšcwZ, #jvi m#½ cwiwPZ nIqv hvK| hšcwZi cwiwPZ [mgbq I e`envi tKškj]

1| ঞাইড K`wjcvm t

^N` cwigv#ci mvaviY tñj w`q Avgiv 1wgiwguvi chš mVKfv#e gvc#Z cwi| Gi tP#q ñz ^N` mVKfv#e gvcvi Rb` MwYZe` wcv#i fwbqvi Awie@vi K#ib fwbqvi tñj| G m#ú#K Avclb gva`gK ̄#i tR#b#Qb| gva`gK ̄#i Avil tR#b#Qb fwbqvi tñji e`envi K#i wbgZ ^N` gvcvi h#ši bvg fwbqvi K`wjcvm ev ঞাইড K`wjcvm| Avmbx hšwUi m#½ cwiwPZ nIqv hvK| GKwU ঞাইড K`wjcvm nv#Z wbb Ges Qie i m#½ wgi#q wbb|



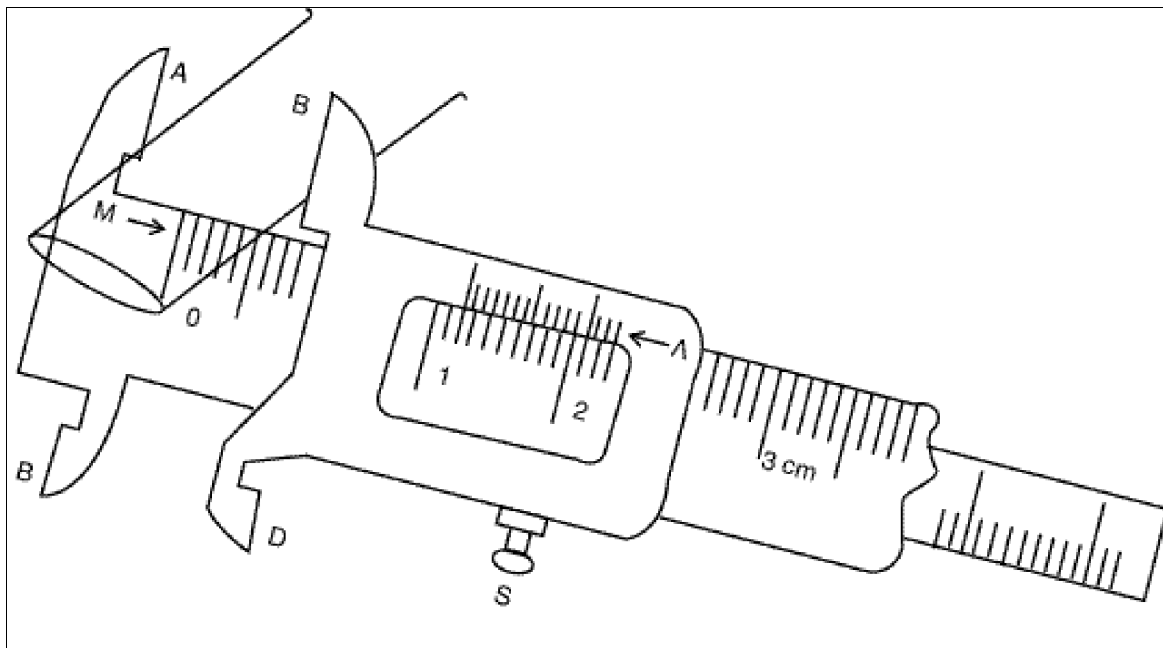
PI 1.2

s wPwYZ AskwUi bvg cavb tñj Gi Mv#q cm ev Inch A_ev Dfq GK#K`vM KwU Av#Q| th cv#š kb` vM KvUv Av#Q tmB cv#š J₁ wPwYZ vqx (fixed) tPqvj jñ Ki`b| C wPwYZ ̄Xjv K#i M wPwYZ ̄Ny#j cavb tñji Dci w`q J₂ tPqvjhñ GKwU tdg tñji Dci w`q W#b ev#q Mwo#q hvq| (tKvb tKvb h#š M ̄bvI vK#Z cv#i tm#ñî C ̄za#i WvB#b ev#q Uvb#j tdgwU m#i hvq| GB Mwo#q hvIqv AskwUi g#a` LwbKUv RvqMv duKv Rvbvjvi g#Zv| G duKv RvqMv w`q cavb tñji Mv#qi vM, #jv t`Lv hvq| tdgwUi v wPwYZ Rvbvjvi cv#k jñ Ki`b KZ, #jv tQvU tQvU N#ii vM KvUv Av#Q| GwU `y#K ev GKw`#KI vK#Z cv#i| GwU fwbqvi tñj| fwbqvi tñji tdgmsjM tPqvjwU fwbqvi tñji mv# MvZkxj|

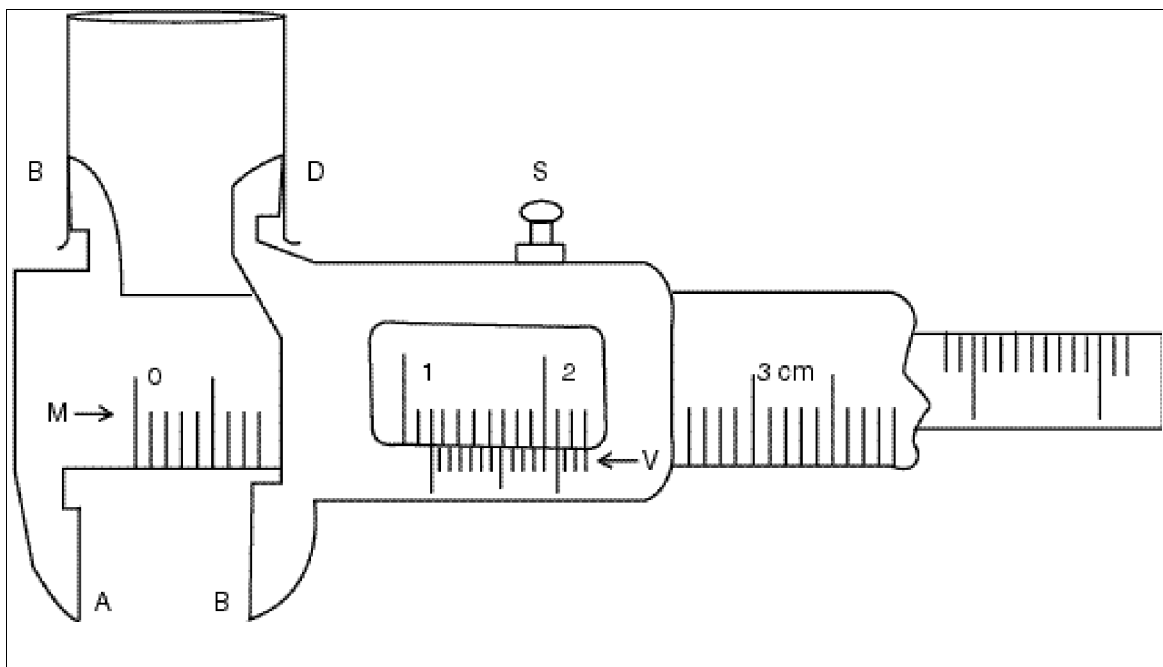
Avil jñ Ki`b, J<sub>1</sub> Ges J<sub>2</sub> tPqvj `yUi Dc#ii Ask `y j#v K#i wee#Z| G `y e#Z AskI hšwUi tPqvj | pq tK fwbqvi tñji Aš tPqvj (Inner Jaw) Ges J₁J₂ Ask#K ewn:tPqvj (external Jaw) e#j|

jñ Ki`b, fwbqvi hñ tPqvjwU meev#g mwi#q w#j J<sub>1</sub>J<sub>2</sub> tPqvj `y ci`úi w#j hvq| cavb tñji kb` vM fwbqvi tñji c_g`v#Mi mv# w#j hvq| tPqvjwU hZB WvB#b mwi#q Av#eb jñ Ki#eb cavb tñj eivei GKwU avZe kjvKv L tew#q Av#m|

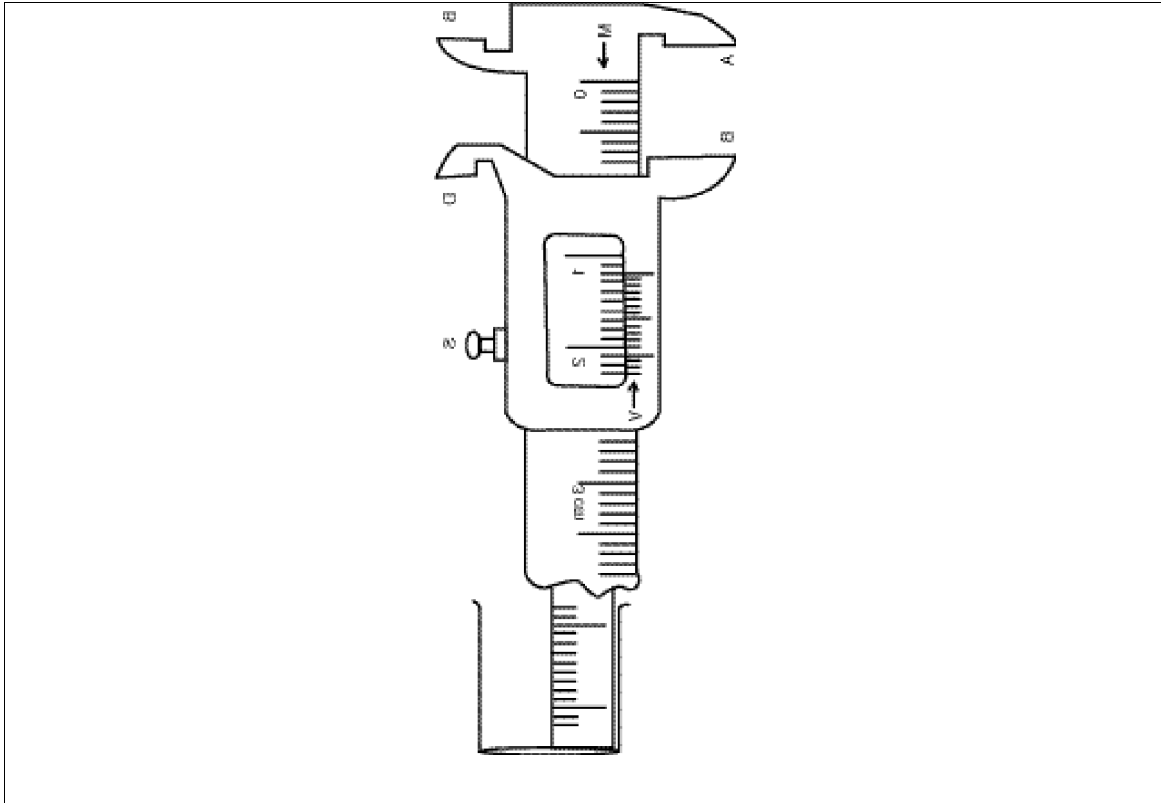
Avcıb Rvıbb ıK GB hŞıU ı`ıq tKvb aiıbi cıııgıvı tbqv nq? ıPÎ,ıjv j ıı Kiıbı



ıPÎÑ1.3 t eıınt tPıqvıj ı`ıq eı̄ı eıııııı eı̄ııı gıvıv nqı



ıPÎÑ1.4 t AŞ:ıPıqvıj eı̄ıııı Kıı eı̄ı tıfZııı eı̄ıı eı̄ı Nı gıvıv nqı



¶PÎÑ1.5 t kjvKv Wæq ¶`q e`z`fZ`ii MfxiZvi gvc tbqv nq|

h`ši e`envi t Dc`iii ¶PÎ 1.3, 1.4, 1.5 t`_K Aek` ¶m×vš ¶b`q`Qb ¶e¶fb Dcv`q ¶æið K`v¶jcvm¶U e`envi K`i`^`N`i c¶igvcB tbqv nq| GB hš e`envi`ii Av`M fvbqv i a`e ¶bYq Ki`Z nq|

fvbqv i a`e ¶bYq t cavb t`_çji ¶ÏZg GK N`ii gvb KZ t`_L ¶bb| aiv hvK s| Gevi fvbqv i t`\_çji NimsL`v KZ , ¶Y t`\_L ¶aivhvK n| Zvn`j GB hš¶Ui fvbqv i a`e $v_c = \frac{s}{n}$

aiv hvK, cavb t`\_çji ¶ÏZg N`ii ^`N` s= 1 mm = 0.1cm fvyqv i t`\_çji ¶ÏZg N`ii msL`v n = 10

fvbqv i a`e $v_c = \frac{0.1}{10}$ cm = 0.01 cm.

hvišK Î`uU t fvbqv i t`_çj¶U`K evg¶`K tU`b J<sub>1</sub>J<sub>2</sub> tPqvj `¶K ¶g¶k`q ¶`b| j ¶¶` Ki`b fvbqv i t`\_çji Mv`qi c_g `vM (k`b` `vM) Ges cavb t`\_çji k`b` `vM ci`ú¶i ¶g`j tM`Q ¶Kbv, h¶` ¶g`j hvq hš¶U Î`uUg¶| h¶` bv ¶g`j Zvn`j hš¶U Î`uUh¶| G Î`uU `¶ ai`bi|

1. h¶` fvbqv i k`b` `vM cavb t`\_çji k`b`i Wbv¶`K _v`K Zvn`j hvišK Î`uU avvK|

2. h¶` fvbqv i k`b` `vM cavb t`\_çji k`b` `v¶Mi evg¶`K \_v`K, Zvn`j hvišK Î`uU FbvZK| (-e)|

h`ši Î`uU _vK`j Zv ¶bi`cY Ki`b| Î`uUi c¶igvb n`e cavb t`_çji cvV + fvbqv i cvV × fvbqv i a`e|

th`Kvb ^`N` c¶igv`ci Rb` ¶æið K`v¶jcvm t`\_K Gfv`eB cvV ¶b`Z n`e|

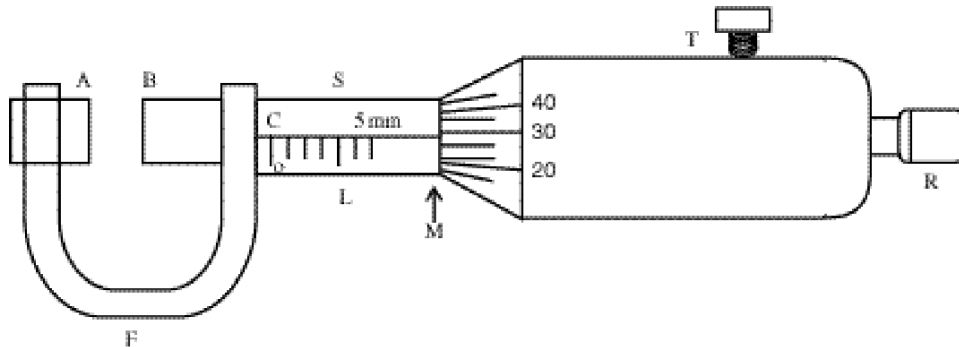
cavb t`\_çji cvV + fvbqv i cvV × fvbqv i a`e ± hvišK Î`uU|

2. 𐌹𐌺𐌹 t

GB hšši bvg gvB†μvgUvi 𐌹𐌺𐌹| Avgiv ms†¶c ejj 𐌹𐌺𐌹| GB hšši mvin†h" 10⁻⁶m ev gvB†μvgUvi fMvsk ^`N" mivKfv†e gvcv hvq| GKU 𐌹𐌺𐌹 N†j Zv Nyb A¶ eivei MZKxj nq| 𐌹𐌺𐌹 maú† GKevi N†j G†j GB MZi mib nq 𐌹𐌺𐌹 M†qi `𐌹 cıkvck c†v†Pi g†a"i j¶K `†Z (G†K ejv nq ıcp)| GB 𐌹𐌺𐌹 c†v†Pi †KŠYK cıgvc†K Kv†R j¶M†q GB hš KvR K†i ejj G†K 𐌹𐌺𐌹 ejv nq|

Avm† hšUı m†½ cııPZ nB| m†e n†j GKU hš nv†Z ıbb Ges ıb†Pi Qıei m†½ ıgıj ıbb|

G†Z F ıPıYz `𐌹 cı†Š mi" mgvšivj evııkó U-AvKıZi GKU KvV†gv|



ıPı 1.6

F-Gı GK evıi mgZj ıcv (face) A Gı m†_ GKU mgZj cvš ııkó `Ű ev Kxjk 𐌹vx†v†e AvUKv†bv| Gı bvg Gbıfj| Aci evı†Z i†q†Q GKU dıcv bj c| GB b†ji M†q i†q†Q ıgıjıgUv†i `vMvıKZ GKU mij ^ııLK ††j| G†K ejj 𐌹𐌺𐌹| ıPı† T ıPıYz †QıU 𐌹𐌺𐌹 j¶" Ki"b GıUı bvg ı_gej| ı_gejıU Nyb| GıU Ny†j 𐌹ı†Wi ga"†q GKU 𐌹ZB †d†gi g†a" Wb†b ev†q m†i hvq| Gibvg ıú†Wj 𐌹ı††ir g†a" GKU dıcv b†ji ıKQyAsk Xı†bv ††K| GB dıcv bjıU ı_gej| ı_ge†ji AMfv†M Gi cıııa tiLvq GKU e†vKvi ††j i†q†Q| e†vKvi ††jıU 100, 50 ev 25 fv†M ıef³| G†K ejv nq e†vKvi ††j (Circular scale)| ı_gejıU Ny†Z Pv†j R 𐌹𐌺𐌹 mvin†h" Ny†Z n†e| R 𐌹𐌺𐌹 bvg †i†PU ÷ c| ı_gejıU ^ııLK †††ji Dci ı†q mvg†b †cQ†b GıM†q hvq|

hšši e"envi t

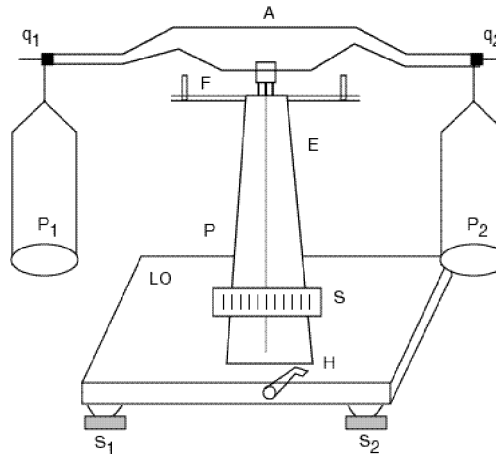
𐌹𐌺𐌹Rı Gbıfj (A) Ges ıú†Wj (B) Gı g†a" †Kvb e†Z†i†L †i†PU ÷ c (R) Ny†q Ny†q Ggb GKUv Ae† cvıqı hvq hLb e† dıKi g†a" myıı AvU†K hvq Ges †i†PU ÷ cıU ıe†kl ai†bi kã K†i Ny†Z ††K| ZLb hšši cavb ††j I e†vKvi †††ji cvı ıb†q e†Z gvııi ^`N" ev dıKi `†Z cvıqı hvq|

j¶Nô MYb ev b†bı¼ (Least count) ıbYq t

GB hš ı†q ¶ıZzg †h ^`N" cıgvc Kiv hvq ZvB n†"Q j¶Nô MYb ev b†bı¼| e†vKvi †††ji gvı GKfvM Ny†j ıú†ŰjıU hZUKzn†i Av†m Zv†K ejv nq hšši j¶Nô Mbb (LC)| hšši ıcp†K e†vKvi †††ji fvM msL"v ı†q fvM Ki†j hšši j¶Nô MYb cvıqı hvq|

emvb $_v\ddot{K}$, hv $\ddot{Z}$ Zx $\ddot{A}$ avi B $_uvZ$ L $\hat{U}$ U Dj α $_a$ A Gi mv $\ddot{g}$ b $_v\ddot{q}$ evav $_xb$ fv $\ddot{e}$ Wv $\ddot{B}$ b ev $\ddot{q}$ Pj $\ddot{Z}$ cv $\ddot{i}$ | $_a$ i cv $\ddot{f}$ $_k$ Ggbfv $\ddot{e}$ GK $_U$ f $_j$ (S) Av $\ddot{Q}$ hv $\ddot{i}$ Dci $_v\ddot{q}$ Zx $\ddot{A}$ avi dj $\ddot{K}$ i k $_3$ kx $_U$ Wv $\ddot{b}$ -ev $\ddot{g}$ th $\ddot{Z}$ cv $\ddot{i}$ |

ex $_U$ i $_p$ cv $\ddot{S}$ t $_K$ $_v$ পাল্লা P $_1$ P $_2$ t $_d$ gi mv $_$ Sz $_v$ bv $_v\ddot{K}$ | পাল্লার $_f$ i $_E$ i gv $_S$ ig $_S$ $_v\ddot{K}$ GK $_U$ $_u$ U t $_j$ fj (L), Avi $_f$ i $_E$ i Zj $_v$ q $_v$ t $_j$ f $_j$ s $_z$ s $_1$ s $_2$ | GQ $_ov$ GK $_U$ $_j$ fv $\ddot{i}$ hy $\ddot{v}$ nv $_Z$ j (H) Ny $\ddot{t}$ q $_eg$ U $_K$ fv $\ddot{i}$ K $_b$ $_i$ mv $\ddot{c}$ $_f$ $_v$ axbfv $\ddot{e}$ t $_v$ j $_v$ bv hv $_q$ | Ab $_v$ $_K$ Ny $\ddot{t}$ q $_eg$ U $_K$ GK $_U$ $_v$ qx t $_d$ g F Gi Dci $_i$ iv $_L$ v hv $_q$ | ex $_U$ i $_p$ cv $\ddot{S}$ $_v$ $_y$ q $_1$ q $_2$ msh $_y$ $_v\ddot{K}$ hv $\ddot{f}$ $_i$ Ny $\ddot{t}$ q Wv $\ddot{b}$ -ev $\ddot{g}$ m $_i$ t $_q$ $_b$ $_3$ i fv $_m$ vg $_v$ Av $_b$ nq |



$_P\hat{I}\hat{N}1.9$

e $_envi$ t $_b$ $_3$ i m $_v$ n $_v$ h $_v$ e $_z$ fi g $_v$ cv hv $_q$ | GR $_b$ c $_t$ g $_b$ $_3$ $_U$ mgb $_q$ Ki $_v$ c $_q$ v $_R$ b | $_b$ $_3$ $_U$ GK $_U$ mg $_Z$ j t $_U$ ev $_j$ i Dci em $_b$ | s $_1$.s $_2$ Ny $\ddot{t}$ q Gi $_u$ U t $_j$ fj L t $_L$ $_f$ i $_E$ Zj $_K$ Av $_b$ y $_g$ K Ki $_b$ | nv $_Z$ j $_U$ Ny $\ddot{t}$ q $_eg$ U Dc $_i$ Z $_j$ t $_L$ Zx $\ddot{A}$ avi K $_q$ K $_U$ t $_f$ j $_i$ Dci $_v\ddot{q}$ Wv $\ddot{b}$ ev $\ddot{g}$ o $_v\ddot{M}$ i Df $_q$ $_K$ mg $_b$ ms $_L$ $_K$ Ni hv $_q$ $_K$ b $_v$ | t $_M$ $_j$ পাল্লাটি e $_envi$ Dc $_i$ h $_M$ x Ges $_i$ Un $_x$ b | h $_v$ $_K$ v $_U$ U Wv $\ddot{b}$ $_K$ t $_e$ k hv $_q$ Z $_v$ n $_j$ e $_S$ $_Z$ n $_e$ ev $_g$ $_K$ i পাল্লাভারী। q $_1$ q $_2$ $_z$ th t $_K$ v $_U$ A $_ev$ Df $_q$ U Ny $\ddot{t}$ q পাল্লাটি $_i$ Ugy $_y$ Ki $_b$ | gv $_S$ gv $_S$ nv $_Z$ j Ny $\ddot{t}$ q $_i$ U Ac $_m$ ib nj $_K$ b $_v$ t $_L$ $_b$ b | h $_v$ $_K$ v $_U$ U ev $_g$ $_K$ t $_e$ k hv $_q$ Z $_v$ n $_j$ e $_S$ $_Z$ n $_e$ Wv $\ddot{b}$ $_K$ i পাল্লাভারী। GKB Dc $_v$ q $_z$ Ny $\ddot{t}$ q পাল্লা $_i$ Ugy $_y$ Ki $_Z$ n $_e$ | GK পাল্লার I $_c$ i b $_g$ b $_v$ e $_z$ t $_i$ L Ab $_v$ পাল্লার IR $_b$ t $_i$ L ev $_i$ vi hv $_P$ v K $_i$ e $_z$ fi $_b$ $_Z$ nq | GR $_b$ GK $_U$ ev $_U$ L $_v$ iv t $_m$ U ev IR $_b$ t $_m$ U e $_envi$ Ki $_v$ nq | ev $_U$ L $_v$ iv $_j$ vi M $_v$ q f $_i$ i g $_v$ b t $_j$ L $_v$ $_v\ddot{K}$ | e $_z$ IR $_b$ $_b$ i $_c$ $_Y$ i R $_b$ cv $_B$ f $_i$ i g $_v$ b $_K$ A $_f$ KIR Zi $_Y$ i g $_v$ b $_v$ iv $_Y$ Ki $_Z$ nq |

h $_S$ $_j$ vi m $_t$ $_2$ t $_g$ v $_v$ g $_v$ c $_v$ i $_P$ Z n $_j$ b | K $_q$ K $_e$ vi e $_envi$ Ki $_j$ B G $_j$ vi avi $_Y$ m $_y$ úo n $_e$ Ges e $_env$ $_i$ i $_v$ U $_v$ ev $_o$ te | cie $_Z$ x c $_p$ v $_q$ thfv $\ddot{e}$ eY $_b$ Ki $_v$ n $_q$ q $_Q$ Z $_v$ GK $_U$ e $_env$ $_i$ K m $_g$ m $_v$ mg $_v$ av $_b$ A $_ev$ ci $_x$ $_Y$ i c $_v$ Z $_e$ $_b$ t $_j$ L $_v$ i b $_g$ b $_v$ | G $_Z$ m $_y$ úo $_b$ $_j$ $_L$ Z Ask $_j$ $_v$ K $_e$ | (1) ci $_x$ $_v$ i b $_v$ g (2) Z $_E$ (3) c $_q$ v $_R$ b $_q$ h $_S$ c $_v$ Z ev Dc $_K$ iY (4) K $_v$ Ri avi $_v$ (5) dj $_v$ dj $_b$ Y $_q$ i QK (6) dj $_v$ dj (7) mZKZ $_v$ (8) Av $_j$ v $_P$ b $_v$ (9) $_P\hat{I}/M\hat{v}d/t\hat{i}L\hat{v}P\hat{I}$ (10) $_m$ ve P $_v$ j $_b$ (c $_q$ v $_R$ b n $_j$) |

KvRi aviv t

(K) *झाइ K"wjcv#mi mrvn#h" ımwjÛv#ii AvqZb ıbyq t*

1. *झाइ K"wjcv#mi cavb f-#ji ॥Zzg fv#Mi gvb KZ Ges fvbqvi f-#ji tgvU fvM msL"v KZ Zv j ॥ Ki"b| fvbqvi a"e ıbyq Ki"b Ges LvZvq ıjLb|*
2. *झाइ K"wjcv#mi tPqvj ` ॥ GKİ ॥ gıj#q cavb f-#ji kb" ıvM Ges fvbqvi f-#ji kb" ıv#Mi Ae"vb j ॥ Ki"b| h#ši hıŠK İ"U Av#Q ıK? ıvK#j c#qvRbxq MYbvi gıa#g hıŠK İ"Ui gvb tei Ki"b Ges LvZvq ıjLb|*
3. *GLb ımwjÛviU "N" eivei झाइ K"wjcv#mi ` ॥ tPqv#ji g#a" ıvcb K#i tPqvj ` ॥ K ımwjÛv#ii ` ॥ v#š nvjKvfv#e tP#c ai"b| G Ae"vq fvbqvi kb" ıv#Mi Ae"vb j ॥ Ki"b| kb" ıvM cavb f-#ji hZ, #jv ıvM AıZıg K#i G#m#Q Zv cavb f-#ji cvV M| G Ae"vq fvbqvi#i tKvb msL"K ıvM cavb f-#ji t#Kvb GKıU ıv#Mi m#½ ıg#j hvq Zv t`Lb| fvbqvi#i GB ıvM msL"vB fvbqvi cvV ev fvbqvi mgcvZb v| fvbqvi cvV#K fvbqvi a"e Øiv , Y K#i fvbqvi cv#Vi gvb cv#eb| cvB cavb f-#j cvV M Ges fvbqvi cvV v Q#K ıjLb|*
4. *ımwjÛviU#K "N" eivei K#qKıU Ae"v#b eım#q 3bs cıııqvq AvıI K#qKıU cvV ıbb Ges Q#K ıjLb|*
5. *Gici ımwjÛviU#K e"vm eivei झाइ K"wjcv#mi tPqv#ji g#a" ıvcb K#i 3bs cıııqvq K#qKıU cvU ıbb Ges Q#K ıjLb|*
6. *Q#K cvB tWUvmgn- ınmve K#i ımwjÛv#ii "N" Ges e"vmva tei Ki"b Ges mgxKiY (1) Gi mrvn#h" ımwjÛviUi AvqZb ıbyq Ki"b|*

(L) *ıv#Ri mrvn#h" ımwjÛv#ii AvqZb ıbyq*

1. *ıv#Ri ıiLK f-#ji ॥Zzg N#ii gvb I e#vKvi f-#ji fvM msL"v t`#L ıbb|*
2. *e#vKvi f-#jıU#K m#úY Gkevi Nıj#q j ॥ Ki"b ıiLK f-#j KZUıZ" N" AıZıg K#i| GB "N" nj ıcP| ıcP#K e#vKvi f-#ji fvM msL"v ı`#q fvM K#i jıNô MYb (LC) ıbyq Ki"b Ges LvZvq ıj#L ıvLb|*
3. *ıvRıUi hıŠK İ"U Av#Q ıKbv j ॥ Ki"b| ıvK#j İ"Ui cıııgvY ıbyq Ki"b Ges LvZvq ıj#L ıvLb|*
4. *cix ॥ vaxb ımwjÛviU#K "N" eivei ıv#Ri mgvšivj evıi ga" Gııfb-ıv#b#Wj cv#ši g#a" Avj#Zvfv#e tP#c ti#L j ॥ Ki"b e#vKvi f-#ji kb" ıvM cavb f-#ji KZ "N" AıZıg K#i#Q| aıv hıK, GB "N" L| 2bs Q#K L Gi gvb ıjLb| Gevi ıiLK f-#ji tiLv ev ıv#Mi m#½ e#vKvi f-#ji KZ b#i ıvM ıg#j tM#Q Zv t`Lb| aıv hıK, Ni msL"v C| C Gi gvb 2bs Q#K ıjLb| C tK jıNô MYb ı`#q , Y K#i L Gi m#½ thıvM Kıj tgvU "N" cvIqv hv#e| cvB gvb Q#K ıjLb|*
5. *ımwjÛviUi "N" eivei K#qKıU ıv#b 4bs cıııqvq GKB iKg AvıI K#qKıU cvV ıbb Ges Q#K ıjLb|*
6. *Gevi ımwjÛviUi e"vm eivei 4bs cıııqvq GKBfv#e K#qKıU cvV ıbb Ges LvZvq ıjLb|*
7. *Q#K cvB tWUv mgn- (1) bs mgxKi#Y eım#q ımwjÛviUi AvqZb ıbyq Ki"b Ges LvZvq ıjLb|*

(M) AvKigW#mi m#fi mrv#h" m#jÛvi AvqZb #bYq

1. #b³Ui পাল্লা c#i@vi Ki"b| #b³U t+jfj Ki"b Ges #b³i mPK hvZ f-#ji iY"v#Mi Dfq
#K mgb msL"K Ni #e#qcb nq Zv VK K#i #bb|
2. Gi ci #b³Ui ডানপাল্লা bgb m#jÛviU eim#q Wb cvši c#igvb gvZv evULvov ivL#| hZ#Y
chš mPK KvUvi #e#qcb f-#ji ib" `v#Mi Dfq #K mgb bv nq ZZ#Y evULvov c#ieZb
Ki"b| Gfv#e bgbUi mVK (fi) -- #bYq Ki"b Ges LvZvq #jL#|
3. #b³i evg পাল্লার Dci GK#U c#Ggbfv#e emvb hvZ c#o#U পাল্লাটিK úm bv K#i| c#oi
Dci GK#U c#bc# exKvi emvb| cix#Y m#jÛviU mZv `#q te#a #b³i evg পাল্লার QK t_#K
Ggb fv#e e#s#q f`b thb G#U c#b c# exKv#ii g#a" m#úY #bg#Z n#h e#s _v#K| j# Zjvq
ev Mv#î tKv_l úk bv K#i Ges m#jÛviU thb m#úYfv#e c#b#Z W# _v#K|
4. m#jÛviU#K Gfv#e c#b#Z #bg#Z t#L (fi) #bYq Ki"b Ges 3 bs Q#K #jL#|
5. GK#U _v#gvgUv#ii mrv#h" K#q Zvcgvîv f`#L #bb| Ges H Zvcgvîvq c#bi NbZ KZ tR#b
#bb (eB A_ev #UDU#ii mrv#h" #bb)|
6. bgbUi evZ#m fi Ges c#b#Z #bg#Z f#ii Rb" Avjv`v Aviv`v K#qK#U cvV #b#Z cv#ib A_ev
GK#U cvVI #b#Z cv#ib| GK#aK cvV #b#j Mo fi #bYq Ki"b Ges 2bs mgxKi#Y M_a-M_ω Ges
ρ_θ Gi gvb eim#q bgbvi AvqZb #bYq Ki"b|
9. Gevi স্নাইড K"vjcv#m, #R Ges D`#b³i mrv#h" cvß GKB bgbvi AvqZ#bi gvb hvPvB K#i,
f`L#| AvqZ#bi gvb GKB nj #K? cvß djvd#ji Z#bvg#K Av#jvPbv Ki"b|
tKvb gvbU te#k mVK? KviY #K? #ZbU gvb #fb nIqvi KviY #K? tKvbU#K cKZ.gvb n#m#e
aiv DiPZ?

ch#e#Y I m#b#ekb t

- K. স্নাইড K"vjcv#m i f#bqv i a"e #bYq t
cavb f-#ji #Zg N#ii gvb, S = _____ cm
f#bqv i f-#ji tgvU fVM msL"v n = _____
AZGe f#bqv i a"e VC = $\frac{S}{n}$ = _____ cm
- L. স্নাইড K"vjcv#m i h#šK Î"U = _____
- M. #Ri j#Nô MYb #bYq t
^iLK f-#ji GK N#ii gvb (cP) S = _____ mm
e#Kvi f-#ji tgvU fVMsL"v n = _____
AZGe j#Nô MYb LC = $\frac{S}{n}$ _____ mm
- N. #Ri h#šK Î"U = _____
- O. K#Zvcgvîv c#bi NbZ ρ_θ = _____ gmCm⁻³.

cixTŸYÑ2

cixṯYi Dṯik'

GB cixTŸ mǣúb Ki‡j Avcw̃b

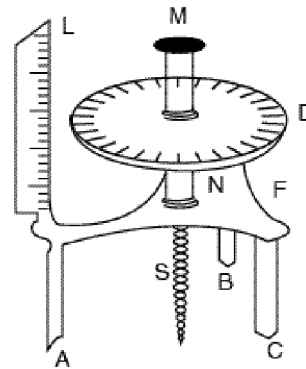
- 1 tûtiŋgUvi e'envi Kti ^N" cwigtci `¶Zv ARb Kiteb,
1 DËj cti/AeZj cti eµZvi e'vma wbyq Kitz cviiteb|

hšc_WZi ci_WP_WZ

Sphere A_ †MvjK| †MvjKxq Z†ji (Spherical Surface) Gi eμZvi e″vm|a gvcvi Rb″ th hš e″eüZ
nq Zvi bvg †ù†iwigUvi| Avm†j GwU| GKwU gvB†μwigUvi| †MR Ges †ù†iwigUvi GKB bxwZ†Z KwR
K†i| Z†e MV†b cv_K″ A†bK| cv†ki wPî †Lb Ges GKwU †ù†iwigUvi wB†q Qwe i m†½ Ask_ †jv
wg†j†q wbb|

M nVZjmn GKU gVb~~μ~~wigUvi ̄z s G h~~†~~š i cavb Ask| ̄z
GKU ̄f~~†~~KvYv KvVv~~g~~vi t d~~g~~i t K~~†~~ eivei GKU bvU (N) Gi
ga~~†~~q DVvbv~~g~~ K~~†~~i | d~~g~~U ̄ZbUcV A, B, C Gi Dci fi K~~†~~i
̄w~~†~~z cv~~†~~i | GKU mgZj K~~†~~ djK ev tU~~†~~e~~†~~j i Dci A,B,C
cv~~†~~qi Dci t~~†~~ù~~†~~iwigUviU ̄w Kivb|

c#qvRb n#j M nvZjWU Ny#q 7zs tK h#_ó Dc#i Zzj wbb|
nvZjWU a#i mvgvb" Pvc w`#j tUw#j i Z#j i Dci wZbWU tdvUv ev
w#yPwYz nq| G, #jv A,B,C cv#qi Qvc| j¶ Ki"b A,B,C
cv, #jv ci_ú i thb mg `#Z t_#K GKWU mgevú wîfB ^Zwi
K#i#Q|



¶ 2.1

12 Dc*i*i gv_vq nvZ*j*i 11bP j 11Ki"b GK1U avZe P1K1Z D| GB P1K1Zi c1i1a1Z LuRKvUv f~j
 jvMv1bv Av1Q| `vMKvUv f~j1U1Z t~L1Zv KZ1U Ni? m1a1iYZ 50, 100 ev 2001U Ni_v1K| GK1U cv
 (thgb Q1e1Z A) Gi m112 উল্লস Z1j GK1U Lvov f~j j 11Ki"b| G1U GK1U ^i1LK f~j| 11g1j1gUv1
 `vMKvUv| 111v1j avZe P1K1Z1U GB ^i1LK 11g1j1gUv1 f~j 11e1i1 DWbv1g K1i|

hš̌i e'envi

tù¹iŋgUvi Ges ~~ʔ~~Ri e¹en¹vi¹wa GKB iKg| j ʔ¹ Ki¹b, e¹ḂKvi f¹ǝjU Nj¹j ʔ¹ c¹vP Ab¹qX
PvKvU Dc¹i D¹V ev w¹b¹P b¹v¹g Ges PvKvi w¹Kb¹viv ¹iLK f¹ǝji v¹Mi m¹½ w¹g¹k v¹ǝK| e¹ḂKvi f¹ǝjU
m¹ú¹Y GKevi Nj¹j GwU ¹iLK f¹ǝji ¹N¹ eivei hZUK¹z¹ ¹N¹ A¹wZug K¹i Zv¹K ej¹v nq w¹cP|
e¹ḂKvi f¹ǝjU 1 f¹vM Nj¹j hZUK¹z¹ ¹N¹ A¹wZug K¹i Zv¹K e¹j j jwMô MYb ev LC|

$$A_{vrlc} = \frac{wcp}{e\ddot{F}vKvi + \ddot{f}ji f vM msL''v}$$

tKvb e⁻z cy⁻Z ev D⁻PZv gvc⁻Z n⁻j c⁻g t⁻u⁻t⁻ivgUv⁻iU⁻K GK⁻U mgZj K⁻W dj⁻tKi Dci t⁻i⁻L
e⁻dvKvi t⁻j⁻U⁻K Ny⁻tq⁻z cvš K⁻W cv⁻Zi M⁻tq Av⁻j⁻Zv fv⁻te⁻uk Kiv⁻bv nq Ges t⁻u⁻t⁻ivgUv⁻i⁻i cvV
tbqv nq| AZ:ci bgb⁻U⁻z⁻ w⁻b⁻P t⁻i⁻L Ges t⁻u⁻t⁻ivgUv⁻i⁻i w⁻Zb⁻U⁻ cv mgZ⁻j⁻i Dci t⁻i⁻L GKBfv⁻te
Ave⁻i cvV tbqv nq| Dfq cv⁻Vi cv⁻K⁻B bgb⁻vi cy⁻Z ev D⁻PZv|

$t \dot{u} \dot{v} q u \dot{v} i i \wedge N'' c \dot{v} i q \dot{v} c i c v \tilde{V} \tilde{N}$

$$M \times \mathbb{C}^p + N \times LC$$

GLv#b, M = eĖvKvi f̄çji c¥N¥b msL`v
 N = eĖvKvi f̄çji A||Z||i³ fVM msL`v
 LC = j||Nô MYb|

h||` tûtiwigUv#ii ||cP ^i||LK f̄çji ¶žZg GKfv#Mi mgvb nq (mvaviYZ ZvB nq) Zvn#jñ
 tûtiwigUv#ii ^`N" c||igv#ci cV = ^i||LK f̄çji cV +N × LC
 Pj# cix¶vU Kiv hvK|

cix¶vi bvg t tûtiwigUv#ii mvin#h" eμZ#ji e`vmva ||bYq|

ZĖ t tKvb eμZj th tMvj#Ki Ask, tmB tMvj#Ki e`vmva#K H eμZ#ji eμZvi e`vmva e#j|
 eμZvi e`vmva R n#jñ

$$R = \left(\frac{d^2}{6h} + \frac{h}{2} \right)$$

GLv#b R = eμZvi e`vmva
 d = tûtiwigUv#ii th tKvb `B cv#qi ga`eZx Mo `iZ
 h = eμZ#ji cō`úk Ki#Yi Rb" tûtiwigUv#ii `K hZUKDc#i DVv#Z ev bvgv#Z nq|
 c#qvRbxq DcKiYñ

tûtiwigUvi

mgZj K# djK

tjY/cY hvi eμZvi e`vmva ||bYq Ki#Z n#e|

Kv#Ri aviv

- 1| ^i||LK f̄çji ¶žZg fv#Mi gvb Ges eĖvKvi f̄çji tgvU fVM msL`v t`#L ||bb|
- 2| tûtiwigUvi||Ui ||cP ||bYq Ki"b| ||cP#K eĖvKvi f̄çji tgvU NimsL`v ||`#q fVM K#i j||Nô MYb
 LC ||bYq Ki"b| LvZvq ||j#L ivL#|
- 3| tûtiwigUvi||U#K mgZj K# dj#Ki Dci `vcb Ki"b| ga`g `K h#ó Dc#i ti#L GKvR
 Ki#eb| Gevi `K Ny#q ||b#P bvgv#Z `vK Ges K# mgZj#K `z kxI ||`#q Avj#Zvf#e
 `úk Ki"b| Avj#Zvf#e `úk Ki#bv nj ||Kbv tevSvi Rb" GB Ae`vq GKB ||`K `K mvgvb"
 Ny#j tûtiwigUvi Kivb#ji Dci `y#Z `vK#e ev K#Z n#q hv#e| G Ae`vq Avevi mvgvb"
 c||igv#Y DĖ||`K Ny#j tmvRv n#q hv#e| G Ae`vq tûtiwigUv#ii ^i||LK f̄çj I eĖvKvi f̄çji
 cV 1bs Q#K ||jL#| G||U c_g cV ev Av||` cV|
- 4| Gevi tûtiwigUv#ii g#a"i `K h#ó Dc#i Z#j ||bb| AZci cix¶vaxb eμZj||U#K
 (tjY/cY) mgZj K#dj#Ki Dci ti#L Zvi Dc#iZ#j tûtiwigUvi||U emvb| Zvici ga`g `K
 Ny#q eμZ#ji ||cV#K Avj#Zvf#e `úk Ki"b| GB Ae`vq tûtiwigUv#ii ^i||LK f̄çj I eĖvKvi
 f̄çji cV ||j#L ||bb|
- 5| 3 Ges 4bs avivU Avil 3/4evi m#úb Ki"b Ges GKBfv#e cV LvZvq ev Q#K ||jL#|
- 6| tûtiwigUvi||U Gevi mgZ#j GKUK#iv mv`v KvM#Ri Dci e||m#q GKUZ#vc ||b| KvM#Ri Dci
 tûtiwigUv#ii ||Zb||U cv#qi Qvc c#e| mgvb `#i th tKvb `B cv#qi g#a"i e`veavB d| GQvov
 ||Zb||Ui `iZ tg#c Mo d ||bYq Ki"b|
- 7| cvB DcvĖmg# Q#K e||m#q c#qvRbxq ||nmve MYbvi gva`tg eμZvi e`vmva R ||bYq Ki"b|

- 1 | $bg\bar{b}v e^{-} \dot{c}ix \uparrow b\dot{x}q K\dot{v}b Z\dot{i}Z, \dot{d}U\dot{K}\dot{i}, BZ\dot{v}\dot{v})$
- 1 | $GK\dot{U} Zi j h\dot{v}\dot{Z} bg\bar{b}v e^{-} \dot{z} eb\dot{x}q b\dot{q} (\dot{t}K\dot{i}i\dot{v}mb)$

Kv̄Ri av̄

- 1 | $D\dot{v}b\dot{v}^3 \dot{K} \dot{t}j\dot{f}j Ki\dot{b} | \dot{b}\dot{v}^3 i$ পাল্লা $c\dot{i}i\dot{v}i K\dot{i} mPK h\dot{v}\dot{Z} \dot{t}\dot{f}ji kb\dot{v} \dot{v}\dot{M}i Df\dot{q} \dot{v}\dot{K} GK\dot{B}$
 $c\dot{i}ig\dot{v}Y ev mg\dot{v}b \dot{v}e\dot{f}\dot{c}Y \dot{t}\dot{q} \dot{t}mf\dot{v}\dot{e} \dot{b}\dot{v}^3 \dot{U} Dc\dot{t}h\dot{v}M\dot{x} K\dot{i} \dot{b}\dot{b} |$
- 2 | $mZ\dot{v}i m\dot{v}n\dot{v}\dot{h} \dot{c}ix \uparrow Y e^{-} \dot{z}K evg$ পাল্লা $\dot{u}\dot{t}Ki m\dot{t}\dot{z} S\dot{z}\dot{t}q W\dot{b}$ পাল্লায় $c\dot{i}ig\dot{v}Y g\dot{t}Z\dot{v} evUL\dot{v}ov i\dot{v}L\dot{b}$
 $h\dot{v}\dot{Z}, \dot{b}\dot{v}^3 i mP\dot{t}Ki \dot{v}e\dot{f}\dot{c}Y kb\dot{v}i Df\dot{q} \dot{v}\dot{K} mg\dot{v}b n\dot{q} | W\dot{b}$ পাল্লায় $evUL\dot{v}ovi c\dot{i}ig\dot{v}Y w |$
- 3 | $\dot{b}\dot{v}^3 i evg$ পাল্লায় $Dci GK\dot{U} \dot{v}c\dot{w} Ggbf\dot{v}\dot{e} i\dot{v}L\dot{b} \dot{t}hb$ পাল্লায় $\dot{K} \dot{u}\dot{k} b\dot{v} K\dot{i} | Ge\dot{v}i GK\dot{U}$
 $\dot{t}K\dot{i}i\dot{v}mb c\dot{y} \dot{v}eK\dot{v}i \dot{v}c\dot{v}oi Dci \dot{t}i\dot{L} \dot{c}ix \uparrow Y\dot{x}q e^{-} \dot{z} \dot{t}K\dot{i}i\dot{v}mb\dot{i} g\dot{t}a\dot{v} m\dot{v}\dot{u}\dot{y} \dot{b}g\dot{v}\dot{z} K\dot{i}$
 $S\dot{z}\dot{t}q \dot{v}\dot{b} | W\dot{b}$ পাল্লায় $c\dot{i}ig\dot{v}Y g\dot{t}Z\dot{v} evUL\dot{v}ov \dot{t}i\dot{L} \dot{b}g\dot{v}\dot{z} e^{-} \dot{z} IR\dot{b} \dot{b}\dot{b} GB c\dot{i}ig\dot{v}Y w_1 |$
- 4 | $c\dot{E} g\dot{v}b\dot{z} \dot{t}j\dot{v} Q\dot{t}K e\dot{v}m\dot{t}q c\dot{t}q\dot{R}b\dot{x}q \dot{v}nm\dot{v}ei g\dot{v}a\dot{t}g s Gi g\dot{v}b \dot{b}Y\dot{q} Ki\dot{b} | Zi Av\dot{M}$
 $\dot{t}K\dot{i}i\dot{v}mb\dot{i} Av\dot{t}c\dot{v}\dot{K} \dot{v}i\dot{t}Zi g\dot{v}b \dot{t}R\dot{b} \dot{b}\dot{b} | [\dot{t}K\dot{i}i\dot{v}mb\dot{i} Av\dot{t}c\dot{v}\dot{K} \dot{v}i\dot{Z} S_L = 0.8]$

QKÑ1

$c\dot{v}b\dot{Z} \dot{v}eY\dot{x}q K\dot{v}b c\dot{v}\dot{t}i Av\dot{t}c\dot{v}\dot{K} \dot{v}i\dot{Z} \dot{b}Y\dot{t}qi \dot{t}WU\dot{v} t$
 $e^{-} \dot{z} evZ\dot{v}\dot{t}m fi = \dots\dots\dots gm$
 $e^{-} \dot{z} evZ\dot{v}\dot{t}m IR\dot{b} = fi \times g = \dots\dots\dots W\dot{B}b$
 $Zi\dot{t}j \dot{b}g\dot{v}\dot{z} e^{-} \dot{z} fi = \dots\dots\dots gm$
 $Zi\dot{t}j \dot{b}g\dot{v}\dot{z} e^{-} \dot{z} IR\dot{b} = w - w_1$
 $\dot{t}K\dot{i}i\dot{v}mb\dot{i} Av\dot{t}c\dot{v}\dot{K} \dot{v}i\dot{Z} S_L = \dots\dots\dots$
 $\dot{c}ix \uparrow Y\dot{x}q e^{-} \dot{z} Av\dot{t}c\dot{v}\dot{K} \dot{v}i\dot{Z} = \frac{W}{W - w_1} \times S_L = \dots\dots\dots$

djv̄dj t

$Dcv\dot{v}\dot{b}i e^{-} \dot{z} Av\dot{t}c\dot{v}\dot{K} \dot{v}i\dot{Z} = \dots\dots\dots$

mZKZv̄ t

- 1 | $IR\dot{b} \dot{t}bq\dot{v}i Av\dot{M} \dot{b}\dot{v}^3 \dot{v}VK Av\dot{t}Q \dot{v}K b\dot{v} \dot{t}\dot{L} \dot{b}\dot{b} |$
- 2 | $me mg\dot{q} evUL\dot{v}ov \dot{t}j\dot{v} \dot{v}PgU\dot{v} \dot{v}\dot{t}q b\dot{v}ovP\dot{v}ov Ki\dot{b} |$
- 3 | $\dot{b}g\dot{v}\dot{z} e^{-} \dot{z} \dot{t}hb m\dot{v}\dot{u}\dot{y}\dot{f}\dot{v}\dot{e} \dot{b}g\dot{v}\dot{z} n\dot{q} | \dot{v}eK\dot{v}\dot{i}i M\dot{v}\dot{t}q ev Zj\dot{v}q \dot{t}hb \dot{t}V\dot{t}K b\dot{v} h\dot{v}q | \dot{v}eK\dot{v}\dot{i}i M\dot{v}\dot{t}q$
 $\dot{t}hb evq\dot{y}e\dot{y}e\dot{y} b\dot{v} \dot{v}\dot{t}K |$
- 4 | $\dot{v}c\dot{w} \dot{U} \dot{t}hb$ পাল্লায় $m\dot{v}\dot{t} \dot{t}K\dot{v}\dot{v}I \dot{t}V\dot{t}K b\dot{v} h\dot{v}q |$
- 5 | $e^{-} \dot{z} \dot{t}K\dot{i}i\dot{v}mb \dot{b}g\dot{v}\dot{z} Ki\dot{t}j \dot{t}hb \dot{t}K\dot{i}i\dot{v}mb Dc\dot{t}P b\dot{v} c\dot{t}o |$
- 6 | $mZ\dot{v}U \dot{t}hb n\dot{v}jK\dot{v} n\dot{q} |$

ci_xTY-4

mi j †`vj‡Ki m‡v‡h" A‡fKl‡q ZiY 'g' Gi g‡v‡b‡Yq (L-T²) ‡jL AsKb K‡i |

Dīk

G cV I ci x T Y mg w B i ci A v c w b

1. $m_{ij} \nmid \nmid j \nmid Ki \nmid m \nmid n \nmid h$ ----- $g \nmid b \nmid b \nmid Y \nmid q \nmid i \nmid Z \nmid E \nmid Y \nmid b \nmid K \nmid i \nmid Z \nmid c \nmid v \nmid i \nmid e \nmid b$.
2. $T = 2\pi \sqrt{\frac{L}{g}}$ $e \nmid g = 4\pi^2 \frac{L}{T^2}$ $m \nmid \hat{U} \nmid i \nmid c \nmid q \nmid M \nmid \nmid L \nmid v \nmid Z \nmid c \nmid v \nmid i \nmid e \nmid b$,
3. $L \nmid e \nmid b \nmid g \nmid T^2 \nmid j \nmid L \nmid A \nmid u \nmid K \nmid Z \nmid c \nmid v \nmid i \nmid e \nmid b$,
4. $L \nmid e \nmid b \nmid g \nmid T^2 \nmid j \nmid L \nmid n \nmid Z \nmid g \nmid G \nmid i \nmid g \nmid b \nmid b \nmid Y \nmid q \nmid i \nmid K \nmid v \nmid R \nmid i \nmid a \nmid v \nmid e \nmid Y \nmid b \nmid K \nmid i \nmid Z \nmid c \nmid v \nmid i \nmid e \nmid b$,
5. $L \nmid e \nmid b \nmid g \nmid T^2 \nmid j \nmid L \nmid i \nmid m \nmid n \nmid v \nmid h$ $g \nmid G \nmid i \nmid g \nmid b \nmid b \nmid Y \nmid q \nmid i \nmid K \nmid v \nmid R \nmid i \nmid a \nmid v \nmid e \nmid Y \nmid b \nmid K \nmid i \nmid Z \nmid c \nmid v \nmid i \nmid e \nmid b$,
6. $m \nmid n \nmid v \nmid h$ $G \nmid i \nmid g \nmid b \nmid b \nmid Y \nmid q \nmid i \nmid R \nmid b$ $c \nmid q \nmid R \nmid b \nmid x \nmid m \nmid Z \nmid K \nmid Z \nmid v \nmid D \nmid t \nmid a \nmid K \nmid i \nmid Z \nmid c \nmid v \nmid i \nmid e \nmid b$

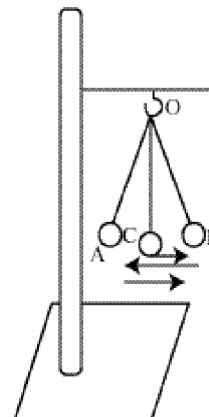
ZĚ : AƵfKI e†ji cfvte gy⁹fvte coš tKvb e⁻z teM e_„x_i nvi†K AƵfKIR ZiY e†j, G†K Œg⁹
Øviv cKvk Kiv nq|

†`vj†Ki ‖e<sup>-</sup>vi 4° Gi Kg n†j, †`vj†Ki m†, †jv †_†K †`vjbKv†ji ‖b‖j ‖LZ mgxKiY cvlq‖ h‖q‖

$$T = 2\pi\sqrt{\frac{L}{g}}$$

$$eV, T^2 = 4\pi^2 \frac{L}{g}$$

$$= \frac{4\pi^2}{g} \times L \text{ ----- (i)}$$

 $GL_{V \neq b},$

$$T = t^* v j b K v j$$

$$L = \{ \langle j, K \rangle \mid K \in \mathcal{K} \}$$

$$g = A_{\mathbb{W}} f K l_{\mathbb{X}} q \, Z i Y$$

$$\pi^2 = 9.87$$

eewU hii` mlyg tMv jK nq Zte t`vj tKi Kv hKi ^`N" mZvi ^`N" l e te i e"vmva thv Md t j im gvb n te |
mZvis, mZvi ^`N" l Ges e te i e"vmva r n t j, L= l +r

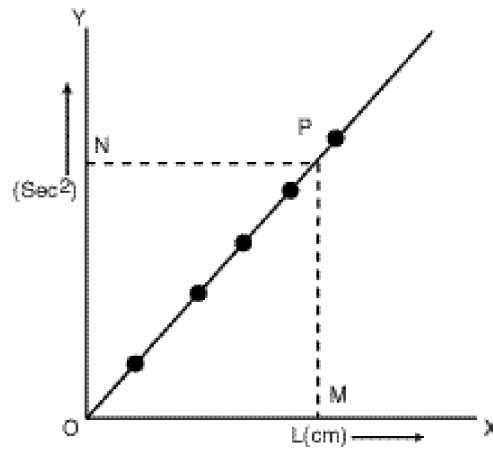
$$t\hbar\ddot{n}Z\pi a^{\prime e} mSL^{\ddot{v}} Ges\ tKvb\ \mathbb{b}\mathbb{w}^{\prime}\acute{o}^{-}v\ddot{t}b_g a^{\prime e}| m\ddot{z}is\ \frac{4\pi^2}{g} a^{\prime e} n\ddot{t}e| GK\mathbb{U}\ QK\ K\mathbb{M}\ddot{t}Ri\ x\ A\ddot{t}\mathbb{T}i$$

$$\mathbb{W}^{\dagger} \# K \perp Gi \vee \mathbb{W} \# fb \text{ gvb Ges } Y \text{ A} \# \dagger i \mathbb{W}^{\dagger} \# K \top^2 Gi \text{ A} \vee b y \mathbb{W}^{\dagger} \# 2 K \text{ gvb } \neg \vee cb K \# i GK \mathbb{W} U \dagger j L \text{ As Kb } K \# i \mid$$

$$d^{\dagger}j\ g^{\dagger}\ \mathbb{e}^{\dagger}\ \mathbb{M}g^{\dagger}\ \mathbb{G}K\mathbb{U}\ m\ i\ j^{\dagger}iK^{\dagger}\ c^{\dagger}lq^{\dagger}\ h^{\dagger}v\mathbb{e}\ |\ K^{\dagger}iY\ T^2 = y, L = x\ \text{Ges}\ a^{\dagger}\mathbb{e}\ \frac{4\pi^2}{g} = m\ a^{\dagger}v\ n^{\dagger}j$$

$Dc\ddot{z}ii\ mgxKiY\cup n\ddot{z}e, y = \max G\cup GK\cup g\ddot{z}e\rangle Mg\ddot{x} mi j\ddot{z}iLvi\ mgxKiY\cup$

e"en^WiK



¶Î 4.2

8. mij†iLvi Dci th †Kvb we`yæ ¶bB| GLb †\_†K Kv¶Ki ^`N" L Ges †`vjbKv†ji eM T² ¶b†q $\frac{L}{T^2}$

Gi gvb ¶bYq Kiv nq|

GLb Dc†ii (2) bs mg¶Ki†Yi m¶n¶h" 'g' Gi gvb ¶bYq Kiv hv†e|

†WUv msMn I QK

ch†e¶Y msL`v	cavb †`j cv†Vi gvb M cm	f¶Yqv †`j cv = v	f¶Yqv `eK V×C cm	f¶Yqv cv†Vi gvb M+F cm	†gvU AvcvZ cv†Vi gvb D' cm	AvcvZ Mo e`vm D' cm	h¶ŠK Î¶U (±e) cm	cKZ. e`vm D = D' - (±e) cm	e`vma r = $\frac{D}{2}$ cm

ch†e¶Y msL`v	ûK mn m¶vi ^`N" l cm	†`vj†Ki Kv¶Ki ^`N" L = (l + r) cm	20 ¶U †`vj†bi mgq t sec				†`vjb Kvj T = $\frac{t}{20}$ sec	T² sec²	†jL n†Z cvß $\frac{L}{T^2}$ cm/sec²	g cm/sec²
1			c_g	¶ØZ¶q	ZZ¶q	†kl				
2										
3										
4										
5										

$$\text{ınmve : } g = 4\pi^2 \frac{L}{T^2} = 4\pi^2 \frac{OM}{ON}$$

$$\text{djıdj : } g = 4 \times 9.87 \times \left(\frac{L}{T^2} \right) \text{ cm/sec}^2$$

mZKZı :

1. t`vj#Ki ıe<sup>-</sup>ıi thb 4° Gi tP#q teık bı nq tııı`#K j ıı" ııL#Z n#e|

2. mZı mi" I cvKnxb n#Z n#e|

3. t`vj#bi msL`ıv mıVKfv#e , Y#Z n#e| bZı T-Gi gıb ııbY#q fj _vK#e| Aveıı g -Gi gı#bi
ııbfjZı A#bKıv#k T Gi Dci ııbfi K#i|

4. KvhKi ^`N" L Gi gıb mıVKfv#e ııbYq Kiv DıPr|

5. ee#K tRv#i av°v bı ıı`#q Avj#Zıfv#e tQ#o t`qv DıPr|

cixŋY-5

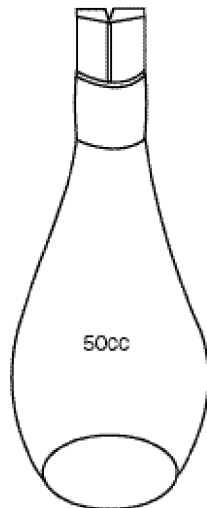
cixŋŋYi bvgŋ Ziŋj AvŋcŋŋK , i"Z ŋbYq (AvŋcŋŋK , i"Z gvcK tevZj e"envi Kŋi)|

Dŋŋk:

G cV I cixŋY mgŋŋŋi ci Avŋb-

1. AvŋcŋŋK , i"Z gvcK tevZŋji eYbv KiŋZ cviŋeb|
2. AvŋcŋŋK , i"Z ŋbYŋqi ZĖ eYbv KiŋZ cviŋeb|
3. Ziŋji cKZ AvŋcŋŋK , i"Z, $S = \frac{W_2 - W}{W_1 - W} \times \rho_\theta - m\hat{H}U$ cŋqVM ŋ`LvŋZ cviŋeb|
4. AvŋcŋŋK , i"Z ŋbYŋqi KŋhcYŋjx eYbv KiŋZ cviŋeb|
5. AvŋcŋŋK , i"Z ŋbYŋqi cŋqRbXq mZKZV Dŋŋŋŋ KiŋZ cviŋeb|

hŋŋi eYbv t AvŋcŋŋK , i"Z gvcK tevZj GKŋU ŋeŋkl aiŋbi jŋv mi" gŋ ŋeŋkó KŋŋPi tevZj|
tevZŋji gŋL m⁻² ŋQ`hy ŋQŋc `pfvŋe jvŋŋŋbv ŋvŋK (ŋPĤ-4-1)| ŋKŋb Zij c`v\_ ŋ`ŋq tevZj fŋZ
Kŋi ŋQŋc GŋU ŋ`ŋj AŋZi<sup>3</sup> Zij ŋQŋci ŋQ` ŋ`ŋq ŋei nŋq Avŋm|



ŋPĤ: 5-1

ŋeŋfb AvqZŋbi tevZj cvlqv hvq| GKŋU AvŋcŋŋK , i"Z tevZŋji Mŋŋq 100 Mvg Ges 20⁰C ŋjLv ŋvKŋj eŋŋZ nŋe th, 20⁰C Zvcgvŋvq tevZjŋU 100 Mvg cŋŋbŋZ cŋŋq|

eŋŋj, ŋPŋb, KŋKo cŋfŋZ. KŋVb c`vŋ\_i AvŋcŋŋK , i"Z D`ŋbŋ³ i mŋŋvŋh" ŋbYq Kiv hvq bv| G mg⁻ KŋVb c`vŋ\_i AvŋcŋŋK , i"Z G tevZŋji mŋŋvŋh" Lŋ mŋŋR ŋbYq Kiv hvq| G tevZŋji mŋŋvŋh" Zij c`vŋ_i AvŋcŋŋK , i"Z ŋbYq Kiv hvq|

ŋeŋfb AvqZŋbi tevZj cvlqv hvq| GKŋU AvŋcŋŋK , i"Z tevZŋji Mŋŋq 100 Mvg Ges 20⁰C ŋjLv ŋvKŋj eŋŋZ nŋe th, 20⁰C Zvcgvŋvq tevZjŋU 100 Mvg cŋŋbŋZ cŋŋq|

eŋŋj, ŋPŋb, KŋKo cŋfŋZ. KŋVb c`vŋ\_i AvŋcŋŋK , i"Z D`ŋbŋ³ i mŋŋvŋh" eŋŋni Kiv hvq bv| G mg⁻ KŋVb c`vŋ\_i AvŋcŋŋK , i"Z G tevZŋji mŋŋvŋh" Lŋ mŋŋR ŋbYq Kiv hvq| G tevZŋji mŋŋvŋh" Zij c`vŋ_i AvŋcŋŋK , i"Z ŋbYq Kiv hvq|

ZĖ t ŋKŋb Zij c`vŋ\_i IRb I 4<sup>0</sup>C Zvcgvŋvi mg-AvqZŋbi cŋŋbi IRŋbi AbŋvZŋK Zij c`vŋ_i AvŋcŋŋK , i"Z eŋj|

⁰C Zvcgvŋvq cŋŋb e"envi Kŋi Zij c`vŋ\_i AvŋcŋŋK , i"Z hŋ` s_θ nq Zŋe cKZ. AvŋcŋŋK , i"Z-

$$S = S_\theta \times \rho_\theta$$

KŋiY Avgiv Rŋb th Zvcgvŋvi cŋŋbi e"envi Kŋi AvŋcŋŋK , i"Z ŋbYq Kiv nq tm Zvcgvŋvi cŋŋbi AvŋcŋŋK , i"Z ŋ`ŋq AvŋcŋŋK , i"ZŋK , Y Kiŋj cKZ. AvŋcŋŋK , i"Z cvlqv hvq|

GLvŋb, $\rho_\theta = \theta^0$ C Zvcgvŋvq cŋŋbi AvŋcŋŋK , i"Z

†WUv msMn I QK

chē¶Y msL`v	tevZj Lwj _vKv Ae`vq পাল্লার evULviv Kgm/s ²	Mo w kgm/s ²	tevZj c¶bc¶ Ae`vq পাল্লার evULviv w <sub>1</sub> kgm/s <sup>2</sup>	Mo w <sub>1</sub> kg m/s <sup>2</sup>	tevZj Zij c¶Ae`vq পাল্লার evULviv w ₂ kgm/s ²	Mo w ₂ kgm/ s ²	Zi¶ji AvCvZ Av. ,. $S_{\theta} = \frac{w_2 - w}{w_1 - w}$	cKZ Av. ,. S = S _θ × p _θ

djdj: c`E Zijj Av#c¶¶K , i`Z, s =

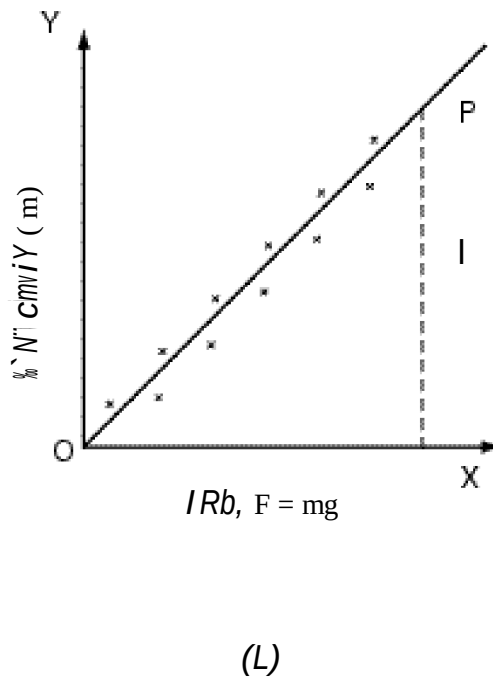
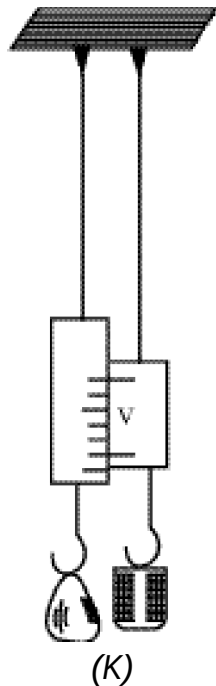
mZKZv t

- 1| tevZj¶U¶K fvj K¶i a¶q c¶i`v¶i K¶i i¶K¶q ¶b¶Z nq|
- 2| IRb ¶bqv¶i Av¶M ¶b¶³ ¶VK Av¶Q ¶Kbv ¶`¶L ¶b¶Z nq|
- 3| tevZj¶U hv¶Z c¶vb ev Zijj ¶`¶q c¶\_v¶K ¶m¶`¶K j ¶¶" ivL¶Z n¶e|
- 4| c¶vb ev Zijj ¶`¶q c¶Kivi ci j ¶¶" ivL¶Z n¶e hv¶Z Gi g¶a" eýeý bv _v¶K| ¶mRb" tevZj¶K fvj K¶i Sv¶K¶q ¶b¶Z nq|
- 5| tevZj¶ji g¶L ¶Q¶c jv¶Mv¶bv¶i ci ¶h Av¶Z¶i³ c¶vb ¶ei nq Zv fvj fv¶e g¶S ¶dj¶Z nq|
- 6| eo IRb me mgq পাল্লার gvSLv¶b ivL¶Z nq Ges IRb me mgq ¶PgUv ¶`¶q IVv¶bv I bvgv¶bv D¶Pr|
- 7| mgM c¶¶qv ¶Zb ev¶i c¶jive¶E Kiv nq|

ciXTY-6

hš̌i eYbV:

$m_{\nu} j e h \ddot{s} i e Y b v t m_{\nu} j i h \ddot{s} G K B D c v \dot{v} b \hat{Z} i x, m y g c \bar{+} " Q \dot{\bar{v}} e i k \acute{o} \dot{\bar{v}} j \dot{a} v a i Z e Z v i c i x \ddot{v} m \ddot{v} i i$
 $Q v Q \dot{+} \dot{+} K e v \dot{+} \dot{+} q \dot{+} j A v U K \dot{+} b v \dot{+} p A e j \dot{a} b n \dot{+} Z S \dot{z} \dot{+} b v \dot{+} \dot{+} \dot{+} K | \# P \hat{I}:-6.1 G s_1 s_1' G e s s_2 s_2' G i j c \dot{\bar{v}} \dot{\bar{v}}$
 $Z v i | Z v i \dot{\bar{v}} \dot{\bar{v}} i A B I C D c \dot{+} \dot{+} \dot{+} \dot{\bar{v}} K v \dot{v} \dot{+} g v s_1 I s_2 G g b f v \dot{+} e j v m \dot{+} b v \dot{+} \dot{+} \dot{+} K t h b K v \dot{v} \dot{+} g v \dot{\bar{v}} \dot{\bar{v}}$
 $উল্লসভা \dot{+} e P j v P j K i \dot{+} Z c \dot{+} \dot{+} i | G K \dot{+} U \# \bar{u} i U \dot{+} j \dot{+} f j A B K v \dot{v} \dot{+} g v i g v S L \dot{+} b A v U K \dot{+} b v G e s C D$
 $K v \dot{v} \dot{+} g v i m \dot{+} \dot{+} m s h y \dot{+} g i B \dot{+} \mu \dot{+} g U v i \bar{+} \dot{+} M G i D c i e m \dot{+} b v | \bar{+} \dot{+} M উল্লস \dot{+} \dot{+} j R e i v e i D v \dot{v} \dot{+} g v K i \dot{+} Z$
 $c \dot{+} \dot{+} i | A B I C D K v \dot{v} \dot{+} g v i b \dot{+} P \hat{u} \dot{+} K i m v \dot{+} \dot{+} h \bar{+} I R b S \dot{z} \dot{+} b v e \dot{+} \dot{+} \dot{+} A v \dot{+} Q |$



WPI: 6.1

ci^x**¶****bi** **bvg** **t** *mw***j** *i* **h**[‡]**Š***i* *mvnv*[‡]**h**” *Bqvs* *Gi* , *YvsK* *wbYq* |

Dʔik t G cix ʔb t kʔl Avci b Syš Zvʔii Dcv vʔbi Bqvs , Yvsk ʔbYq Kiv | ʔkLʔZ cviʔeb |

ZĖ t w Z⁻vcK m_xgvi g^aa" w Z⁻vcK e⁻z Aby⁻N" c_xob Ges Aby⁻N" w eK_UZi Aby⁻Z GK_UU a^e
i_wk | G a^e i_wk⁺K e⁻z Dc⁻v⁺bi Bq_v s₁ Y_vsK e⁺j | Bq_v s₁ Gi₁ s₁ Y_vsK y aⁱv n⁺j₁,

$$y = \frac{Aby^N c_{xob}}{Aby^N w_{eKwZ}}$$

3. $gva^{\sim}vKIY RıbZ ZiY$ = m/sec²
- $gvB\sharp\mu vıgUv\sharp ii \neg zcP$ = mm
- = m
4. $e\ddot{E}vKvi \neg j i f vM msL^{\sim}v$ =
- $\therefore j\parallel N\hat{o} MYb$ = mm
- = m

Zv\sharp ii e^{\sim}vmva ıby\sharp qi QK

$ch\sharp e\Uparrow Y$ $msL^{\sim}v$	$\hat{i}\parallel LK$ $\neg j c vV$ m	$e\ddot{E}vKvi$ $f vM$ $msL^{\sim}v$ c	$j\parallel N\hat{o}$ MYb LC m	$e\ddot{E}vKvi$ $\neg j c vV$ C×LC m	$e^{\sim}vm$ d' m	$h\parallel \check{S}K$ $\hat{i}\parallel U$ $\pm x$ m	cKZ $e^{\sim}vm$ d=d'±x m	Mo $e^{\sim}vm$ d' m	$e^{\sim}vmva$ $r = \frac{d}{2}$ m
1									
2									
3									
4									
5									

$\% \neg N^{\sim} cmviY ıbyq QK$

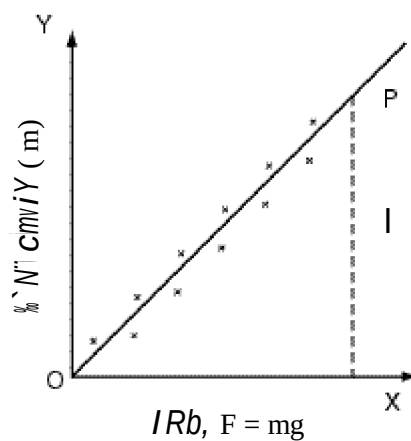
$ch\sharp e\Uparrow Y$ $msL^{\sim}v$	fi m kg	IRb N	$fi e\parallel x i mgq c vV$			$cmviY$ m	$fi nı\sharp mi mgq c vV$			$cmviY$ m	Mo l m
			$\% i\parallel LK$ $\neg j c vV$ m	$e\ddot{E}vKvi$ $\neg j c vV$ m	$tg vU$ m		$\% i\parallel LK$ $\neg j c vV$ m	$e\ddot{E}vKvi$ $\neg j c vV$ m	$tg vU$ m		
1											
2											
3											
4											
5											
6											

djvdj:

nmve: $Y = \frac{mgL}{\pi r^2 l}$ [F = mg / l

Gi gvb †jL PÎ n†Z]

∴ Y = ...



PÎ: 6.2

mZKZ:

- 1, r Gi gvb †QvU Ges eM nm†m†e Av†m e†j r m⁻² fv†e gvc†Z n†e
2. cmviY l gvcvi mgq c`vivjv · âvš cinvi Ki†Z n†e|
3. Ggb fi m †`qv DmPZ n†e bv, thb Zv Amn cxo†bi A†a†Ki tekx nq|

cix¶Y-7

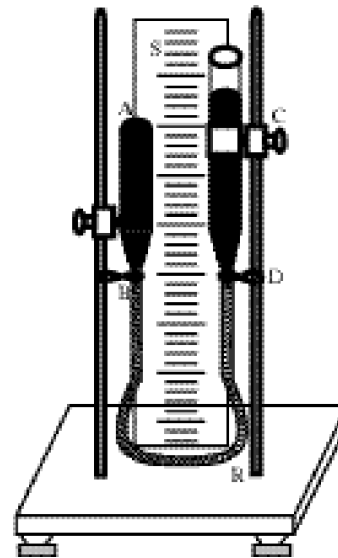
hšİ eYbv

7bs cix¶YıU İi“ Kivi c#e D³ cix¶Yı Rb“ e“eüZ hšİU m#ú#K tR#b tbqv hvK|

hšİUi bvg: e#qj Gi hš|

e#qj-Gi hšİ eYbv:

GB hšŠ GKıU myg c⁻#”Q` w#kó Kv#Pi bj AB
Av#Q| Gi GK g# (A) eÜ I Ab” g# (B) tLv#v|
tLv#v g#ıU GKıU iev#ii bj R Øviv Ab” GKıU
`# g# tLv#v Kv#Pi bj CD-Gi mv#_ h#|
iev#ii bj Ges AB I CD b#ji w#b#Pi Ask
cvi` Øviv c# Kiv nq| AB b#ji Dc#ii As#k
evqy_v#K| bj `# GKıU Kv#Vi KvV#gvi mv#_
jvMv#bv t⁻#ji `# cv#k AvUKv#bv \_v#K| G#`i
Dc#i I w#b#P b#vg#q zØviv AvUKv#bv hvq|
t⁻#ji m#nv#h” Dfq b#ji cvi` t#ai D”PZvi
Ae_vb w#bYq Kiv hvq| AB b#ji evqy AvqZb
Gi c⁻#”Q` (πr^2) I evq# As#ki ^#N”i (l)
Yd#ji mgvb| th#nZz b#ji c⁻#”Q` meİ
mgvb| evqy AvqZb, v b#ji evq# As#ki
^#N”i mgvb#ZK|



¶PÎ-7.1

cix¶v-7

cix¶vi bvg: e†qj-Gi mĥ cix¶v

D†Ĭk

GB cV I cix¶Y mgvβi ci Avc||b

(1) e†qj-Gi mĥ eYbv Ki†Z cvi†eb|

(2) cix¶†bi mṽn†h" M"v†mi Pvc I AvqZ†bi ,Ydj th GK||U a"e msL"v nq G||U cgvb Ki†Z cvi†eb|

(3) AvqZb ebvg Pvc †jL||PĬ A½b Ki†Z cvi†eb|

(4) i†qj-Gi mĥ cix¶vi KvhcYvjx eYbv Ki†Z cvi†eb|

(5) i†qj Gi mĥ cix¶vi c†qvRbxq mZKZv D†Ĭk Ki†Z cvi†eb|

ZĚ : ||i ZvcgvĤvq †Kvb ||b||ó c||igvb M"v†mi AvqZb Gi Dci chy? P†ci mgvbyZK|

h|| †Kvb ||b||ó fi ||e||kó M"v†mi AvqZb I Pvc P nq Zvn†j,

$V\alpha\frac{1}{P} hLb ZvcgvĤv ||i_v†K|$

eV, PV = K = a"e msL"v|

AZGe, ||i ZvcgvĤv h|| P₁, P₂ I P₃ P†c M"v†m AvqZb h_vμ†g V₁, V₂ I V₃ nq, Zvn†j,

$P_1 V_2 = P_2 V_2 = P_3 V_3 = K = a"e msL"v|$

c†qvRbxq hšc||Z: e†qj Gi hš, e"v†i||gUvi, cvi` iev†ii bj|

KvhcYvjx:

(1) cix¶vi c_g chvq:

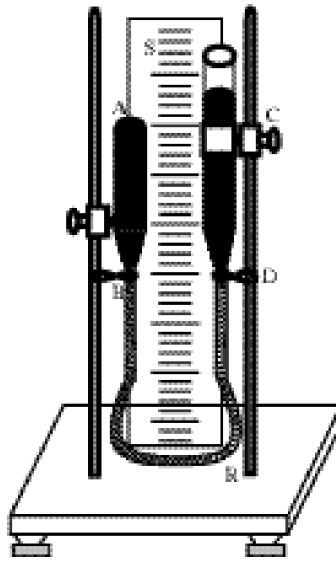
(K) e"v†i||gUvi †_†K evqyŮ†ji Pvc ||j†L iV||b|

(L) AB bj†K ||i||v f†jvfv†e AvU||K†q iV||b|

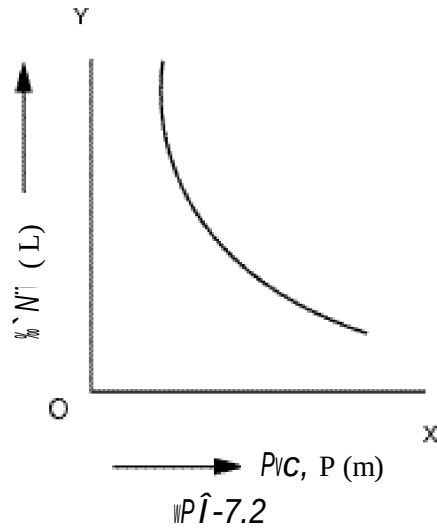
(2) evqyŮjxq P†c Avex "†ai ^^N" ||bYq:

(K) †Lvjv bj CD †K DVbvvgv K†i Dfq b†ji cvi†` i D"PZv mgvb Ki"b| GB Ae"vq AB b†j Avex evqy Pvc evqyŮ†ji P†ci mgvb nq|

(L) †_j †_†K AB b†ji Dc†ii cv†ši Ges cvi` Z†ji cV ||bj| GB `P cv†Vi cv_K" AB b†j Avex evqy"†ai ^^N"|


$$\mathbb{W}P\hat{I}: 7.1$$

- (3) $evqy\hat{U}jxq P\ddot{v}ci \uparrow P\ddot{t}q A\ddot{w}aK P\ddot{v}c Ave \times evqy\ddot{v}ci \wedge N'' \mathbb{w}bYqt$
 (K) $CD bj\ddot{t}K ax\ddot{t}i ax\ddot{t}i Dc\ddot{t}i D\ddot{w}b thb Gi cvi\ddot{t} \neg \alpha AB b\ddot{t}ji cvi\ddot{t} \neg \ddot{v}ci Dc\ddot{t}i \neg \ddot{v}tK, GB$
 $Ae\ddot{v}q AB b\ddot{t}j Ave \times evqy\ddot{v}c evqy\hat{U}\ddot{t}ji P\ddot{v}ci \uparrow P\ddot{t}q te\ddot{w}k \neg \ddot{v}tK|$
 (L) $\uparrow \neg \ddot{t}ji m\ddot{v}n\ddot{v}th'' \neg \ddot{v} b\ddot{t}ji cvi\ddot{t} \neg \ddot{v}ci D''PZvi cv\ddot{w} \mathbb{w}bb| GB \neg \ddot{v} cv\ddot{t}Vi cv\ddot{w}K''B A\ddot{w}Z\ddot{w}i^3$
 $Pvc| h\ddot{w} e\ddot{v}\ddot{t}i\mathbb{w}gU\ddot{v}i cvi\ddot{t} \neg \ddot{v}ci D''PZv H Ges GB ch\ddot{v}tq \neg \ddot{v} b\ddot{t}ji cvi\ddot{t} \neg \ddot{v}ci D''PZvi$
 $cv\ddot{w}K'' h nq Z\ddot{v}n\ddot{t}j, evqy\ddot{v}ci \uparrow g\ddot{v}U Pvc = (H+h) cvi\ddot{t} \neg \ddot{v}ci Pvc|$
 (M) $Ave \times b\ddot{t}ji Dc\ddot{t}ii cv\ddot{t}\ddot{S}i cv\ddot{w} I cvi\ddot{t} \neg \ddot{v}ci cv\ddot{t}Vi cv\ddot{w}K'' \uparrow \neg \ddot{v}tK evqy\ddot{v}ci \wedge N'' \mathbb{w}bYq$
 $Ki\ddot{b}|$
- (4) $evqy\hat{U}\ddot{t}ji P\ddot{v}ci \uparrow P\ddot{t}q Kg P\ddot{v}c Ave \times evqy\ddot{v}ci \wedge N'' \mathbb{w}bYqt$
 (K) $CD bj\ddot{t}K ax\ddot{t}i ax\ddot{t}i \mathbb{w}bP b\mathbb{w}g\ddot{t}q \mathbb{w}bb thb Gi cvi\ddot{t}\ddot{t}i D''PZ AB b\ddot{t}ji cvi\ddot{t}\ddot{t}i D''PZvi \uparrow P\ddot{t}q$
 $Kg nq| G \uparrow \neg \ddot{t}\hat{t} AB b\ddot{t}j Ave \times evqy\ddot{v}c evqy\hat{U}\ddot{t}ji P\ddot{v}ci \uparrow P\ddot{t}q Kg n\ddot{t}e|$
 (L) $Dfqb\ddot{t}ji cvi\ddot{t} \neg \ddot{v}ci D''PZvi cv\ddot{w} \mathbb{w}bb Ges \neg \ddot{v} cv\ddot{t}Vi cv\ddot{w}K'' \mathbb{w}bYq Ki\ddot{b}| h\ddot{w} e\ddot{v}\ddot{t}i\mathbb{w}gU\ddot{v}i$
 $cvi\ddot{t} \neg \ddot{v}ci D''PZv H Ges bj \neg \ddot{v}ci cvi\ddot{t} \neg \ddot{v}ci D''PZvi cv\ddot{w}K'' h nq, Z\ddot{v}n\ddot{t}j \uparrow g\ddot{v}U Pvc, p = (H-h)$
 $cvi\ddot{t} \neg \alpha mgM c\mathbb{w}\mu q\mathbb{w}U A\ddot{S}Z \mathbb{w}Zbevi c\mathbb{v}i\mathbb{v}e\ddot{t} Ki\ddot{b},$
- (5) $H \times L, (H+h) \times L \mid (H-h) \times L, Ydj \mathbb{w}g\ddot{t}q \uparrow \neg L\ddot{b}|, Yd\ddot{t}ji g\ddot{v}b c\mathbb{w}Z \uparrow \neg \ddot{t}\hat{t} cvq GKB n\ddot{t}e|$
- (6) $\uparrow jL\mathbb{w}\hat{P}\hat{I} A\frac{1}{4}b:$
 $b\ddot{t}j Ave \times evqyA\ddot{v}qZb, v = b\ddot{t}ji c\ddot{t}\ddot{t}Q'' \times evqy\ddot{v}ci \wedge N'',$
 $th\ddot{t}nZb\ddot{t}ji c\ddot{t}\ddot{t}Q'' me\hat{t} mg\ddot{v}b| \uparrow \neg N'' (L) A\ddot{v}qZb (v) mg\ddot{v}b\mathbb{v}ZK| X-A\ddot{t}\neg \ddot{t}i \mathbb{w} \neg \ddot{t}K Pvc, H\pm h$
 $Ges Y A\ddot{t}\frac{1}{4}i \mathbb{w} \neg \ddot{t}K L a\ddot{t}i \uparrow jL\mathbb{w}\hat{P}\hat{I} A\frac{1}{4}b Ki\ddot{t}j \uparrow jL\mathbb{w}\hat{P}\hat{I}\mathbb{w} GK\mathbb{w}U A\ddot{v}qZ\ddot{v}Ki A\ddot{w}ae\ddot{t} n\ddot{t}e (\mathbb{w}\hat{P}\hat{I} bs-2)$



DcñĒ msMn

e`vi i gUv`i cvi` ¯#ai D"PZv, H =

cix¶vKv`j K#¶i i ZvcgvÎv, θ =

P/c	chē¶b msL`v	Ave× b#ji Dci cvi`Ši cW a(m)	Ave× b#ji cvi` ¯#ai cW b(n)	†Lv jv b#ji cvi` ¯#ai cW c(m)	evq. ¯#ai `N" L=(a-b)m	eÜ I †Lv jv b#ji cvi` ¯#ai cvi`Vi cV_K" h = (c-b)r	Ave× evqy P/c, p=(H±h)	Ydj (H±h)× L ev PV	gŠe"
evq. gÜjxq P/c									
evq. gÜjxq P/ci †P/q AaK P/c									
evq. gÜjxq P/ci †P/q Kg P/c									

djvdjt †jLwPÎ †_#K K#qKwU ¶e>`yn#Z Pvc I `N" †ei Ki"b| P/c I `N" ,b Ki"b| cVZ#¶iÎ Pvc
I `N"i ,Ydj ¶g¶j#q †`Lb|
e#qj-Gi m#Îi mZ"Zv hvPvB Ki"b|

mZKZt

1| bj `w m#úY Lvov Ae`vq ivL#Z n#e|

2| †Lv jv bjw DVwbvgvi mgq Lg ax#i ax#i DVwbvgv Ki#Z n#e|

3| ciZevi cW tbqvi ci cieZx cW tbqvi Rb" ¶KQyngq A#c¶v Ki#Z n#e|

cixTŸÑ8

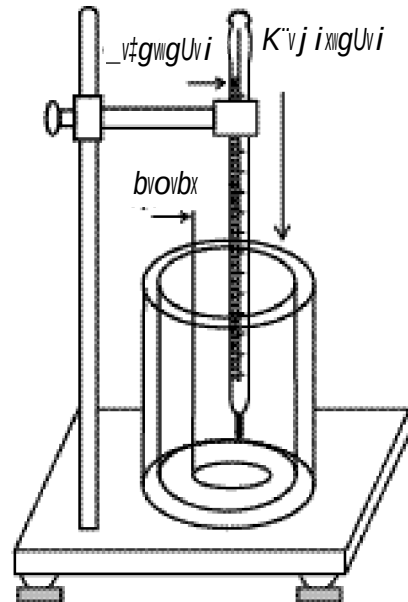
8bs cix¶¶wU ii" Kivi c#e D³ cix¶¶vi Rb" e"eüz h†ši m†_ c¶i¶PZ nIqv h¶K| ¶b†P
K'v†j¶wi¶gUvi I ÷xg n¶Uvi ev ev-ú DĖv†Ki eYbv †`qv n†jv|

K'v j w i w g U v i

GhU GKuU †PvOvKuZi (Cylindrical) cvî|
mvaviYZ cvîuU Zvgvi ^Zwi nq| Zvgvi ^Zwi
GKüU Avjvok ev bvoovx _v†K| K`vjwıgUv†i
†Kvb Zij c`\_ †i†L Zv†K bvoovx w`†g bvoov nq
hv†Z Zi†ji me RvqMvq Zvcgıv mgıv _v†K|
K`vjwıgUvııU†K Ab` GKüU cv†îi g†a` ivLv nq
Ges ga`eZx `vb KZııevnx c`_ Øviv cY Kiv
nq|

K'v j w i w g w Z i g j b x w Z

¶fb Zvcgvîvi`~~u~~ e`ZZvcxq ms`ú+k Avm†j
 Zv†`i g†a" Zv†ci Av`vb-c`vb N†U Ges GK mgq
 mgZvcgvîvq t†š†| h† evB†i t`†K Zvc bv
 Av†m ev ¶fZi t`†K †Kvb Zvc evB†i bv hvq Ges
 Zv†`i g†a" ivmqbK e†µqv bv N†U Zv††j k†³i
 ¶bZ`Zv m†Aby†i M†xZ Zvc = e†RZ Zvc|



WPIÑ8.1

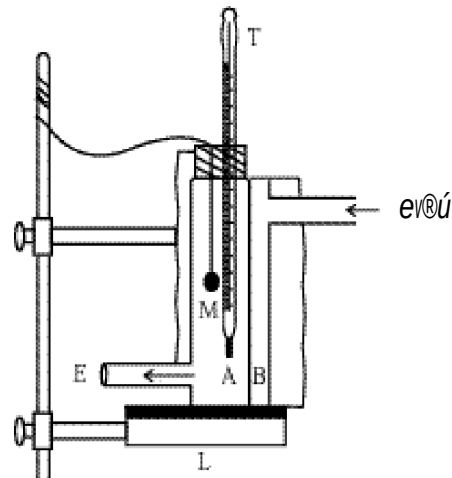
ev[®]-DËvcK t

ev@ú DĚvc#K †Kvb ¶ž e⁻#K ev#úí cZ"¶ ms⁻úk QıovB DĚB Kiv hıq| ev@ú DĚvc#K (¶PĪ
bsÑ8.2) GKB A¶¶eıko` ¶Zvgıı ducv †PvO A I B \_v#K| †PvO` ¶ı ga^eZx evq#Y _v#bi` B gı
eÜ Ges B †Pv#Oı Dc#ıı ¶#K GKıU AvMg bj I ¶b#Pi ¶#K GKU ¶bMg bj jvMv#bv _v#K|

ivei bj w`tq AvMg bjw GKwU eqjv#ii mv#
hy Kiv nq| eqjvi t_#K ev@ú AvMg bj w`tq
tPvO ybi ga"eZx v#b c#ek K#i Ges wBmg bj
w`tq tei ntq hvq|

A bʝwUi Dcʔii gʎ KK ʱʔq eÜ Kiv _vʔK Ges
wʔPi gʎ GKwU XiKbv E _vʔK hv BʔQvZ mivʔbv
hvq| KʔKi gʔaʱ GKwU ʱQʰ ʱʔq _vʔgʱgUvi T
cʔek Kivʔbv nq Ges Abʱ GKwU ʱQʰ ʱʔq mZvi
mʱvʱhʱ KʱVb eʱZmʔK Sʝʔq iVlv nq|

d#j e-ú ei#ú i ms-ú#k bv G#m l c#iv¶fv#e
DĚß nq|



«Письма к сыну» Д.В.С.

ciXŸÑ8

KVb c`v_ i AvcŸK Zvc WbYq

Dİk

GB cV I ciXŸY †k†I AvcbÑ

- | AvcŸK Zvc i msÁv ej†Z cvi†eb;
- | KVb c`v_ i AvcŸK Zvc WbY†qi ZË WjL†Z cvi†eb;
- | KVb c`v_ i Av:Zvc WbY†qi KvhcYvjx eYbv Ki†Z cvi†eb;
- | GB ciXŸY c†qvRbxq mZKZv D†Ñ† Ki†Z cvi†eb|

ZËt

†Kvb e⁻z 1kg f†ii ZvcgvÎv 1K ev 1°C eWx Ki†Z th cWigvY Zvc i c†qvRb Zvc K H e⁻z Dcv`v†bi AvcŸK Zvc e†j |

aiv hvK, K`vjWigUvi WQycWb ivLv n†jv | th e<sup>-</sup>z Av:Zvc WbYq Kiv n†e tm e<sup>-</sup>z K DËß K†i K`vjWigUvi g†a` †d†j W`†j e⁻z WQyZvc nviv†e Ges K`vjWigUvi I cWb WQyZvc MnY Ki†e |

aiv hvK bvoibxmn K`vjWigUvi fi = m₁kg

K`vjWigUvi I VÊv cWbi fi = m₂kg

K`vjWigUvi I WÛv cWbi ZvcgvÎv = θ₁°C

e⁻z m†evP ZvcgvÎv = θ₂°C

Pøš ZvcgvÎv = θ°C

KVb e⁻z fi = Mkg

K`vjWigUvi Dcv`v†bi Av:Zvc S₁Jkg⁻¹ K⁻¹

KVb e⁻z Av:Zvc = SJ kg⁻¹ K⁻¹

∴ K`vjWigUvi KZK.MpxZ Zvc = m₁s₁(θ - θ₁)J

VÊv cWb KZK.MpxZ Zvc = (M₂- M₁)4200(θ - θ₁)j

e⁻z KZK eWZ Zvc = MS(θ - θ₁)j

Ab` †Kvb fv†e Zvc i Av`vb-c`vb bv n†j MpxZ Zvc = eWZ Zvc |

∴ m₁ s₁(θ - θ₁) + (m₂-m₁) 4200 (θ - θ₁) = M.S ((θ₁- θ)

ev, S = $\frac{\{m_1 s_1 (\theta - \theta_1) + 4200 (m_2 - m_1) (\theta - \theta_1)\}}{M(\theta_2 - \theta)}$ J kg⁻¹ K⁻¹

c†qvRbxq hšcWZ t bvoibxmn GKW Zvgvi K`vjWigUvi, ÷xg nXUvi ev ev@ú DËvcK, ciXŸYxq e<sup>-</sup>z mZv, WbW<sup>3</sup>, IRb ev ·, \_v†gWigUvi, K†Vi ev · BZ`W` |

KvhcYvjx t

- 1| $c_{\#g} K^{vj} i g U v i \# K c w i \# v i K \# i i \# K \# q \# b b \text{ Ges } \# b \#^3 i m v n v \# h'' b v o v b x m n G i f i (m_1) \# b Y q K i \# b |$
- 2| $K^{vj} i g U v i \# i \frac{2}{3} \text{ Ask } W \hat{U} v c w b \emptyset v i v c \# K \# i A v e v i f i (m_2) \# b Y q K i \# b |$
- 3| $G e v i K^{vj} i g U v i \# K Z v c \# b \# i v a x K v \# V i e v \# \cdot \neg v c b K \# i \neg v \# g w i g U v i \# i m v n v \# h'' c w b I K^{vj} i g U v i \# i Z v c g v \hat{I} v \theta_1 \# b Y q K i \# b |$
- 4| $t h c \neg v \# i A v \# c w \# K Z v c \# b Y q K i \# Z n \# e Z v i G K U \# i v \# b \# q f i (M) \# b Y q K i \# b |$
- 5| $e \neg \# K m Z v i m v n v \# h'' e v \# \acute{U} D \ddot{E} v c \# K i g \# a'' S \# \# q D \ddot{E} \beta K i \# b |$
- 6| $e \neg \# i Z v c g v \hat{I} v m e v i a K n \# q \# i n \# j \neg v \# g w i g U v i \# i m v n v \# h'' G i Z v c g v \hat{I} v (\theta_2) \# b Y q K i \# b |$
- 7| $G e v i K^{vj} i g U v i \# K e v \# \acute{U} D \ddot{E} v c \# K i \# b \# P G \# b m Z v t K \# U D \ddot{E} \beta e \neg \# K c w b i g \# a'' t d \# j \# b |$
- 8| $b v o v b x i m v n v \# h'' f v j f v \# e b v o b \text{ Ges } \# g k \# Y i P \# \# Z v c g v \hat{I} v (\theta) \# b Y q K i \# b |$
- 9| $m g M c \# \mu q w U A \# Z \# Z b e v i c \# r i v e \# \ddot{E} K i \# b \text{ Ges } c \# Z c v \# V i M o \# b Y q K i \# b |$
- 10| $c v \beta D c v \ddot{E} m g n \# Q \# K e \# m \# q c \# q v R b x q m g x K i \# Y i m v n v \# h'' \# n m v e K \# I K \# V b c \neg v \# i A v : Z v c \# b Y q K i \# b |$

DcvEmgn

ch#eY msL ^v	bvoibxmn K ^{vj} i g U v i \# i f i		c w b i f i (m ₂ -m ₁) kg	K v b c ^v \# i f i mkg	Z v c g v \hat{I} v			K v b c ^v \# i A v : Z v c = SJkg ⁻¹ k ⁻¹	M o A v : Z v c = SJkg ⁻¹ k ⁻¹
	L v j m ₁ kg	c w b m n m ₂ kg			W \hat{E} v c w b θ ₁ °C	K v b c ^v \# θ ₂ °C	g k Y θ° C		
1									
2									
3									
4									

$$\# n m v e t \ S = \frac{\{m_1 s_1 + 4200(m_2 - m_1)\} (\theta - \theta_1)}{M(\theta_2 - \theta)}$$

djvdj t c^v \# K v b c^v \# i A v : Z v c

$$S = \text{-----} \text{ J kg}^{-1} \text{ K}^{-1}$$

mZKZv t

- 1| $m \# f v \# e Z v c \# b Y \# q i R b'' L \# m \# e \neg v \# g w i g U v i e'' e n v i K i \# Z n \# e |$
- 2| $Z v c \# q n v m K i v i R b'' K^{vj} i g U v i \# K K z i e v n x c \neg v \# \# q \# N \# i i v L \# Z n \# e |$
- 3| $K^{vj} i g U v i \# K e v \# \acute{U} D \ddot{E} v c \# K i \# b \# P G \# b L \# \# Z K v b e \neg \# K c w b \# Z t d j \# Z n \# e h v \# Z D \ddot{E} \beta K v b e \neg \# \neg v b v \# \# i i m g q t K v b Z v c b v n v i q |$
- 4| $c w b \# Z M \# j b v G g b c \neg v \# i A v : Z v c G c \# \mu q v \# b Y q K i \# Z n \# e |$
- 5| $c w b \# K m e m g q b v o \# Z n \# e h v \# Z c w b i m e \hat{I} Z v c g v \hat{I} v m g v b n q |$

cixŲY-9

kxZjxKiY c×Z Z Zij c`v_ i Av:Zvc ŲbYq|

Dİk

GB cV I cixŲY mgvßi ci Av:Zvc

- I ŲbDU#bi kxZjxKiY mĤ ej#Z cvi#eb;
- I kxZjxKiY c×Z Z Zij c`v_ i Av:Zvc ŲbY#qi ZĖ ŲjL#Z cvi#eb;
- I kxZjxKiY c×Z Z Zij c`v_ i Av:Zvc ŲbY#qi KvhcYvjx eYbv Ki#Z cvi#eb;
- I G cixŲY#Y cvjbxq mZKZv D# K i#Z cvi#eb|

ZĖ

ŲbDU#bi kxZjxKiY mĤ AbŲv#i tKvb e⁻z Zvc nv#mi nvi e⁻zl Zvi cŲicv#ki ZvcgvĤi cv_#K"i mgvbxZK|

Aveni tKvb cvĤi g#a" Zij c`v\_ DĖß K#i WĖv n#Z Ų`#j cŲZ t#K#Ų Zvc nv#mi nvi Ųbfi K#i (1) cvĤi DbŲ Z#ji tŲĤdj, (2) Zij c`v\_ i ZvcgvĤi (3) cŲicv#ki ZvcgvĤi (4) th cvĤi Zij ivLv nq t#m cvĤi cKŲZ. I Gi evB#ii c#ôi tŲĤd#ji Dci| Zvc nv#mi nvi Zij c`v_ i cKŲZi Dci Ųbfi K#i bv| hŲ` ŲŲ Ųfb Zij c`v_ #K Dc# GKB kZvax#b kxZj n#Z t`qv nq, Zvn#j Zv#` i Zvc nv#mi nvi GKB n#e|

aivhvK,

K`vjŲigUv#ii fi = m₁kg

Zi#ji fi = m₂kg

cŲbi fi = m₃kg

K`vjŲigUv#ii Dcv`v#bi Av:Zvc = S₁Jkg⁻¹K⁻¹

Zi#ji Av:Zvc = S₂Jkg⁻¹K⁻¹

cŲb θ₁°C t_#K θ₂°C chš kxZj n#Z mgq tbq = t₁Sec.

Zij θ₁°C t_#K θ₂°C chš kxZj n#Z mgq tbq = t₂ Sec.

AZGe, cŲb I K`vjŲigUv#ii kxZjxKiY nvi = $\frac{(m_3 \times 4200 + m_1 s_1)(\theta_1 - \theta_2)}{t_1}$

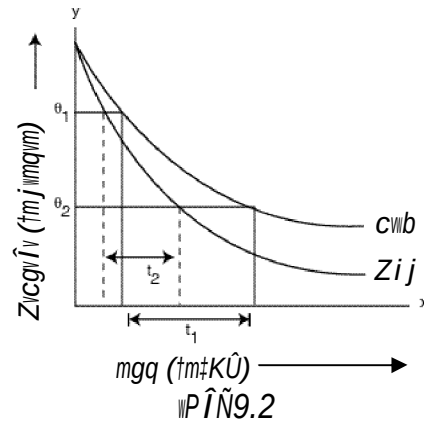
Zij I K`vjŲigUv#ii kxZjxKiY nvi = $\frac{(m_2 s_2 + m_1 s_1)(\theta_1 - \theta_2)}{t_2}$

GKB kZvax#b _vKvi Rb" kxZjxKiY nvi ŲŲ mgvb n#e|

∴ $\frac{(m_3 \times 4200 + m_1 s_1)(\theta_1 - \theta_2)}{t_1} = \frac{(m_2 s_2 + m_1 s_1)(\theta_1 - \theta_2)}{t_2}$

eV, t₁(m₂s₂+m₁s₁) = t₂ (m₃×4200+m₁s₁)

eV, m₂s₂t₁ = t₂(4200m₃+m₁s₁) - m₁s₁t₁



mgq-ZvcgvÎv QK

mgq gwb±U	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
cwb ZvcgvÎv °C																					
Zij ZvcgvÎv °C																					

djdj

tjLwPÎ t_±KÑ

Zij ZvcgvÎv ----- t_±K ----- tZ nvm tc±Z mgq jv±M = ----- Sec.

cwb ZvcgvÎv ----- t_±K ----- tZ nvm tc±Z mgq jv±M = ----- Sec.

$$\therefore S_2 = \left\{ \frac{(4200m_3 + m_1 S_1) t_2}{m_2 t_1} - \frac{m_1 S_1}{m_2} \right\}$$

$$= \text{----- JKg}^{-1}\text{K}^{-1}$$

mZKZv t GB cix¶Y wbbjwLZ mZKZv, ±jv Aeja±b Ki±Z nq|

1) Zij ev cwb ZvcgvÎv ù±b±¼i A±bK w±P ivLv DwPZ|

2) cwb ev Zij±K Ab" cv±Î DËB Ki±Z n±e|

3) ZvcgvÎv evvg mgq tjLwPÎ A¼b Ki±Z mveavbZv Aeja±b Kiv DwPZ|

4) ZvcgvÎv mVVK cv±Vi Rb" Zij I cwb me`v bvo±Z n±e|

cixTŸÑ10

K^vj^wi^gUv†i i m^vn^v†h^h ei j Mj†bi A^v†c^w†K m^g Z^vc w^bYq

Dik''

GB cV I ci x ¶ Y mg v ß i ci A v c w b

- 1 *eid Mj#bi m8Zv#ci msÁv wjL#Z cvi#eb;*
 1 *K"vjingUv#ii mwnv#h" eid Mj#bi Av#c¶K m8Zvc wby#qi KvhcYvjx eYbv Ki#Z cvi#eb;*
 1 *K"vjingUv#ii mwnv#h" eid Mj#bi Av:m8Zvc wby#qi ci x¶Y wK wK mZKZv Ae j#b Ki#Z n#e*
Zv D#ñx Ki#Z cvi#eb|

ZĚ

1kg ei†di Zvcgŷŷ Gi Mjbv†¼ ŵ i †i†L KŵVb Ae⁻ v n†Z Zij Ae⁻vq 1kg cŵb†Z i|cvšŵiZ Ki†Z
th cŵigY Zv†ci c†qRb nq, Zv†K eid Mj†bi Av†cŵŵK mßZvc e†j|

GKwU K^vjwngUv⁺i i ga[~] cwb⁺Z K⁺qK U~~K~~⁺iv eid tQ⁺o w⁺j eid Zvc MnY K⁺i c⁺g o⁺C
Zvcg⁺vq M⁺j c⁺i w⁺gk⁺Yi Zvcg⁺v cv⁺B n⁺e| K^vjwngUv⁺ I cwb Zvc eRb K⁺i w⁺gk⁺Yi Zvcg⁺vq
tb⁺g Av⁺m|

$$aiv\ hvK, bvo\ vb\ xmn\ K''j\ w\ igUv\ \sharp\ ii\ fi = m_1\text{kg}$$

$$K_{vj} = \frac{g U_{vj}}{D c_v} = \text{SJ kg}^{-1} \text{K}^{-1}$$

$$c_{wbi\,fi} = m_2 \text{kg}$$

$$K_v^j i w g U v i \mid c_{v w b i} c_{v_w g} K Z_{v c g v} \hat{I}_v = \theta_1 ^\circ \text{C}$$

$$w_{gk} \neq Y_i Z_{vc} g_v \hat{I}_v = \theta_1 ^\circ \text{C}$$

$$e_i \nmid d_i \quad f_i = \text{mkg}$$

$$e_{id} M_j \# b_i A_{v \# c} \# K m \# Z_{v c} = L_f J \text{kg}^{-1}$$

Avgi v Rwb, K"v j w w g w Zi b x w Z Abm t i

$$M_{p \times Z} Z_{vc} = e \| R Z_{vc} |$$

$$\therefore \text{eid } KZK.Mp \times Z \ Zvc = K''v j w i g U v i \mid c v w b \ KZK.e w R Z \ Zvc \mid$$

$$\therefore m L_f + m \times 4200 \times \theta = m_1 \times S (\theta_1 - \theta) + (m_2 \times 4200) (\theta_1 - \theta)$$

$$eV, m L_f + m \times 4200 \times \theta = m_1 \times S (\theta_1 - \theta) + (m_2 \times 4200)$$

$$e\%, mL_f = (\theta_1 - \theta) (m_1 S + m_2 \times 4200) - m \times 4200$$

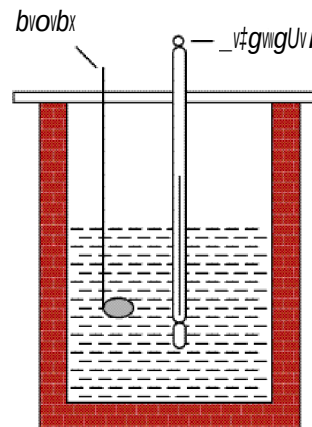
$$\therefore L_f = \left(\frac{(m_1 S + 4200 m_2)(\theta_1 - \theta)}{m} - 4200 \theta \right) \text{ J kg}^{-1} \text{ -----(1)}$$

c`qvRbxq hšcWZ

Zv`iii Rvjhy<sup>3</sup> bvoibxmn K`vj`iigUvi, \_v`gwigUvi | K`qK U~~K~~iv eid, tPvI KvMR, wbi³ I IRb ev · |

KvhcYvjx t

- 1) c`tg cwi@vi I iK`bv K`vj`iigUvi³ fi (m₁) wbyq Ki`b|
- 2) K`vj`iigUvi³ $\frac{1}{2}$ Ask cwib fWZ K`i fi wbyq Ki`b| wZxq fi t`K c\_g fi we`qVM K`i cwibi fi (m<sub>2</sub>) wbyq Ki`b|
- 3) GKwU _v`gwigUvi Øviv K`vj`iigUvi I cwibi cv\_wgK ZvcgŶv θ<sub>1</sub>°C wbyq Ki`b|



WPIÑ10.1

- 4) K`qK U~~K~~iv tQvU tQvU ei`di U~~K~~iv fv`jv K`i a`q tPvI KvMR w`q g`q K`vj`iigUvi<sup>3</sup> g`a` t`djy Ges bvoibx w`q bvo`Z _vKb|
- 5) eid I cwibi w`gk`Yi Pøvš ZvcgŶv wbyq Ki`b|
- 6) eid I cwibmn Avevi K`vj`iigUvi³ fi tei Ki`b| GB fi t`K wZxq fi we`qVM K`i ei`di fi m wbyq Ki`b|

DcvË msMn

K`vj`iigUvi³ Dcv`v`bi Av:Zvc, S = -----

K`vj`iigUvi I cwibi cv_wgK ZvcgŶv, θ°C = -----

QK t mß Zvc wby`qi `WUv

ch`eY msL`v	bvoibxmn K`vj`iigUvi ³ fi m ₁ kg	K`vj`iigUvi + cwibi fi = w ₁ kg	cwibi fi m ₂ = (W- m ₁)kg	K`vj`iigUvi + cwib + ei`di fi = W <sub>2</sub> kg	MjZ ei`di fi m = (W ₂ - W ₁)kg	w`gk`Yi ZvcgŶv θ°C	eidMj`bi Av`cYK mßZvc L _f Jkg ⁻¹	L _f Jkg ⁻¹
1.								
2.								
3.								

$$L_f = \left\{ \frac{(m_1 S + 4200 m_2)(\theta_1 - \theta)}{m} - 4200 \theta \right\} \text{ Jkg}^{-1}$$

$$= \text{----- Jkg}^{-1}$$

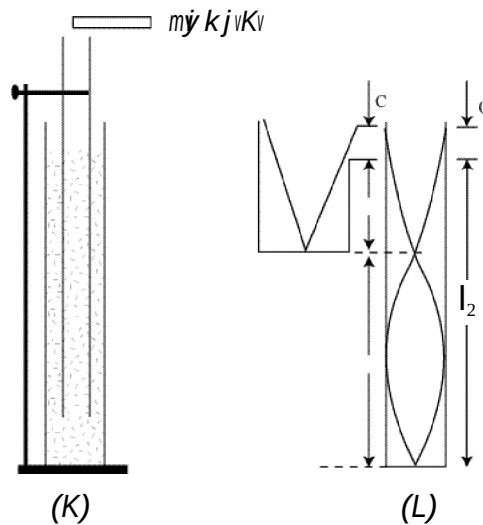
mZKZv

- 1) cwb#Z tđjvi Av#M ei#di UKiv, #jv tPvl KvM#Ri mrvn#h" fvjfv#e i@ K#i wbt#Z n#e Ges tPvl KvM#Ri mrvn#h" tđj#Z n#e| Zv bvn#j nvZ t_#K Zvc tkvIY K#i eid M#j th#Z cv#i |
- 2) ei#di UKiv, #jv bvovbx i ZviRv#ji mrvn#h" cwbi g#a" W#tq ti#L bvo#Z n#e| Zv bvn#j eid tf#m DV#j evqgŮj t_#K Zvc tkvIY K#i M#j th#Z cv#i Ges Av:m8Zv#ci mVVK gvbc vlqv hv#e bv |
- 3) cwigvb g#Zv eid cwb#Z tđj#Z n#e hv#Z wgk#Yi wb#Zg ZvcgvÎv 5°C Gi wb#P bv bv#g| KviY ZvcgvÎv twk bvg#j K'vjwiingUv#ii Mv#q wkiki R#g hv ch#e¶#Y Î#U NUvq |
- 4) K'vjwiingUv#i cwbi cv_wgK ZvcgvÎv#K K¶ ZvcgvÎv A#c¶v 5°C ev 6°C evov#bv DwPZ | Avevi cix¶vq e'eüZ ei#di cwigvY Ggbfv#e wbt#Z n#e hv#Z K'vjwiingUv#ii Pøš ZvcgvÎv K¶ ZvcgvÎv A#c¶v 5°C ev 6°C Kg nq | d#j cix¶vUi c_g ch#q K'vjwiingUvi n#Z th Zvc nvm nq, w0Zxq chv#q cwicvk t_#K K'vjwiingUvi KZK.MpxZ Zv#ci mrvn#h" Zv ci#Y nq | G#K ivg#dv#Wi ¶wZc#Y e'e_v ejv nq | G e'e_v tbqvi KviY n#jv G cix¶vq wgk#Yi Pøš ZvcgvÎv K¶ ZvcgvÎv A#c¶v Kg e#j K'vjwiingUvi cwicvk t_#K Zvc MnY Ki#Z cv#i |

cix¶Y-11

hšš i eYbv

Abbv` evqȳa bšji eYbv t myg Afššixb e`všmi `šš bj tbqv nq| GKU bšji GKgy ex Ges mgZj nq thb bjU Lvovfvte `wvšZ cvš i| ØZxq bšji `šš gy tLvjv Ges Gi ein: e`vm c_g bšji Avš:e`všmi tPšq tQvU hvšZ ØZxq bjU c\_g bšji t fZi mnšRB tXvKvšbv hvq| GKgy tLvjv bšj cvq Zb PZzsk cvb Øviv cš Kiv nq| ØZxq bjU c\_g bšji t fZi XšKšq K`všú i mrvnšh` Djšfvte AvUKvšbv nq| ØZxq bj Dci ššP Dvšq bvšq evqȳš i `N` cšieZb Kiv hvq| ØZxq bšji ššP cvb vKvq GvU GKgy ex bj mšmte KvR Kš i Ges cvbšZ ex Zšj šš:ú` e`y Ae`vb Kš i| `šš gy tLvjv bj cvbšfšZ Avš iKvU GKgy eÜ bšji t fZi iLv i mšeav nj GB th, evqȳš i `N` cšqvRbgZ cšieZY Kiv hvq| cKZcš¶ `šš gy tLvjv bjB Abbv` bj|



¶PÎ 11.1

cix¶vi bvg t Abbv` evqȳa cšZšZ kšš i teM ššYq|

DšİK` t G cix¶Y t kš i Avcšb cix¶vMvš i K¶ Zvcgvš evqȳva`šg ššKfvte kšš i teM ššYq KišZ nq ššKLšZ cvš ieb|

Zš t

GK gy ex bšj evqȳš i `N` Abbvqx Gi GKU všvšK Kšúvš všK| bšji tLvjv gy GKU myš kvvKv aišj evqȳš Kšúv mš nq| hš` myš kvvKv Kšúvš evqȳš i všvšK Kšúvš i mgv nq Zš evqȳš Abbv` mš nq Ges tRvš i kš tkvbv hvq| G Ae`vq Abbv` x evqȳš i `N` i Ges myš kvvKv Kšúvš n nšj evqȳš i mšvš `N` i evqȳš c_g Abbv` nš hLb $l_1 = \frac{\lambda}{4}$ nš i kšš i teM $v = n\lambda = 4nl_1 \text{---(i)}$

†WUv msMn I QK

$cix\uparrow vMv\ddagger ii\ Zvcgv\hat{I}v = \theta^\circ$

$k\ddagger\tilde{a}i\ teM\ \mathbb{b}Y\ddagger qi\ QK$

$ch\ddagger e\uparrow Y$ $msL\ddot{v}$	$m\acute{y}kjvKvi$ $K\alpha\acute{u}v\frac{1}{4}$ n	$bj\ IV\ddagger bvi\ mgq$ $c_g\ Ab\ddot{v}\grave{x}$ $evq\bar{y}\ddagger\alpha i\ \hat{\text{``}}N\text{''}\ I_{1m}$	$bj\ IV\ddagger bvi\ mgq$ $\mathbb{O}Zxq\ Ab\ddot{v}\grave{x}$ $evq\bar{y}\ddagger\alpha i\ \hat{\text{``}}N\text{''}\ I_{2m}$	$k\ddagger\tilde{a}i\ teM\ v =$ $2n(I_2 - I_1)m/s$	$Mo\ teM$ $v\ m/s$
1					
2					
3					

$dj\grave{v}dj\ t\ K\uparrow\ Zvcgv\hat{I}vq\ k\ddagger\tilde{a}i\ teM = m/s$

$mZKZ\grave{v}\ t\ Ab\ddot{v}\grave{x}\ bj\ memgq\ উল্লম্বভা\ddagger e\ i\grave{v}L\ddagger Z\ n\ddagger e\ |$

DİkÑ

G cix¶v tk†I AvcbÑ

I Uvbn Zv†ii Káub mĥ n ∞ $\frac{1}{1}$ cgY Ki†Z cvi†eb;

I mÿ kjvKvi ARvbn Káuv¼ bYq Ki†Z cvi†eb|

ZĚ t

(K) †Kvb Uvbn Zv†i g, yAvNvZ Ki†j Avo Zi½ Drcb nq Ges kã †Kvbn hvq| Uvbn Zv†ii Uvb T, ^N" I, Zv†ii GKK ^N"i fi m Ges KávsK n n†j,

$$N = \frac{1}{2l} \sqrt{\frac{T}{M}} \quad | \quad Uvb \quad T \quad Ges \quad Zv†ii \quad GKK \quad ^N"i \quad fi \quad m \quad \bar{i} \quad _vK†j \quad †jLv \quad hvq,$$

$$n \propto \frac{1}{l} \quad e^v, \quad n = \frac{k}{l}$$

mÿ kjvKvi KávsK n †K x A†¶ Ges $\frac{1}{1}$ †K y A†¶ $\bar{v}cb$ K†i †jL AsKb Ki†j gje`Mgx mij†iLv n†e|

(L) G †jL¶P†îi x-A†¶ ARvbn Kávs†Ki mÿ kjvKvi †¶†Ĥ Abbn` ^N"i $\frac{1}{1}$ Gi সংশ্লিষ্ট y Gi gvb †_†K ARvbn KávsK bYq Kiv hvq|

hšcwZ t

m†bwi¶Uvi, Rvbn Kávs†Ki 5U mÿ kjvKv Ges GKU ARvbn Kávs†Ki mÿ kjvKv, ivevi c`w|

KvhcYjx t

1| m†bwi¶Uv†ii পাল্লার Dchÿ fi $\bar{v}cb$ K†i Zvi Uvb Ki"b|

2| Rvbn Kávs†Ki GKU mÿ kjvKv ivev†ii c`vW AvNvZ K†i mÿ kjvKv evû Dci ¶†K ¶†q উল্লেখ্য m†bwi¶Uv†ii Kv†Vi ev†.  $\bar{u}k$  Kii†q ai"b| d†j kjvKvi Káub Zv†i mÂvjjZ n†q Avo Káub m¶ó K†i| G Ae $\bar{v}q$  mÂiYKxj tmZzW†b euq mii†q evg cv†Ši  $\bar{i}$  tmZzt\_†K mÂiYKxj tmZz`†Z I Ggb Ki"b thb, m†bwi¶Uv†ii Zv†i Abbn` m¶ó nq| Abbn` m¶ó n†q†Q ¶Kbv ešvi Rb" GK UKiv †QvU KvMR I ^N"i Ici ivLg Ges Abbn` n†j Zv†i †Rv†i Káú†bi d†j KvM†Ri UKiv c†o hvq| G Ae $\bar{v}q$ ^N" I gvcb|

3| Gfv†e meKvU Rvbn Kávs†Ki mÿ kjvKvi †¶†Ĥ c¶ZvUi Rb" Zv†ii Abbn` ^N" I bYq Ki"b|

4| x- A†¶ n AsKb K†i Ges c¶Zi½K (corresponding) $\frac{1}{1}$ †K y-A†¶ AsKb K†i †iLv Uvbn| †iLvU mij†iLv nIqv D¶PZ|

Gfv†e Uvbn Zv†i Avo Káú†bi mĥ n ∞ $\frac{1}{1}$ cgY Kiv hvq| ARvbn Kávs†Ki mÿ kjvKv b†q c¶µqv

(2), (3) Gi c¶iveĚ K†i ARvbn Kávs†Ki mÿ kjvKvi Abbn` ^N" I bYq Ki"b|

†jLıPÎ y-A†¶ 1 Gi Ae⁻v#b x-A†¶i mgvŠivj tiLv Uvby| mgvŠivj tiLv mij†iLvi th ıe>`jZ
†Q` K†i Zv ıı`†q x-A†¶i Dci jı Uvby Ges cıZıı½K (corresponding) KıúvSK n tei Ki“b|

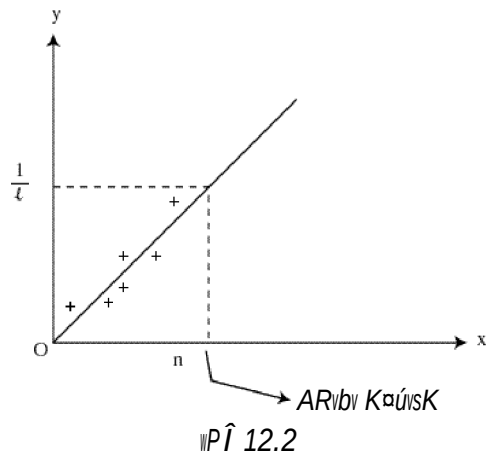
†WUv msMn I QK

ch†e¶Y msL“v	mý kjvKvi KıúvSK	m†bııgUv†i Abıv`x Zv†ii ^N“ I m				1 ı m ⁻¹
		1	2	3	Mo	
1						
2						
3						
4						
5						
6						

djıdj t

(K) T I m ıı`i _vK†j n ∝ 1

(L) †jL n†Z n = Hz.



mZKZı t

- 1| mýkjvKv†K ivevi c“v†W AvNıZ K†i Avj†Zvfı†e Kv†Vi ev† · i Ici ai“b|
- 2| mýkjvKvi evû KıúvKv†j †Kvb ıe>`jZ thb ıúk bv K†i j ¶ı“ ivLı|
- 3| fi পাল্লার Ici Ggbfı†e ivLı thb পাল্লার †`vjb bv nq|
- 4| Lı cvZjv KvM†Ri †QvU UKıv ivBWı (rider) ıı†m†e e“envi Ki“b|

evsjv`k Dbly<sup>3</sup> wekle`vj q

I⁺cb⁻q̇

GBPGm^m tcvMvg

c`v_ weÁvb (ZĖxq) 1g cĥ (bgby ck)

mgq t 3 N>Uv

cYg_vb-100

- 1| (K) msÁv $\parallel jLb?$ Ae⁻vb $\dagger f \pm i$, msi $\Uparrow Ykxj$ I Amsi $\Uparrow Ykxj$ ej, gy³ $\dagger eM$ | 3
 (L) $\dagger f \pm i$ thv $\dagger$ Mi mvgš $\parallel iK$ we $\parallel a$ U eYbv I j $\times \dagger f \pm i$ $\parallel bY \dagger qi$ Mv $\parallel Y$ ZK m $\hat{f}$ U c $\parallel Z$ ôZ Ki"b | 1+5=6
 (M) cgvY Ki"b th, s = ut + $\frac{1}{2}$ at² GLv $\dagger$ b ms $\dagger$ KZ₃ $\dagger jv$ cP $\parallel jZ$ A₋ enb K $\dagger i$ | 3
 (N) GK $\parallel U$ cv₋ i $\dagger$ K 9.8 ms⁻¹ tmvRv Dc $\dagger i i$ $\parallel$ $\dagger K$ Q_{jo} $\dagger$ Iqv nj, cv₋ i $\parallel U$ KZ D"PZvq DV $\dagger e?$ 3
 A₋ev,
 (K) cv $\dagger$ mi M $\parallel Zc$ $\dagger$ i mgx $iKiY$ $\parallel bYq$ Ki"b | 3
 (L) fi $\dagger f$ Mi msi $\Uparrow Y$ m $\hat{f}$ U weeZ Ki"b | $\parallel bDU \dagger bi$ $\parallel \emptyset Zxq$ M $\parallel Zm$ $\hat{f}$ n $\dagger Z$ $\dagger$ Lvb th, $\vec{F} = m \vec{a}$,
 GLv $\dagger$ b ms $\dagger$ KZ₃ $\dagger jv$ cP $\parallel jZ$ A₋ enb K $\dagger i$ | 1+5 = 6
 (M) mij Q $\parallel$ $\dagger$ Z⁻ ú $\dagger$ $\dagger bi$ e⁻ eKjbxq mgxKiY c $\parallel Zôv$ Ki"b | 3
 (N) GKRb mvB $\dagger$ Kj PvjK N>Uvq 15 gvBj $\dagger$ $\parallel Z \dagger Z$ PjvKvjxb 44 d $\dagger$ e⁻vmv $\dagger$ ai GK $\parallel U$ tgv $\dagger$ o e $\parallel K$
 tbq | $\dagger$ $\dagger$ $\dagger$ i mv $\dagger$ Zvi AvbZ $\dagger$ KvY $\dagger$ ei Ki"b | 3
- 2| (K) GK $\parallel U$ Av $\dagger$ k M⁻v $\dagger$ mi $\dagger$ $\Uparrow \dagger \hat{f}$ $\dagger$ Lvb th, PV = nRT. 3
 (L) GK $\parallel U$ Zvc Z $\parallel or$ $\dagger$ $\dagger$ gv $\parallel gUv$ $\dagger i i$ Kv $\dagger$ h cYvjx eYbv Ki"b | 4
 (M) Av $\dagger$ k M⁻v $\dagger$ mi $\dagger$ $\Uparrow \dagger \hat{f}$ cgvY Ki"b C_p -C_v = R₁. GLv $\dagger$ b cZ $\dagger$ K₃ $\parallel j$ cP $\parallel jZ$ A₋ enb K $\dagger i$ 4
 (N) GK $\parallel U$ $\hat{f}$ $\parallel Uhy$ $\dagger$ $\dagger$ gv $\parallel Ugv$ i mvav $\dagger$ iY evq $\dagger$ c Mjš ei $\dagger$ d 1°Ges ev $\dagger$ $\dagger$ ú 96° cv $\dagger$ $\dagger$ q |
 $\dagger$ $\dagger$ gv $\parallel gUv$ i $\parallel U$ 48.5° cvV $\parallel$ $\dagger$ j cKZ Zvcgv $\hat{f}$ v KZ n $\dagger$ e? 3
 A₋ev,
 (K) $\parallel \dagger \dagger d \dagger bi$ m $\hat{f}$ $\dagger$ $\dagger$ K $\parallel bDU \dagger bi$ k $\dagger$ ZjxKiY m $\hat{f}$ U c $\parallel Zc$ $\dagger$ b Ki"b | 4
 (L) 268 K Zvcgv $\hat{f}$ vi 0.1Kg ei $\dagger$ d $\dagger$ K 373 K Zvcgv $\hat{f}$ vi ev $\dagger$ $\dagger$ ú c $\parallel iYZ$ Ki $\dagger$ Z c $\dagger$ q $\parallel Rbxq$ Zvc $\parallel bYq$
 Ki"b | (ei $\dagger$ d $\dagger$ i Avt Zvc = 2100 JKg-1K⁻¹, c $\parallel b$ i Avt Zvc = 4200 JKg-1K⁻¹, ei $\dagger$ d $\dagger$ Mj $\dagger$ bi
 m $\dagger$ Zvc = 3.36 $\times 10^5$ Jkg-1 Ges c $\parallel b$ i ev $\dagger$ $\dagger$ ú $\dagger$ e $\dagger$ bi m $\dagger$ Zvc = 2.26 10⁶ Jkg⁻¹) 4
 (M) Kv $\dagger$ bi P μ eYbv Ki"b 4
 (N) GK $\parallel U$ Kv $\dagger$ bv B $\parallel \hat{A}$ $\dagger$ bi $\dagger$ $\Uparrow Zv$ 50% | h $\parallel$ $\dagger$ Zvc M $\dagger$ n $\dagger$ Ki Zvcgv $\hat{f}$ v 227° C nq, Zvc Dr $\dagger$ mi
 Zvcgv $\hat{f}$ v KZ n $\dagger$ e? 3
- 3| (K) mij Q $\parallel$ $\dagger$ Z M $\parallel Z$ Kv $\dagger$ K e $\dagger$ j? GK $\parallel U$ AMMvgx Zi $\dagger$ $\frac{1}{2}$ i mgxKiY $\parallel j \dagger L$ Zi $\dagger$ $\frac{1}{2}$ i Zi $\frac{1}{2}$ $\wedge$ N", Zi $\frac{1}{2}$
 $\dagger$ eM, K α úv $\frac{1}{4}$ I chvqKvj $\parallel bYq$ Ki"b | 4
 (L) GK $\parallel U$ AMMvgx Zi $\dagger$ $\frac{1}{2}$ i mgxKiY y = 0.1 sin π (340t-x). G Zi $\dagger$ $\frac{1}{2}$ i Zi $\frac{1}{2}$ $\wedge$ N", Zi $\frac{1}{2}$ $\dagger$ eM,
 K α úv $\frac{1}{4}$ I chvqKvj $\parallel bYq$ Ki"b | 4

- (M) M'vnxq gvaʔg kʔãi tẽM mǎÜxq w̥bDUʔbi mʔH̥U Dccv`b Kiʔb| 4
- (N) ʔb̥ m̥y̥ kjvKv#K Nlv nʔj Avev i l c||Z t̥mʔKʔŨ 4||U -iKaú t̥kvb hvq| w̥Zxq m̥y̥ kjvKvi
KaúvsK KZ? 3

 $A_{ev},$

- (K) Zi½i e⁻ZPvi nIqvi kZ K? kãi e⁻ZPvi t⁻KvZ KB½i cix¶vi eYbv w⁻b | 1+3=4
- (L) GKU Zi½i fi 3 gm Ges ~N⁻ 60 gm | ZviU½K KZ e½j Uvbn n½j Gi Avo Káú½b Drcb 1g Dcm½ji KáúvSK n½e 200Hz. 4
- (M) t⁻Lv b th, Uvbn Zv½i Avo Zi½i teM, v = √(T/m), GLv½b T ZviU i Uvbn Ges ej Gi GKU ~N⁻i fi | 4
- (N) 1080 Káú¼¼ wekó GKU kjiKvi mnvn⁻h⁻ evqy⁻ cix¶vq t⁻Lv tMj c_g I ØZxq Abbn⁻ nq h_vµtg 7.65 tmg. I 22.95 tmg. % tN⁻ | evq½Z kãi teM wYq Ki⁻b | 3
- 4 | mgy⁻Z½Z e⁻Kvi c½ NYbiZ tKvb e⁻i Dci µqkxj tK⁻g½ e½ji i wkgvjv c½Zcv⁻b Ki⁻b | 3
- A_ev, k³ i wBZ⁻Zvi m½U wjLp | wús cmvi½Y máúv⁻Z Kv½Ri i wkgvjv wYq Ki⁻b | 1+4=5
- 5 | we⁻yf½i Rb⁻ gnvKIxq wefe wYq Ki⁻b | 5
- A_ev, Aí we⁻v½i t⁻v½Ki M½Z n½e mij Q⁻Z M½Z cgvY Ki⁻b 5
- 6 | f wYqv½i c×½Z½ Bqs Gi , YvSK wY½qi c×½Z eYbv Ki⁻b | 5
- A_ev, Kkk bj c×½Z½ Zij c⁻v½i c½Uvbn wY½qi c×½Z eYbv Ki⁻b | 5
- 7 | µwš Zvcgv½ Kv½K e½j? vfwēK Zvcgv½ I P½c KQyi⁻ evq-m½gvÁ cµqvq msµgZ K½i Gi AvqZb A½aK Kiv n½jv | Pøš P½c wYq Ki⁻b | 1+4=5
- 8 | fx½bi miY m½ eYbv Ki⁻b | fx½bi m½ t½K wKfv½e MxY n½DR c½Zwµqv e⁻vL⁻v Kiv hvq | 1+4=5
- A_ev, GbU½c K? cZ⁻veZx I AcZ⁻veZx cµqv e⁻vL⁻v Ki⁻b | 1+4=5
- 9 | MvYwZK w½a⁻½Yi mnvn⁻h⁻ w⁻i Zi½½ wKfv½e w½úb we⁻yDrcb nq e⁻vL⁻v Ki⁻b | 5
- A_ev, Ab⁻bv⁻ evqy⁻ c×½Z½ kãi teM wY½qi cix¶vU eYbv Ki⁻b | 5

GBPGm m cix¶v-2006

c`v_ eÁvb (ZËxq)

c_g cÎ

†Kvm †KvW : HSC-1831

mgq : 3 N»Uv

cYgvb - 75

[`eóe" t Wvb cv†k D†k†k msL"v c†ki cYgvb ÁvcK|]

b»i

- 1| K) msÁv ¶jLb :- 4
- i) Ae⁻vb †f±i;
- ii) AvqZ GKK †f±i |
- L) ¶b¶`ó Z†j M»Zkxj GK»U e<sup>-</sup>z M»Zi mgxKiY  $\vec{v} = \vec{v}_0 + \vec{a} t$  c»Zcv`b Ki"b| 5
- M) mij Q»`Z M»Z ej†Z »K eßvq? mij Q»`Z M»Zi e"eKjbxq mgxKiY c»Zcv`b Ki"b| 1+5=6
- A_ev,
- K) ¶bDU†bi ¶Zxq M»Z m†U ¶jLb Ges †`Lv b th, F=ma, thLv†b cZxK, ¶j cP»jZ A_ enb K†i | 1+3=4
- L) U†Ki msÁv ¶jLb| †`Lv b th, τ=Iα, thLv†b cZxK, ¶j cP»jZ A_ enb K†i | 1+4=5
- M) gnvKlxq ¶efe Kx? gnvKlxq ¶efe k»³ i i¶kqvjv ¶bYq Ki"b| 1+5=6
- 2| K) Av`k M"v†mi †¶†Î †`Lv b th, p= $\frac{1}{3}$ pc², thLv†b cZxK, ¶j cP»jZ A_ enb K†i | 6
- L) gvb¶i kix†ii ⁻v¶veK ZvcgvÎv 98⁰ F. tm»U†MW †¶j I †Kj¶fb †¶j Gi gvb KZ? 5
- M) ZvcM»Zie`vi c_g m†U ¶eeZ I e"vL"v Ki"b| 4
- A_ev,
- K) GK†gvj Av`k M"v†mi Rb" †`Lv b th, Cp-Cv=R. 6
- L) 0⁰ †m. ZvcgvÎvi 10 Mvg eid†K 100⁰ †m. ZvcgvÎvi c¶b†Z c¶iYZ Ki†Z KZUxZv†ci c†q/Rb (eid Mj†bi mßZvc 80 K"vj¶i/Mvg)| 5
- M) cZ"veZx I AcZ"veZx c¶µqv i g†a" cv_K" D†k†k Ki"b| 4
- 3| K) Av»Zi½ I Ab¶N" Zi†½i g†a" cv_K" D†k†k Ki"b| 4
- L) GK»U AMMvgx Zi†½i mgxKiY y=0.2 sin π (500t-x). miY ¶gUv†i Ges mgq tm†K†Û cK»kZ n†q†Q| GB Zi†½i ¶e"vi, Zi½N" I †eM ¶bYq Ki"b|
- M) Ab¶v` evqy» c×»Z†Z »Kfv†e k†ãi †eM ¶bYq Kiv hvq, eYbv Ki"b| 5
- A_ev,
- K) msÁv ¶jLb -
- i) Zi½g¶;
- ii) `kv| 4

bai

L) M'vnxq gva"tg kãi teM m'úKZ bDU#bi m' cZcv`b Ki"b| 6

M) GKU kã Drm n#Z 300 Hz K'ús#Ki kã btmZ n#"Q| evZv#m kãi teM 300
 ugUvi/tm#KÛ| DrmU h" 300 ug/tm te#M "i Ae"vq `Ûvqgvb tkvZv n#Z `#i m#i hvq,
 Z#e tkvZv KZ K'ús#Ki kã ib#Z cv#e? 5

4| mvgš#iK m#i m'nv#h" `yU tft#i i jãi gvb bYq Ki"b| 5

A_ev,

GKU ej#K Abyvg#Ki m#_ 30⁰ tKv#Y 20 ug/tm te#M tQov nj| ejU m#ev"P KZ D"PZvq
 DV#e?

5| e#Kvi c#_ Nvqgvb e"z tK`gk Zi#Yi i#kgvjv cZcv`b Ki"b| 5

A_ev,

t`Lvb th, Aí we"v#i t`vjvqgvb mij t`vj#Ki MZ GKU mij Q#`Z MZ|

6| c#Uvb I c#k"i g#a" m'úK"vcb Ki"b|

A_ev,

m#` Zi#ji g#a" "tg coš e"z c#ŠK te#Mi t÷vKm-Gi mgxKiY tei Ki"b|

7| cgvY Ki"b th, Av`k M'v#mi i"×Zvcxq cieZ#bi t#i PV^γ = a#K| 5

A_ev,

Kv#Yv-P#μi Rb" t`Lvb th, `#Zv e=1- $\frac{T_2}{T_1}$.

8| M'v#mi MZZ#Ei tgs#jK"Kvh, #jv D#Kv Ki"b| 5

A_ev,

msÁv #jL#:-

i) cig Av`Zv;

ii) Mo g#c_ |

9| AMMvgx Zi#½i ^e#kó", #jv #jL#| 5

A_ev,

ciek K'úb e"vL"v Ki"b|

--

evsjv`k Dbj eke`vjq
 I+cb -z
 GBPGm m +cvMvg
 c`v\_ eÁvb (ZËxq I e`enwik) 1g c+îi gvbe>Ub
 +gvU b+i = 100 (ZËxq 75 + e`enwik 25)

1| iPbvgtK ck

3U c+ki DËi +Z n+e

$3 \times 15 = 45$

msi B DËi ck

6U c+ki DËi +Z n+e

$3 \times 15 = 45$

e`enwik = 25

ck cÎ cYq+bi bXZgvjv

mKj c+ki DËi + Iqv eva`ZvgÿK

ZËxq iPbvgtK As+k cZU c+k GKwaK Ask _vK+Z cv+i

mKj c+ki eKí ck _vK+e

cZU efvM thgb ejv, Zvc I kã +_K Kgc+ 1U ck _vK+e|

e`enwik cix 15

e`enwik LvZv 5

+gšLK cix 5